The Health Status of Soon-To-Be-Released Inmates

A Report to Congress
Volume 2

National Commission on
Correctional Health Care

NCCHC

The Health Status of Soon-To-Be-Released Inmates

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Preface

Through the mid-1990s, a number of studies, limited in scope, found a higher prevalence of certain infectious diseases, chronic diseases, and mental illness among prison and jail inmates. Further, each year the Nation's prisons and jails release more than 11.5 million inmates. The potential that ex-offenders may be contributing to the spread of infectious disease in the community became of increasing concern. In addition, as these ex-offenders' diseases get worse, society may have to pay substantially more to treat them than if these conditions had been treated at an earlier stage—or prevented altogether—while these individuals were still incarcerated.

In 1997 Congress instructed the U.S. Department of Justice to determine whether these concerns were well founded and, if so, to recommend solutions. The National Institute of Justice (NIJ), the research arm of the Department of Justice, entered into a cooperative agreement with the National Commission on Correctional Health Care (NCCHC) to study the problem. *The Health Status of Soon-To-Be-Released Inmates* report is the result of that research.

The NCCHC commissioned a series of papers (summarized in volume 1 of this report and provided in full in volume 2) that documents indisputably that tens of thousands of inmates are being released into the community every year with undiagnosed or untreated communicable disease, chronic disease, and mental illness. Another set of commissioned papers clearly shows that it not only would be cost effective to treat several of these diseases, but in several instances, it would even save money in the long run.

The report concludes with policy recommendations designed to improve disease prevention, screening, and treatment programs in prisons and jails. The recommendations have been carefully crafted. First, they are based on a consensus among a number of the Nation's leading experts in correctional health care and public health. Second, they propose interventions for which there is strong, and in many cases overwhelming, scientific evidence of therapeutic effectiveness. Third, they reflect a realistic consideration of what correctional systems can reasonably be expected to accomplish.

There are serious political, logistical, and financial barriers to improving health services in prisons and jails. As documented in this report, however, a number of jurisdictions have found ways to overcome some of these barriers, often through collaborations with public health departments and national or community-based organizations.

Prisons and jails offer a unique opportunity to establish better disease control in the community by providing improved health care and disease prevention to inmates before they are released. Implementing the recommendations in this carefully researched report will go a long way toward taking advantage of this opportunity and contribute significantly to improving the health of both inmates and the larger community.

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President
National Commission on Correctional Health Care

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Executive Summary

In the Omnibus Consolidated Appropriations Act of 1997, Congress instructed the U.S. Department of Justice to set aside funding for a study of *The Health Status of Soon-To-Be-Released Inmates*. As a result of these earmarked funds, the National Institute of Justice (NIJ), the research and evaluation arm of the U.S. Department of Justice, entered into a cooperative agreement with the National Commission on Correctional Health Care (NCCHC) to conduct the study. This report is the culmination of the project's work. The project has shown unmistakably that a unique opportunity exists to reduce the health risks and financial costs to the community that are associated with releasing large numbers of inmates with undiagnosed and untreated diseases.

Volume 1 of *The Health Status of Soon-To-Be-Released Inmates* has seven chapters. This summary outlines the information presented in considerably more detail in volume 1. It is important to read the entire volume to gain a full understanding of the problems and opportunities associated with the health status of inmates. Volume 2 of the report includes the papers commissioned for the project. They form the basis for the project's findings and policy recommendations.

Introduction

The inmate population in the United States has been growing rapidly since the early 1970s: As of 1999, an estimated 2 million persons were incarcerated in the Nation's jails and prisons, compared with 325,400 in 1970—an increase of about 500 percent.[1] Approximately 11.5 million inmates were released into the community in 1998, most from city and county jails.[2] As explained below, these inmates have high rates of communicable disease, chronic disease, and mental illness. Coupled with the expanding inmate population, these high rates of disease create a critical need for preventing, screening, and treating illness before inmates are released into the community.[3] Why?

- Some of the serious diseases affecting inmates, including sexually transmitted diseases (STDs), human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS), hepatitis B and C, and tuberculosis (TB), can be transmitted to other inmates.

- The Nation's one-half million correctional employees[4]—and thousands of daily visitors to prisons and jails—may be at risk of becoming infected from inmates with communicable diseases if appropriate precautions are not implemented.

- Inmates with communicable diseases who are released without having been effectively treated may transmit these conditions in the community, threatening public health.

- Inmates who are released with untreated conditions may become a serious financial burden on community health care systems.

Because they have a large and concentrated population of individuals at high risk for disease, prisons and jails offer a unique opportunity for improving disease control in the community by providing comprehensive health care and disease prevention programs to inmates.[5] Prisons and jails make it possible to reach a population that is largely underserved and difficult to identify and treat in the general community. Because inmates are literally a "captive" audience, it is vastly more efficient and effective to screen and treat them while they are incarcerated than it is to conduct extensive outreach in local communities designed to encourage at-risk individuals to go to a clinic for testing and treatment.

History of the Project

The Health Status of Soon-To-Be-Released Inmates project involved several components. A steering committee coordinated the work and

provided expert guidance to the project. Three expert panels, one each on communicable disease, chronic disease, and mental illness, provided expert guidance to the steering committee. Panel members included many of the Nation's most respected researchers, practitioners, and scholars in the fields of public and correctional health care (see appendixes A and B). Centers for Disease Control and Prevention (CDC) staff were especially helpful in guiding the scholarly work of the expert panels.

After identifying the specific communicable diseases, chronic diseases, and mental illnesses the project would examine, each expert panel estimated the extent of illness among inmates for the more common but remediable health problems; determined the cost-effectiveness of preventing or treating these health problems; and developed public policy recommendations for capitalizing on these opportunities.

The steering committee conducted a mail survey of State prison systems to collect information on policies and procedures for discharge planning and for providing medications to inmates with chronic disease and mental illness when they were released. The survey also asked about the availability of databases on the prevalence of chronic disease and mental illness.[6]

The steering committee commissioned eight papers and two sets of presentation materials from nationally known experts in the correctional and public health care fields. The authors estimated the prevalence of the selected diseases in prisons and jails and calculated whether it would save money or be cost effective to prevent, screen for, or treat these diseases. The papers present the principal empirical support for the project's policy recommendations.

Prevalence of Communicable Disease, Chronic Disease, and Mental Illness Among the Inmate Population

Different procedures were used to estimate the prevalence of disease and mental illness among the inmate population, but the estimates rely on well-established national databases.

Communicable disease[7]—prevalence

The approximate number of inmates with selected communicable diseases in 1997 was calculated by applying national prevalence estimates for each condition to the total number of inmates in U.S. prisons and jails on June 30, 1997. The approximate number of releasees with these conditions was obtained by applying the same prevalence percentages to the total unduplicated number of persons released from prisons and jails during 1996 (the most recent data available at the time the estimates were done). Because the estimates for releasees are based on total numbers of persons released during a full year, an especially high figure for jails, they are much higher than the estimates for inmates, which are based on the correctional population on a given day. Statistics on total number of individuals incarcerated during a full year are not available.

The estimated prevalence of selected communicable diseases in prisons and jails is as follows:

- An estimated 34,800 to 46,000 inmates in 1997 were infected with HIV. An estimated 98,500 to 145,500 HIV-positive inmates were released from prisons and jails in 1996.

- Included among the HIV-positive inmates in 1997 were an estimated 8,900 inmates with AIDS. An estimated 38,500 inmates with AIDS were released from prisons and jails in 1996.

- There were an estimated 107,000 to 137,000 cases of STDs among inmates in 1997 and at least 465,000 STD cases among releasees: 36,000 inmates in 1997 and 155,000 releasees in 1996 had current or chronic hepatitis B infection; between 303,000 and 332,000 prison and jail inmates were infected with hepatitis C in 1997; and between 1.3 and 1.4 million inmates released from prison or jail in 1996 were infected with hepatitis C.[8]

- About 12,000 people who had active TB disease during 1996 served time in a correctional facility during that year.[9] More than 130,000 inmates tested positive for latent

TB infection in 1997. An estimated 566,000 inmates with latent TB infection were released in 1996.

Thus, a highly disproportionate number of inmates suffer from infectious disease compared with the rest of the Nation's population. During 1996, about 3 percent of the U.S. population spent time in a prison or jail; however, between 12 and 35 percent of the total number of people with selected communicable diseases in the Nation passed through a correctional facility during that same year.

- Seventeen percent of the estimated 229,000 persons living with AIDS in the United States in 1996 passed through a correctional facility that year.[10] The prevalence of AIDS among inmates is five times higher than among the general U.S. population.[11]

- The estimated 98,000 to more than 145,000 prison and jail releasees with HIV infection in 1997 represented 13 to 19 percent of all HIV-positive individuals in the United States.

- The estimated 155,000 releasees with current or chronic hepatitis B infection in 1996 indicate that between 12 and 15 percent of all individuals in the United States with chronic or current hepatitis B infection in 1996 spent time in a correctional facility that year.

- The estimated 1.3–1.4 million releasees infected with hepatitis C in 1996 suggest that an extremely high 29–32 percent of the estimated 4.5 million people infected with hepatitis C in the United States[12] served time in a correctional facility that year. The 17.0–18.6 percent prevalence range of hepatitis C among inmates—probably an underestimate—is 9–10 times higher than the estimated hepatitis C prevalence in the Nation's population as a whole.[13]

- Of all people in the Nation with active TB disease in 1996, an estimated 35 percent (12,200) served time in a correctional facility that year. The prevalence of active TB among inmates is between 4 and 17 times greater than among the total U.S. population.

Chronic disease[14]—prevalence

- The prevalence of asthma among Federal, State, and local inmates in 1995 is estimated to be between 8 and 9 percent, for a total of more than 140,000 cases nationwide. Prevalence rates for asthma are higher among inmates than among the total U.S. population.

- The prevalence of diabetes in inmates is estimated to be about 5 percent, for a total of nearly 74,000.

- More than 18 percent of inmates are estimated to have hypertension, for a total of more than 283,000 inmates.

Mental illness[15]—prevalence

The estimated prevalence of mental illness among jail inmates is as follows:

- An estimated 1 percent have schizophrenia or another psychotic disorder.

- About 8–15 percent have major depression.

- Between 1 and 3 percent have bipolar disorder.

- Between nearly 2 and less than 5 percent of jail inmates are estimated to have dysthymia (less severe but longer term depression).

- Between 14 and 20 percent have some type of anxiety disorder.[16]

- Another 4 to less than 9 percent suffer from post-traumatic stress disorder.

The estimated prevalence of mental disorders among State prison inmates is as follows:

- An estimated 2–4 percent have schizophrenia or another psychotic disorder.

- Between 13 and less than 19 percent have major depression.

- Between 2 and less than 5 percent have bipolar disorder.

- Between 8 and less than 14 percent have dysthymia.
- Between 22 and 30 percent have an anxiety disorder.
- Between 6 and 12 percent have post-traumatic stress disorder.

Improving Correctional Health Care: A Unique Opportunity to Protect Public Health

The large concentration of prison and jail inmates with serious disease or mental illness affords a unique opportunity to provide needed treatment and prevention and to help protect public health in general. To what extent are prisons and jails seizing this opportunity? Many correctional agencies are doing too little to address communicable disease, chronic disease, and mental illness.

Communicable disease[17]—current state of corrections prevention, screening, and treatment programs

- Few prison or jail systems have implemented comprehensive HIV-prevention programs[18] in all their facilities.
- On average, less than one-quarter of jail inmates undergo routine laboratory testing for syphilis during incarceration. In some jails, only 2–7 percent of inmates are tested.
- More than 90 percent of State and Federal prisons, and about half of jails, routinely screen at intake for latent TB infection and active TB disease. Particularly in jails, however, many inmates are released before skin tests can be read. Most prisons and jails report that they isolate inmates with suspected or confirmed TB disease in negative pressure rooms. Some facilities, however, do not test the rooms to ensure that the air exchange is working properly, or they continue to use the rooms even when the air exchange is known to be out of order.

Chronic disease—current state of corrections prevention, screening, and treatment programs

Of the 41 State correctional systems that responded to a survey conducted for *The Health Status of Soon-To-Be-Released Inmates* project,[19] only 24 reported they had protocols for diabetes, 25 for hypertension, and 26 for asthma. A content analysis revealed that many of these "guidelines" were incomplete or out of date.

Mental illness—current state of corrections prevention, screening, and treatment programs

Few jails provide a comprehensive range of mental health services.[20] Only 60 percent provide mental health evaluations, 42 percent provide psychiatric medications, 43 percent provide crisis intervention services, and 72 percent provide access to inpatient hospitalization.[21] A majority of State adult prisons provide screening and assessment for mental illness, medication and medication monitoring, counseling or verbal therapy, and access to inpatient care. Only 36 percent of prisons have specialized housing for individuals with stable mental health conditions.[22]

Continuity of care for inmates released with communicable disease, chronic disease, and mental illness is especially inadequate. Only 21 percent of jails provide case management or prerelease planning for mentally ill inmates.[23]

Corrections' Mixed Record of Compliance With National Clinical Guidelines

Many prisons and jails fail to conform to nationally accepted clinical guidelines. For example, consider the following:

- A significant proportion of prisons and jails do not adhere to CDC standards with regard to screening for and treating latent TB infection and active disease. About 10 percent of State and Federal prisons, and about 50 percent of jails, do not have mandatory TB screening for inmates at intake and annually thereafter.[24]

- Most prisons and jails fail to conform to nationally accepted health care guidelines for mental health screening and treatment. Seventeen percent of jails and prisons do not provide recommended intake screening for mental illness, and 40 percent of jails and 17 percent of prisons do not provide recommended mental health evaluations.[25]

By rectifying these gaps in prevention, screening, and treatment services in prisons and jails, communities can take advantage of a tremendous opportunity to improve public health by reducing the problems associated with untreated inmates returning to the community. Furthermore, addressing these health care deficiencies would be cost effective.

Cost-Effectiveness of Prevention, Screening, and Treatment of Disease Among Inmates

A cost-saving intervention saves more money in averted medical costs than is needed to implement it. An intervention is cost effective if the benefits it will achieve are worth the price—even if the intervention costs more than the money saved.

Cost-effectiveness findings

The members of the project steering committee and expert panels found that several interventions would be a cost saving or cost effective.

- Universal screening for syphilis at intake in both prisons and jails would be a cost saving (and, therefore, cost effective) if at least 1 percent of the inmates had the disease. Routine syphilis screening and treatment would save almost $1.6 million for every 10,000 inmates screened.[26]

- Routine screening of men and women in prisons and jails for gonorrhea and chlamydia would be cost effective. Universal screening of women for gonorrhea and chlamydia at intake to prisons and jails would also be a cost saving if at least 8 percent of female inmates had gonorrhea and 9 percent had chlamydia.[27]

- For correctional systems with HIV prevalence rates as low as 1.5 percent, an HIV-prevention program of voluntary counseling and testing for HIV-infected inmates in prison would be a cost saving. Offering counseling to 10,000 prison inmates would prevent three future cases of HIV if 60 percent of those inmates agreed to be counseled and tested. On the three cases alone, $140,000 could be saved. Counseling and testing 10,000 inmates would cost the prison system about $117,000, or approximately $39,000 per case of HIV prevented.[28]

- For correctional systems with HIV prevalence rates of at least 2.3 percent—the overall infection rate in prisons and jails nationwide—universal screening for tuberculosis in prisons would be a cost saving because of the heightened susceptibility to TB of individuals with HIV. The 989 cases of active TB that would be prevented for every 100,000 inmates tested, with treatment of those inmates found to have latent TB infection,[29] would save $7,174,509, or $7,254 per case prevented.[30]

- Universal screening in prisons and jails for hypertension and diabetes would be cost effective.[31]

Scientifically effective interventions

Obviously, only effective medical interventions can be a cost saving or cost effective. Fortunately, correctional agencies can introduce many scientifically tested interventions to target inmate diseases. The following interventions have proven to be effective for communicable diseases:[32]

- **Sexually transmitted diseases:** Peer-led educational sessions addressing safer sexual practices, rapid screening for and treatment of syphilis, and screening and treatment for gonorrhea and chlamydia.

- **HIV/AIDS:** Encouraging all inmates with risk factors to agree to be tested, providing educational programming to help inmates avoid acquiring and transmitting HIV/AIDS,

and offering appropriate standard-of-care treatment to all inmates with HIV infection.

- **Tuberculosis:** Training correctional staff to be alert for inmates with TB symptoms, screening all new admissions, testing current inmates and all staff annually, having access to properly operating negative pressure isolation rooms, providing prompt and effective treatment under direct observation, and providing for followup in the community when release precedes completion of treatment.

- **Hepatitis B and C:** Routinely vaccinating all inmates, or susceptible inmates, against hepatitis B and offering educational sessions that present strategies to avoid acquiring and transmitting infection.

Empirically based interventions are known to reduce illness and death associated with several chronic diseases, including asthma, diabetes, and hypertension. Appendix D in volume 1, "Sample Draft Clinical Guidelines," provides examples of these proven interventions.[33]

Barriers to Effective Prevention, Screening, and Treatment—and Overcoming Them

Despite the compelling reasons for improving the prevention, screening, and treatment of disease among inmates, significant barriers may make it difficult for prisons and jails to improve these services. Most barriers fall into one of four categories:

- **Lack of leadership**, such as failure to recognize the need for improved health care services, reluctance to consider that improving public health is a correctional responsibility, and unwillingness of public health agencies to advocate for improving correctional health care or to collaborate to promote improvement.

- **Logistical barriers**, such as short periods of incarceration, security-conscious administration procedures for distributing medications, and difficulty coordinating discharge planning.

- **Limited resources** that require difficult budgeting decisions to meet the high cost of many health care services and some medications, and that make it difficult to provide adequate space for medical services.

- **Correctional policies**, such as failure to specify minimum levels of required care in contracts with private health care vendors, delays caused by the need to escort inmates to medical treatment, poor communication between public health agencies and prisons and jails, and lack of adequate clinical guidelines.

Most of these barriers to improved health care for inmates can be overcome. First, position statements that a number of well-respected, national professional groups have developed describing appropriate health care for inmates can be used as leverage to encourage correctional administrators to find ways of resolving barriers to providing adequate care. A list of NCCHC position statements appears in appendix C. Second, collaboration among correctional agencies, public health departments, and community-based organizations can help overcome the lack of correctional health care funds and staff. Public health departments may be willing to contribute funds, staff, and expertise if they understand that this use of their resources can advance the cause of public health in their communities. Public health departments in some jurisdictions already contribute significantly to testing and screening of inmates, providing prevention and treatment programs in prisons and jails, and following up on inmates after release to ensure a continuum of care. Many community-based organizations are interested in and willing to provide services to inmates.

- The Hampden County Correctional Center, which serves 500,000 residents of Massachusetts' second largest metropolitan area,

has developed a public health model of correctional health care that focuses on disease screening, prevention, treatment, discharge planning, and continuity of care for releasees. The program costs about $6 per inmate day, or 9 percent of the facility's budget. Based on ZIP Code of residence, inmates with HIV/AIDS and other serious medical and mental health conditions are assigned to one of four health teams that work jointly in the correctional center and in four community health centers. Case managers who work in both agencies provide discharge planning services for all inmates with HIV/AIDS and serious mental health problems. A discharge planning nurse at the facility provides similar services for inmates with chronic diseases. Releasees are linked with community-based agencies that address issues of family reintegration, housing, employment training and readiness, and benefit programs.[34]

- The Fairfax County (Virginia) Jail has overcome the pervasive barriers to discharge planning for mentally ill inmates. A private nonprofit organization links detainees with mental health-related services upon release and maintains the detainee's family ties while the person is incarcerated. This affords the inmate a source of additional support after release. The organization's eight staff provide or arrange for the following services:
  - Transportation and housing assistance to mentally ill inmates upon release.
  - Teaching, mentoring, and tutoring in the facilities.
  - Teaching life skills to releasees.
  - Group therapy for inmates and their families.
  - Support groups for families and close friends of inmates.
  - Emergency funds for families to buy food and clothing while providers are in jail.[35]

Policy Recommendations

The expert panels assembled for *The Health Status of Soon-To-Be-Released Inmates* project developed policy recommendations for improving the health care of prison and jail inmates. The project steering committee refined the panels' recommendations. The recommendations are based on expert consensus that there is sufficient—if not always definitive—scientific evidence to justify their implementation. Much of this scientific evidence is presented in this report.

Many prisons and jails have implemented interventions that are not reflected in these recommendations. That this report does not include an intervention that correctional systems are currently implementing does not mean that these systems should discontinue the intervention—or that other systems should not consider introducing it. In fact, professional organizations, including the National Commission on Correctional Health Care, will likely develop new recommendations as clinical studies demonstrate the effectiveness of additional interventions.

The policy recommendations to Congress, listed in full below, are followed by actions that the steering committee proposes that specified Federal, State, and local agencies take in order to support implementation of the recommendations.

Surveillance[36]

The principal use of disease surveillance in correctional facilities is to monitor disease incidence, prevalence, and outcomes in the inmate population. Surveillance includes collecting health data and evaluating the data collection system to assist correctional health officials in characterizing the health status of the inmate population. The information obtained from the surveillance system is used to plan, implement, and evaluate health needs of the inmate population and their anticipated health needs upon release.

I. Congress should promote surveillance of selected communicable diseases, chronic diseases,

and mental illnesses among inmates in all correctional jurisdictions. Appropriate Federal agencies in partnership with national health-related organizations should:

A. Develop surveillance guidelines to promote uniform national reporting of selected conditions to enhance epidemiologic research of these conditions and assist with accurate health care planning. Ensure that data collected in prisons and jails as part of the surveillance program are collected in the same manner as they are collected in the community.[37] Surveillance guidelines should incorporate processes for protecting confidentiality of data.

B. Create a national correctional health care database.

    1. Develop standardized definitions and measures for reporting to assess the prevalence of selected communicable diseases, chronic diseases, and mental illnesses.[38]

    2. Mandate national reporting of these prevalence data.

    3. Design an information system and make it available for use by local, State, and Federal correctional authorities to measure and report the data with the ability to categorize the data by age, race, and gender.

C. Produce statistical reports of local, State, and national rates of selected communicable diseases, chronic diseases, and mental illnesses in prisons and jails to aid planning correctional and public health programs and allocate local resources.[39]

D. Evaluate the utility of surveillance activities and implement improvements as appropriate.

Clinical guidelines

Clinical guidelines provide definitions and abbreviated decision trees for the diagnosis and management of various diseases and conditions. They guide the clinician in areas where scientific evidence of the value of selected interventions exists to improve survival and clinical outcomes and to reduce morbidity and the cost of care. Clinical guidelines are widely used outside corrections.

II. Congress should promote the use of nationally accepted evidence-based clinical guidelines for prisons and jails. This will help assure appropriate use of resources to prevent, diagnose, and treat selected communicable diseases, common chronic diseases, and mental illnesses that are prevalent among inmates. Appropriate Federal agencies in partnership with national health-related organizations should:

A. Ensure that the clinical guidelines are consistent with nationally accepted disease definitions and evidence-based guidelines used for the nonincarcerated population.[40]

B. Disseminate the clinical guidelines to correctional health care professionals, public health agencies, and public policymakers.

C. Update the clinical guidelines as often as needed.

D. Develop standardized performance measures for State and local correctional authorities to determine adherence to nationally accepted clinical guidelines.

E. Train correctional health and public health professionals in the use of these clinical guidelines and performance measures.

F. Develop tools for correctional systems to assess over-prescribing and under-prescribing of psychotropic medications.

Immunizations

Immunizations prevent the development of a variety of communicable diseases in individuals. In the case of diseases such as hepatitis B, poliomyelitis, measles, mumps, or rubella, immunizations prevent the transmission of disease to susceptible individuals in the general population. Such immunizations are nationally accepted and

promoted by the Centers for Disease Control and Prevention. Some immunizations are directly cost saving and others are highly cost effective.

III. Congress should establish and fund a national vaccine program for inmates to protect them and the public from selected vaccine-preventable communicable diseases.

A. The vaccination program should be similar to the National Vaccine Program for Children.

B. The program should conform to the recommendations of the CDC's Advisory Committee on Immunization Practices (ACIP).[41]

National correctional health care literature database

To function competently, correctional health care clinicians require access to the medical literature, especially as it relates to correctional health care issues. Existing resources do not provide this level of specificity.

IV. Congress, through appropriate Federal agencies and health-related national organizations, should develop and maintain a national literature database for correctional health care professionals, including a compendium of policies, standards, guidelines, and peer-reviewed literature.

Ethical decisionmaking

Correctional health care professionals function in a uniquely restrictive environment with limited opportunity for peer review of medical policies and administrative actions. A national forum is needed to discuss issues, such as confidentiality, informed consent, clinical management of hepatitis C[42] and HIV, and the availability of biomedical research.

V. Congress should establish a national advisory panel on ethical decisionmaking among correctional and health authorities to assist those authorities in addressing ethical dilemmas encountered in correctional health care.

Eliminate barriers to inmate health care

In correctional facilities, health care professionals face unique barriers to the delivery of health services. These include constraints on policy, budgets, priorities, and staffing. Correctional institutions are positioned to provide individual care to inmates and protect the public health through aggressive health promotion and disease prevention efforts. At all levels of government, public policymakers should recognize that eliminating barriers to health care for inmates provides long-term public health benefits.

VI. Congress, through appropriate Federal and State agencies and health-related national organizations, should identify and eliminate barriers to the successful implementation of public health policy.

A. Reduce obstructions to effective public health programs within correctional facilities and in the community.

B. Promote continuity of inmate health care by maintaining Medicaid benefits for eligible inmates throughout their incarceration.

C. Promote continuity of ex-offender health care by mandating immediate Medicaid eligibility upon release.

D. Provide incentives to jails and prisons to expand their alcohol and other drug treatment programs. These services should be gender specific and made available to inmates from admission through release, with special attention paid to inmates with both mental illness and substance abuse problems.

Correctional health care research

Too little is known about the epidemiology of disease in correctional populations and too little has been done to evaluate programs designed to improve inmate health.

VII. Congress, through appropriate Federal agencies and health-related national organizations, should support research in

correctional health care to identify and address problems unique to correctional settings.

A. Fund projects to evaluate models that emphasize creative, cost-effective options for continuity of care following release.

B. Fund research programs to define effective health education and risk reduction strategies for inmates. These strategies need to deal with relevant differences between inmate and noninmate populations. The research programs should work through public, private, and community-based health care agencies.

C. Fund research programs to identify correctional system barriers that prevent correctional health care staff from implementing prudent medical care and public health recommendations.

Improve delivery of health care

For a variety of reasons, the scope and content of correctional health care services vary. The quality of care is not as high as it might be, resulting in unnecessary morbidity, premature mortality, and increased costs.

VIII. Congress, through appropriate Federal agencies and medically based accrediting organizations, should promote improvements to the delivery of inmate health care.[43]

A. Require Federal, State, and local correctional systems to adhere to nationally recognized standards for the delivery of health care services in corrections.[44] These standards should include access to care, quality of care, quality of service, and appropriate credentialing of health care professionals.

B. Provide sufficient resources for correctional systems to adhere to national standards.

C. Weigh the correctional system's adherence to national standards for health care delivery whenever determining funding levels for the system.

Disease prevention

Primary prevention is designed to keep disease from occurring. Examples include lifestyle choices and vaccination against selected communicable diseases. Primary prevention is widely believed to be the best and most cost-effective use of health care dollars. In some cases, it is also a cost saving—that is, prevention program saves more money than it costs to implement. Secondary prevention (screening) is the early detection of disease that already exists but may not be apparent to the patient.[45]

IX. Congress, through appropriate Federal agencies and national organizations, should encourage primary and secondary disease prevention efforts.

A. Promote primary disease prevention measures by requiring Federal, State, and local correctional agencies to:

1. Provide all inmates with a smoke-free correctional environment. Offer tobacco cessation programs for all staff and inmates as a method of achieving tobacco-free facilities.

2. Offer heart-healthy choices on institutional menus and in commissaries.

3. Make daily aerobic exercise available to all inmates.

4. Consistent with the recommendations of the ACIP, make hepatitis B vaccines available to all inmates, even when their length of incarceration is short or indeterminate.

5. Screen all females for pregnancy. Test women found to be pregnant for hepatitis, HIV infection, syphilis, gonorrhea, and chlamydia. Provide HIV treatment to HIV-infected mothers to prevent transmission of the disease to the newborn.

6. Although not a correctional system responsibility, administrators should seek

to collaborate with community health care providers to ensure the timely immunization of all infants born to mothers who test positive for hepatitis B.

7. Offer scientifically based risk reduction education on HIV infection and STD to all inmates.

B. Promote secondary disease prevention measures by using nationally accepted evidence-based clinical guidelines as appropriate.

1. Provide hypertension, obesity, asthma, and seizure disorder screening for all prison inmates.

2. Provide diabetes and hyperlipidemia screening for jail and prison inmates at high risk.

3. Provide suicide prevention programs, including timely screening for inmates at high risk for suicide.

4. Prevent the spread of tuberculosis.

a. Consistent with nationally accepted guidelines,[46] routinely screen inmates for TB disease and infection, and provide preventive treatment for inmates with latent TB infection.

b. Promote the use of short-course preventive therapy (delivered over 2 months) in correctional settings.

c. Strengthen links of TB control efforts between correctional facilities and public health departments.

d. On employment and annually thereafter, screen all correctional staff who have inmate contact for latent TB infection.

5. Prevent the spread of HIV infection.

a. Encourage voluntary HIV counseling and testing of inmates.

b. Provide appropriate treatment for HIV-positive, pregnant inmates to prevent HIV transmission to their babies.[47]

6. Screen inmates for syphilis, gonorrhea, and chlamydia routinely upon reception at prisons and jails, and treat inmates who test positive for these infections.[48]

Prerelease planning

Many inmates are released into the community while still being treated for communicable and chronic diseases or mental illness. Ensuring continuity of care upon release can reduce health risks to the public, such as in cases of tuberculosis and sexually transmitted diseases. Continuity of care upon release for inmates with co-occurring mental illness and substance abuse disorders can reduce the risk of illicit drug use in the community. It is cost effective to the community to provide continuity of care on release for inmates with chronic disease.

X. Congress, through appropriate Federal agencies and national organizations, should encourage Federal, State, and local correctional facilities to provide prerelease planning for health care for all soon-to-be-released inmates.

A. Address the medical, housing, and postrelease needs of inmates in prerelease planning and make use of appropriate resources and new technologies.

B. Coordinate discharge planning efforts between appropriate public agencies—such as correctional, parole, mental health, substance abuse, and public health agencies—to prevent disease transmission and to reduce society's costs from untreated and undertreated illness.

Recommended actions by government agencies

The steering committee and expert panels recognized that many Federal agencies have a role in affecting the health status of soon-to-be-released inmates. Within the U.S. Department of Health and Human Services (DHHS), for example, agencies such as the Centers for Disease Control and Prevention (CDC), the Health Resources and Services Administration (HRSA), the Substance

Abuse and Mental Health Services Administration (SAMHSA), the National Institute of Drug Abuse (NIDA), the Office of Women's Health (OWH), the Public Health Service (PHS), the Indian Health Service (IHS), and the Office of Minority Health (OMH) are actively engaged in health services programs that impact on inmates. In addition, within the U.S. Department of Justice (DOJ), agencies such as the National Institute of Justice (NIJ), the Immigration and Naturalization Service (INS), the Bureau of Prisons (BOP) including the National Institute of Corrections (NIC), the Corrections Program Office (CPO), and the Office of Justice Programs (OJP) conduct programs and activities that ultimately influence inmate health. Finally, the Office of the Surgeon General (OSG) and the White House Executive Office of National Drug Control Policy (ONDCP) also impact the health care of inmates.

The steering committee and expert panels recommend that Congress provide the necessary authorization, funding, and other assistance to the appropriate agencies to implement the following recommendations.

I. The Secretary of DHHS should direct appropriate agencies to collaborate with other agencies in analyzing the potential economic benefits to the community of early diagnosis and treatment of communicable diseases, chronic diseases, and mental illnesses.

II. The Secretary should direct CDC to collaborate with NIJ, NIC, CPO, and other DOJ divisions in developing tools to assist State and local agencies in deciding when and whom to screen for communicable diseases in correctional settings.

III. The Secretary should direct all appropriate agencies within the department to work toward reducing interagency regulatory and bureaucratic barriers to testing and counseling for HIV, TB, and STDs among inmates.

IV. The Secretary and the Attorney General should involve correctional health professionals in public health planning and the evaluation of correctional health care programs.

V. The Secretary and the Attorney General should direct appropriate agencies to support field tests of innovative medical information systems to improve the continuity of care for inmates transferred between correctional facilities or released into the community. These efforts should concentrate on removing barriers that impede the transfer of appropriate medical information.

VI. The Secretary and the Attorney General should direct appropriate agencies to develop educational programs to inform policymakers and the public about the public health and social benefits of investing in health care for inmates.

VII. A Federal interagency task force, currently established and cochaired by CDC and NIJ, should report annually to the Secretary and the Attorney General on the status of correctional health care in the Nation and on progress made toward implementing the recommendations included in this report.

Notes

1. Beck, A.J., *Prisoners in 1999*, Bulletin, Washington, DC: U.S. Department of Justice, Bureau of Justice Statistics, August 2000, NCJ 183476.

2. Beck, Allen, U.S. Department of Justice, Bureau of Justice Statistics, personal interview, May 15, 2000.

3. Corrections departments also have a legal obligation to treat inmates. The most important single ruling has been the U.S. Supreme Court's 1976 finding in *Estelle* v. *Gamble*, 429 U.S. 97, that "deliberate indifference" (not mere medical malpractice) to "serious medical needs" of inmates violates the eighth amendment's prohibition against cruel and unusual punishment.

4. An estimated 339,070 people were employed in State and Federal correctional facilities in 1995 and 165,500 were employed in jails. See Stephan, J.J., *Census of State and Federal Correctional Facilities, 1995*, Bureau of Justice Statistics Executive Summary, Washington, DC: U.S. Department of Justice, Bureau of Justice Statistics, August 1997, NCJ 166582; and Perkins, C.A., J.J. Stephan, and A.J. Beck, *Jails and*

Jail Inmates, 1993–94, Bulletin, Washington, DC: U.S. Department of Justice, Bureau of Justice Statistics, April 1995, NCJ 151651.

5. See, for example, Glaser, J.B., and R.B. Greifinger, "Correctional Health Care: A Public Health Opportunity," *Annals of Internal Medicine* 118(2) (1993): 139–145.

6. Hornung, C.A., B.J. Anno, R.B. Greifinger, and S. Gadre, "Health Care for Soon-To-Be-Released Inmates: A Survey of State Prison Systems," paper prepared for the National Commission on Correctional Health Care, Chicago, Illinois, n.d. (Copy in this volume.)

7. Hammett, T.M., P. Harmon, and W. Rhodes, "The Burden of Infectious Disease Among Inmates and Releasees From Correctional Facilities," paper prepared for the National Commission on Correctional Health Care, Chicago, Illinois, May 2000. (Copy in this volume.)

8. The U.S. Department of Justice, Bureau of Justice Statistics, is preparing a report for release in 2002 on the prevalence of hepatitis among correctional populations, based on data from the 2001 census of State and Federal adult correctional facilities.

9. This figure was derived by applying the prevalence of TB disease among inmates in prisons (0.04 percent) and jails (0.17 percent) to the estimated number of releasees from prisons and jails. The estimate of releases was calculated by applying a point prevalence rate for inmates (i.e., the percentage of inmates who were under treatment for TB disease on a given day in 1997) to the total number of releasees during all of 1996. The estimate suggests that about 12,000 people who were released from a correctional facility during 1996 had TB disease at some time during that year, but it does not mean that they all had TB disease at the time of their release from prison or jail. Most of them probably did not have TB disease at the time of their release because, if properly treated, TB disease typically lasts only a short time. The denominator (34,000) is an estimate of the total number of persons with TB in the United States during 1996. The Centers for Disease Control and Prevention's TB Registry Reports, which provided the numbers of cases in a given year, were discontinued in 1994. The only report for subsequent years is CDC's TB surveillance report, which provides incident (new) cases each year. Therefore, an average ratio of incident cases to prevalent cases was calculated for the last 3 years in which Registry Reports were available (1992–94). This ratio (0.627) was then applied to the number of incident cases for 1996 (21,337) to obtain the estimate of 34,000 prevalent cases in 1996.

10. Centers for Disease Control and Prevention, *HIV/AIDS Surveillance Report, 1997,* Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 1997.

11. A more recent study concluded that the 1996 AIDS rate for incarcerated persons was at least six times the national rate. See Dean-Gaitor, H.D., and P.L. Fleming, "Epidemiology of AIDS in Incarcerated Persons in the United States, 1994–1996," *AIDS* 13(17) (1999): 2429–2435.

12. Based on the prevalence estimate in McQuillan, G.M., M.J. Alter, L.A. Moyer, S.B. Lambert, and H.S. Margolis, "A Population-Based Serologic Survey of Hepatitis C Virus Infection in the U.S.," in *Viral Hepatitis and Liver Disease*, M. Rizzetto, R.H. Purcell, G.L. Gerin, and G. Verme, eds., Turin, Italy: Edizioni Minerva Medica, 1997: 267–270.

13. Hammett, Harmon, and Rhodes, "The Burden of Infectious Disease Among Inmates and Releasees" (see note 7). The 17.0–18.6 percent estimate is probably very low, given that studies conducted in individual prison systems have found prevalence rates of 30–40 percent.

14. Hornung C.A., R.B. Greifinger, and S. Gadre, "A Projection Model of the Prevalence of Selected Chronic Disease in the Inmate Population," paper prepared for the National Commission on Correctional Health Care, Chicago, Illinois, n.d. (Copy in this volume.)

15. Veysey, B.M., and G. Bichler-Robertson, "Prevalence Estimates of Psychiatric Disorders in Correctional Settings," paper prepared for the National Commission on Correctional Health Care, Chicago, Illinois, May 1999. (Copy in this volume.)

16. Dysthymia and anxiety range from completely disabling (e.g., agoraphobia) to not even mildly incapacitating (e.g., generalized anxiety disorder). Depending on the severity of their condition, many individuals with dysthymia and anxiety do not require medical treatment.

17. Hammett, T.M., P. Harmon, and L.M. Marushak, *1996–1997 Update: HIV/AIDS, STDs, and TB in Correctional Facilities*, Issues and Practices, Washington, DC: U.S. Department of Justice, National Institute of Justice, July 1999, NCJ 176344.

18. A comprehensive HIV-prevention program provides HIV counseling and testing, instructor-led education, peer-based programs, and multisession HIV-prevention counseling in each correctional facility.

19. Hornung, C.A., B.J. Anno, R.B. Greifinger, and S. Gadre, "Health Care for Soon-To-Be-Released Inmates: A survey of State Prison Systems" (see note 6).

20. Steadman, H.J., and B.M. Veysey, *Providing Services for Jail Inmates With Mental Disorders*, Research in Brief, Washington, DC: U.S. Department of Justice, National Institute of Justice, January 1997, NCJ 162207.

21. Ibid.

22. Manderscheid, R.W., and M.A. Sonnenschein, eds., *Mental Health, United States, 1992*, Rockville, Maryland: U.S. Department of Health and Human Services, 1992.

23. Steadman, H.J., and B.M. Veysey, *Providing Services for Jail Inmates With Mental Disorders* (see note 20).

24. Hammett, T.M., P. Harmon, and L.M. Maruschak, *1996–1997 Update: HIV/AIDS, STDs, and TB in Correctional Facilities* (see note 17).

25. Steadman, H.J., and B.M. Veysey, *Providing Services for Jail Inmates With Mental Disorders* (see note 20).

26. Kraut, J.R., A.C. Haddix, V. Carande-Kulis, and R.B. Greifinger, "Cost-Effectiveness of Routine Screening for Sexually Transmitted Disease Among Inmates in United States Prisons and Jails," paper prepared for the National Commission on Correctional Health Care, Chicago, Illinois, February 2000. (Copy in this volume.)

27. Ibid.

28. Varghese, B., and T.A. Peterman, "Cost-Effectiveness of HIV Counseling and Testing in U.S. Prisons," paper prepared for the National Commission on Correctional Health Care, n.d. (Copy in this volume.)

29. American Thoracic Society and the Centers for Disease Control and Prevention, "Targeted Tuberculin Testing and Treatment of Latent Tuberculosis Infection," *American Journal of Respiratory and Critical Care Medicine* 161 (2000): 221S–247S; American Thoracic Society and the Centers for Disease Control and Prevention, "Diagnostic Standards and Classification of Tuberculosis in Adults and Children," *American Journal of Respiratory and Critical Care Medicine* 161 (2000): 1376–1395.

30. Taylor, Z., and C. Nguyen, "Cost-Effectiveness of Preventing Tuberculosis in Prison Populations," presentation prepared for the National Commission on Correctional Health Care, Chicago, Illinois, n.d. (Copy in this volume.)

31. Tomlinson, D.M., and C.B. Schechter, "Cost-Effectiveness Analysis of Annual Screening and Intensive Treatment for Hypertension and Diabetes Mellitus Among Prisoners in the United States," paper prepared for the National Commission on Correctional Health Care, Chicago, Illinois, n.d. (Copy in this volume.)

32. Shuter, J., "Communicable Diseases in Inmates: Public Health Opportunities," paper prepared for the National Commission on Correctional Health Care, Chicago, Illinois, n.d. (Copy in this volume.)

33. Draft clinical guidelines submitted to the National Commission on Correctional Health Care, Chicago, Illinois, currently under consideration for adoption. (Copy in appendix D of volume 1 of this report.)

34. Hammett, T.M., P. Harmon, and L.M. Maruschak, *1996–1997 Update: HIV/AIDS, STDs, and TB in Correctional Facilities* (see note 17).

35. Morris, S.M., H.J. Steadman, and B.M. Veysey, "Mental Health Services in United States Jails: A Survey of Innovative Practices," *Criminal Justice and Behavior* 24 (1) (1997): 3–19.

36. Surveillance is the ongoing systematic collection, analysis, and interpretation of health data.

37. See, for example, National Center for Health Statistics, *National Health and Nutrition Examination Survey III [NHANES–III]*, Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 1997.

38. The definitions of mental disorders and presentation of their prevalence in American Psychiatric Association, *Diagnostic and Statistical Manual of Mental Disorders*, 4th ed., Washington, DC: American Psychiatric Press, 1994, are a good illustration of the standardized definitions and measures that are needed in the field of correctional health care.

39. "Summary of Notifiable Diseases, United States, 1998," *Morbidity and Mortality Weekly Report* 47(53) (December 31, 1999).

40. See, for example, "Guidelines for the Use of Anti-retroviral Agents in HIV-Infected Adults and Adolescents," Rockville, MD: U.S. Department of Health and Human Services, available at http://www.hivatis.org/guidelines/adult/Apr23_01/pdf/AAAPR23S.PDF (updated April 23, 2001); American Diabetes Association, "Standards for Medical Care for Patients With Diabetes Mellitus," *Clinical Practice Recommendations 2000, Diabetes Care* (supp. 1) (2000): 1–23; American Diabetes Association, "Management of Diabetes in Correctional Institutions," *Clinical Practice Recommendations 2000, Diabetes Care* 21 (supp. 1) (2000): 1–3; National Institutes of Health, National Asthma Education and Prevention Program, *Expert Panel Report 2: Guidelines for the Diagnosis and Management of Asthma*, Bethesda, MD: National Heart, Blood, and Lung Institute, February 1997; National Institutes of Health, "Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure," Bethesda, MD: National Heart, Lung, and Blood Institute, November 1997; "Clinical Guidelines: Report of the NIH Panel to Define Principles of Therapy of HIV Infection and Guidelines for the Use of Antiretroviral Agents in HIV-Infected Adults and Adolescents," Bethesda, MD: National Institutes of Health (updated May 5, 1999); and Centers for Disease Control and Prevention, "Clinical Guidelines: 1999 USPHS/IDSA Guidelines for the Prevention of Opportunistic Infections in Persons Infected With Human Immunodeficiency Virus," *Morbidity and Mortality Weekly Report* 48 (RR–10) (August 20, 1999): 1–59, 61–66.

41. The recommendations of the CDC's Advisory Committee on Immunization Practices can be found at CDC's Web site: http://www.cdc.gov/nip/publications/ACIP-list.htm.

42. See the Centers for Disease Control and Prevention, "Recommendations for Prevention and Control of Hepatitis C Virus (HCV) Infection and HCV-Related Chronic Disease," *Morbidity and Mortality Weekly Report* 47 (RR–19) (October 16, 1998): 1–39.

43. For a comparison of accreditation services for correctional institutions, see Anno, B.J., *Correctional Health Care: Guidelines for the Management of an Adequate Delivery System*, Washington, DC: U.S. Department of Justice, National Institute of Corrections (in press).

44. See National Commission on Correctional Health Care, *Standards for Health Services in Jails*, Chicago, IL: Author (in press).

45. A detailed discussion of the differences between primary and secondary prevention may be found in Last, J.M., *Public Health and Human Ecology*, 2d ed., Stamford, Connecticut: Appleton & Lange, 1998.

46. An excellent source for a tuberculosis clinical guideline is the Centers for Disease Control and Prevention at their Web site: www.cdc.gov.

47. See U.S. Department of Health and Human Services, "Guidelines for the Use of Antiretroviral Agents in HIV-Infected Adults and Adolescents" (see note 40).

48. The Centers for Disease Control and Prevention have prepared "HIV Prevention Through Early Detection and Treatment of Other Sexually Transmitted Diseases—United States. Recommendations of the Advisory Committee for HIV and STD Prevention," *Morbidity and Mortality Weekly Report* 47 (RR–12) (July 31, 1998).

Health Care for Soon-To-Be-Released Inmates: A Survey of State Prison Systems

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Introduction

A higher percentage of the population is incarcerated in the United States than in any other country. In the decade between 1985 and 1995, the population in prisons and jails increased dramatically. During this period, the total correctional population increased by 78.5 percent. Accounting for this was a 57.3 percent increase in the number of individuals on probation, a 95.8 percent increase in the number in jail, a 121.2 percent increase in the number in prison, and a 133.2 percent increase in the number on parole. The rate of growth of the prison population has averaged about 8.3 percent per year, while jail inmate population growth averaged 7.0 percent between 1985 and 1995. According to the Bureau of Justice Statistics (BJS), in 1995 approximately 3,096,529 persons were on probation, 1,078,500 individuals were in State prisons, another 499,300 were in local jails, and 700,174 were on parole. In 1995, prisons saw 521,970 new admissions of inmates with a sentence of 1 year or more and 455,139 releases.[1]

The rebellions that occurred in prisons across the Nation in the 1960s and 1970s called for improved health care as one of their central demands. The U.S. Supreme Court responded in 1976 with the *Estelle* v. *Gamble* decision that said deliberate indifference to the serious medical needs of prisoners constitutes the "unnecessary and wanton infliction of pain" prohibited by the eighth amendment.[2] This decision affirmed inmates' constitutional right to health care.

Inmates demanded better health care in jails and prisons before the epidemic of human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) and the concurrent rise in multiple drug-resistant tuberculosis (TB). These demands also occurred before Federal initiatives to reduce the use of illegal drugs. The most important of these initiatives was the National Drug Control Strategy, announced in 1989, which called for mandatory minimum sentences for drug crimes. This resulted in a 423 percent increase (from 24,200 in 1985 to 104,400 in 1990) in the number of new court commitments to State prisons of individuals whose most serious offense was a drug offense. While 13.2 percent of newly sentenced prisoners admitted to State prisons in 1985 were for drug offenses, in 1990 the percentage jumped to 31.7 percent—a 240 percent increase. The proportion of those newly sentenced for a drug offense as their most serious crime has remained at about 31 percent through 1995.[3] During the same period, the percentage of inmates newly sentenced to State prisons for property crimes (e.g., burglary, larceny/theft, motor vehicle theft, fraud) dropped from 42.4 to 28.9 percent (a 31.8 percent decline), and the percentage sentenced for violent offenses declined from 35.1 to 29.5 percent (a 16 percent decline).

The increase in the percentage of newly sentenced inmates for drug offenses, coupled with longer sentences, has dramatically altered the composition of the prison inmate population. In 1985, only 38,900 inmates out of a total inmate population of 451,812 (8.6 percent) were in State

prisons for drug offenses as their most serious crime.[4] By 1995, this number had increased by 478 percent to 224,900 out of a total State prison inmate population of 989,007 (22.7 percent).

The increase in the numbers of inmates incarcerated for drug offenses has led to concomitant changes in the demographic profile of inmates. The numbers of female, nonwhite, and foreign-born inmates have increased disproportionately to the inmate population as a whole. The significance of these changes cannot be overstated. Most inmates are poor, have little education, and come from disadvantaged communities where health care services other than hospital emergency rooms are scant or underutilized.

Although considerable data exist about the prevalence of HIV/AIDS, sexually transmitted diseases (STDs), and TB in the prison and jail population,[5] little has been published about the prevalence of hepatitis and still less about the prevalence of chronic diseases and mental disorders among inmates. In an effort to acquire information about the prevalence of chronic diseases and mental illness in the State prison inmate population, State departments of correction were surveyed to determine which States had information about the demographic composition of their inmate population, which maintained databases containing information on the prevalence of chronic diseases and mental disorders, and which had information about the health status of inmates that they had released recently into the community.

The State prison survey was designed to collect these data as the first phase of a research plan. A planned second phase was to review the medical records of a sample of inmates who had been recently released from prison in those States that appeared to have the most complete data on the health status of their inmate population. The objective of this second phase was to collect the information necessary to assess the health status and health care needs of soon-to-be-released inmates. Such an assessment, supported by empirical data, is needed for informed policy decisions and actions by prison and public health officials to insure that inmates with communicable or chronic diseases or mental disorders do not pose a threat to the health of the communities into which they are released.

Methods

A mailback questionnaire (see appendix C in volume 1) was sent to corrections officials in each State, the District of Columbia, and the Federal Bureau of Prisons. The survey instrument consists of three sections and is designed to be completed by different individuals in the prison health system. Section 1 requests the following information:

- What data are available on the prison system census.
- Whether inmate demographic data are computerized.
- Whether the prison administration can determine the demographic profiles of the current inmate population by age, gender, and race.

Section 2 of the instrument focuses on chronic diseases and the availability of medications for inmates, and seeks the following information:

- Routine screening practices for hypertension and diabetes.
- Policies and procedures for vaccinating inmates for hepatitis B.
- The prevalence of certain chronic medical conditions (i.e., asthma, diabetes, hypertension, and heart disease).
- The ability of the prison administration to determine the age-, race-, and gender-specific prevalence rates of those conditions.
- The existence of systemwide clinical protocols or treatment guidelines for the

management of asthma, diabetes, hypertension, and heart disease.

- Whether pharmacy data are computerized.
- The number of inmates taking selected medications.
- Policies and procedures about giving inmates medication when they are released into the community.
- The ability to identify recently released inmates with chronic conditions.

Section 3 of the survey asks administrators the following questions about mental health:

- Whether they have data on the number of inmates with mental disorders.
- How mental disorders are classified.
- Whether inmates with selected mental disorders can be identified by age, gender, and race.
- The prevalence of coexisting alcohol or other substance dependency.
- What treatment protocols are used.
- Whether inmates recently released with a mental disorder can be identified.

It was hoped that the information provided from the survey would enable the research team to identify those State prison systems with the most comprehensive data on the health status of their inmate populations and of inmates released into the community within the past 6 and 12 months. Once those State systems could be identified, the second phase of the research plan called for selecting a sample of prison facilities in these systems at which medical record reviews could be conducted to collect comprehensive data on the health status of a sample of inmates who were recently released into the community. Researchers were particularly interested in the prevalence of communicable diseases, chronic diseases, and mental health problems as well as provisions for continuity of health care. State prison systems and facilities would be selected to reflect States or regions with known high and low prevalence of disease (e.g., HIV/AIDS).

The surveys were mailed to the State departments of correction by the National Commission on Correctional Health Care (NCCHC). States that did not respond within 1 month were contacted by telephone by the Data Coordinating Center, NCCHC, and/or the project director. At least two calls were made to encourage response.

Results

Forty-one States,[6] including all of the Midwestern States and the District of Columbia, responded, although missing information was a significant problem. Three of the responding States did not provide reliable prevalence data and were not included in that analysis. One State reported hospital discharge figures, another reported chronic disease percentages, and the third reported prevalence for one institution in a State system. No response was obtained from the Federal Bureau of Prisons or from 10 States: 1 in the Northeast, 5 in the South, and 4 in the West.

The first section of the survey requested information on the inmate census. Table 1 presents the average daily population, total annual intakes, and total annual releases for the most current year available for those States that responded to the survey.

Responding States reported an average daily population (ADP) of a little more than 17,800 inmates for a total census of 641,137. The total represents approximately 76 percent of the prisoners under the jurisdiction of State correctional authorities at yearend 1996. These States reported more than 333,587 new intakes and 309,929 releases for the most recent period for which they had data (the period ending June 1997 to the period ending January 1998).

Table 1. Inmate Census Data for States Responding to the Survey*			
	Average Daily Population	Total Annual Intakes	Total Annual Releases
Range			
Minimum	840	578	520
Maximum	69,671	29,868	30,469
Mean	17,809	9,266	8,609
Medium	12,134	6,610	5,576
Sum	641,137	333,587	309,929

* Based on 36 of 41 responses; 2 States provided no data; data from 3 States were not usable.

Forty States indicated they had computerized systems for recording inmate demographic data, yet only 38 reported having the capability to determine the *current* population by their demographic characteristics (e.g., age, race, and gender). All 41 responding States said they could determine the gender distribution of their inmate population; 39 could determine the age and the race distribution. Most important, 37 States reported they had the capability to determine the age, race, and gender distribution of their inmates (e.g., the number of Hispanic/Latino males aged 35–40).

Eight States (20 percent of those responding) reported that they designate certain facilities for housing inmates with specific chronic diseases or cluster inmates with chronic conditions in certain facilities. These eight State prison systems had an ADP totaling 217,492, with a total annual intake of 96,734 and total annual releases of 94,766.

This amounts to 26.5 percent of the total inmate population in the responding States, 20.6 percent of total annual intakes in those States, and 21.9 percent of total annual releases among responding States. Those State systems that have designated facilities for housing inmates with specific chronic diseases or that cluster inmates with chronic conditions in certain facilities have larger populations than States that did not designate one or more facilities to manage inmates with chronic conditions (mean ADP 27,187 vs. 19,504; mean annual intake 12,092 vs. 12,047; and mean total annual releases 11,846 vs. 10,887).

The 10 States that did not respond to the survey have generally smaller prison populations according to BJS.[7] Two nonresponding States had inmate populations of fewer than 2,000; two had populations of about 3,500; three had populations of nearly 10,000; and two had populations of approximately 15,000. Only one had a population of more than 115,000.

Screening for Diabetes and Hypertension

States were asked if they routinely screened inmates for fasting blood sugar and for blood pressure at intake to their prisons. Table 2 shows the number of State prison systems that routinely screen inmates at intake, their total annual intake, and the percentage of all annual intakes in all 39 responding States who are screened for diabetes and hypertension.

Table 2. Intake Screening for Diabetes and Hypertension			
Screened for:	**# of States**	**Mean Annual Intake**	**% Total Annual Intake Screened***
Fasting blood sugar	12	9,266	25.4
Blood pressure	38	12,310	99.5

* Responding States only.

Only 25 percent, or 119,267, of the approximately 470,000 annual intakes into these 39 prison systems are screened for diabetes using fasting blood sugar; more than 99 percent have their blood pressures measured at intake. No information was collected on how the results of screening tests were treated. It is not known what is done when an inmate coming into the system has a fasting blood sugar greater than 110 mg/dL, which constitutes glucose intolerance according to the most recent guidelines of the National Institutes of Health (NIH), or 126 mg/dL, which constitutes diabetes according to the most recent NIH guidelines.[8] Similarly, although almost every new inmate has his or her blood pressure taken, no data were collected on whether the screening procedures conform to NIH standards or whether the diagnostic or treatment guidelines published by the Joint National Committee (JNC–VI)[9] were followed.

Prevalence of Chronic Diseases

Nineteen States reported that they had data on the number of inmates in their system with chronic diseases. These States tend to be smaller in terms of average, daily population than those that did not have data on chronic disease prevalence (mean ADP 14,103 vs. 23,076). At the same time, these States had a larger mean annual intake (11,264 vs. 7,945) and larger mean annual releases (10,339 vs. 7,510).

Although these 19 States claimed to have data on the prevalence of chronic diseases in their prison systems, when asked to report either the number or percentage of inmates in their systems with asthma, diabetes, hypertension, and heart disease, not all of them could provide numbers or percentages for each condition. When the prevalence of chronic diseases were expressed as rates per 1,000 inmates, rates varied as much as threefold. The prevalence of asthma among 17 responding States ranged from 2.5 percent (25/1000) to 7.2 percent (72/1000; mean: 4.8 percent); the prevalence of diabetes in 18 State systems ranged from 1.9 percent (19/1000) to 2.8 percent (28/1000; mean 2.35 percent). The prevalence rates for hypertension in 15 State systems reporting ranged from 1.3 percent (13/1000) to 7.8 percent (78/1000; mean 4.5 percent). The prevalence rates for heart disease in 15 State systems reporting ranged from 1.5 percent (15/1000) to 2.8 percent (28/1000; mean 2.1 percent).

Table 3 shows the crude prevalence rates for asthma, diabetes, hypertension, and heart disease per 100 inmate population calculated from survey forms completed by the States.[10] For comparison purposes, table 3 also shows rates calculated from the National Health and Nutrition Examination Survey (NHANES–III; 1988–94).[11] NHANES–III is a multistage probability sample of the noninstitutionalized U.S. population. Prevalence rates also were calculated for a subsample of the NHANES respondents selected to reflect low socioeconomic status. The individuals in this subsample had received food stamps, welfare assistance, or other public assistance within the previous year. This subsample represents a population of approximately 66 million and reflects the lowest quartile of socioeconomic status in the United States.[12]

Table 3. Prevalence of Chronic Diseases in Prisons From the Survey of State Prison Facilities and the U.S. Population Estimated From the National Health and Nutrition Examination Survey (NHANES–III)

Disease	NIJ–NCCHC State Prison Survey	NHANES–III (All U.S.)	NHANES–III[a] (Lowest SES)
Asthma	4.8[b]	7.7	8.4
Diabetes	2.3	5.3	7.3
Hypertension	4.5	23.1	28.5
Heart disease	2.1	3.4	5.3

[a] Self-report data: "Have you ever been told that you have . . . ?"
[b] All rates are per 100.

The rates in table 3 are crude rates per 100 population. Comparing estimated prevalence between the prison population and the general population (i.e., NHANES) can be misleading because of differences in the demographic profiles and other characteristics that may make one group more or less susceptible to disease than another. For example, the prevalence of hypertension increases with age. Thus, the crude prevalence of hypertension is expected to be lower in the prison population because it is disproportionately younger than the general population. Diabetes tends to be more prevalent among women than men. Therefore, it could be expected to be less prevalent in the prison population than the general population because of a lower percentage of women in the prison population.

The prevalence of asthma, diabetes, hypertension, and heart disease in the prison population as reported by the States responding to the survey are low relative to the rates in the general U.S. population. These lower prevalence rates are unlikely to be "explained away" by age, race, or gender differences in the respective populations. In the case of hypertension, where more than 99 percent of inmates have blood pressures taken upon entering the system, the estimate that 4.5 percent of the inmates are hypertensive is significantly lower than the rate of self-reported hypertension in the general U.S. population. Moreover, it is only one-fifth the rate of hypertension in a similar socioeconomic group in the community, who are least likely to have their blood pressures checked frequently. The survey data raise the suspicion either that chronic diseases are significantly undetected and underdiagnosed in prison health care systems or that prison systems have poor quality data on the prevalence of chronic disease in their populations.

Treatment Protocols

The next section of the survey inquired about systemwide clinical protocols or treatment guidelines for the management of the target chronic diseases. Table 4 shows that the number of States with systemwide treatment protocols varies. Twenty States have protocols for treating heart disease; 26 States have protocols for treating asthma. States with systemwide protocols for treating or managing diseases tended to be those with the largest ADP and the most annual releases.

About two-thirds of the responding prison systems reported systemwide protocols for treating asthma. These 26 prison systems house approximately 84 percent of inmates and account for 78 percent of annual releases among responding States. Fewer than 70 percent of inmates and annual releases are from prisons with systemwide protocols for treating heart disease. Despite numerous guidelines for treating diabetes and hypertension, only about 73 percent of inmates and releases are from systems with protocols for treating diabetes, and 80 percent of inmates and 77 percent of releases are from systems with protocols for treating hypertension.

The implications of this sporadic use of systemwide treatment protocols are unclear. On the one hand, one could expect a higher quality of care to

Table 4. Systemwide Treatment Protocols for Chronic Diseases: Average Daily Population and Mean Total Annual Releases

			Average Daily Population		Total Annual Releases	
Disease	Mean ADP	Mean TAR	*N*	%	*N*	%
Asthma (*n* = 26)	26,627	13,706	692,295	84.2	338,695	78.4
Diabetes (*n* = 24)	25,287	13,195	606,878	73.8	316,686	73.3
Hypertension (*n* = 25)	26,421	13,453	660,520	80.3	336,320	77.8
Heart disease (*n* = 20)	26,597	14,654	566,103	68.9	307,731	68.9

be provided when established treatment protocols (such as that advocated for hypertension by the JNC–VI or for diabetes by NIH or the American Diabetes Association) are in place systemwide. On the other hand, treatment guidelines that are not adhered to may lead to poorer quality of care than when accepted standards are followed in the absence of systemwide treatment protocols.

Medication Use

The survey asked whether pharmacy data for the prison system were computerized. Thirty-one States responded that they had a computerized pharmacy system. These systems have an ADP of 708,835 (86.2 percent of the ADP for the 41 responding States). Only 17 States, however, indicated they could determine the number of inmates taking selected medications. Even fewer gave the number of inmates taking inhaled asthma medications, insulin or oral hypoglycemic agents, or antihypertension medicines. Fewer yet could state the number of inmates taking medications prescribed for heart disease (e.g., anti-ischemic and antiarrhythmic agents). Table 5 presents the available data on the number and percentage of inmates in the States reporting this information who are taking these medications.

Discharge Planning

Discharge planning facilitates an inmate's transition into the community. In the case of health care, discharge planning means that arrangements are made for inmates to have a "point of care" to receive needed medical attention for their condition when they are released into the community. Sixteen States indicated they had policies and procedures for discharge planning for inmates with chronic diseases. These State systems housed 60.8 percent of the total inmate population and released 278,548 inmates into the community in their most recent accounting period. Twenty-nine States, accounting for 84.2 percent of total annual releases, indicated that inmates with chronic medical conditions were given a supply of medication when they were released. At least 35 percent of inmates (approximately 150,000) are released each year without the benefits of a system of discharge planning. More disturbing, 67,000 or more inmates with chronic medical conditions are released each year without even a supply of medication.

Recently Released Inmates

An important section of the survey queried respondents about information they could provide concerning inmates recently released from their prison systems. Of the 41 States that responded, 30 indicated they could determine which inmates had been released within the past 6 months. These facilities released approximately 382,799 inmates (88.6 percent of inmates released from all State prisons) during the most recent period. Only 12 State systems indicated that they could provide demographic data (e.g., age, race, and gender) on their recently released inmates. These 12 systems released 219,827 inmates in 1997 (50.1 percent of those released by all State prisons). Moreover, only 10 State systems, which released 94,531 inmates in 1997 (48.5 percent of those released by all State prisons), said they could identify the age, race, and gender of recently released inmates with chronic diseases.

Table 5. Number and Percentage of Inmates Taking Selected Medications

Medication	# of Inmates	% ADP
Inhaled asthma medications	4,787	2.48
Insulin or oral hypoglemics	4,995	2.48
Antihypertension agents	11,916	6.29
Anti-ischemic agents	2,782	1.85
Antiarrhythmic agents	1,162	0.61

Table 6 lists these 10 State systems, the number of inmates they released in 1996, and the number of inmates reported to have asthma, diabetes, hypertension, and heart disease. Although these 10 States reported they could identify inmates with chronic diseases released within the past 6 months, 3 States (North Dakota, Maryland and Oklahoma) either could not or did not indicate the prevalence of any of the target chronic diseases in their current population of inmates. Three other States (Illinois, Florida, and Utah) could provide prevalence data on some, but not all, of the target conditions.

The prevalence rates reported by Oregon and Washington appear to be inconsistent. Both States have an approximately equal number of annual releases (5,608 vs. 5,545), yet Washington has three or more times the number of inmates diagnosed with asthma, diabetes, and hypertension and six times the number of inmates diagnosed with heart disease.

Mental Health

The final section of the survey instrument inquired about the prevalence of mental disorders among inmates. Seventeen States with a total ADP of 401,265 (48.8 percent of the ADP of all responding State prisons), 170,263 annual intakes (36.2 percent of annual intakes into State prisons in responding States), and 161,554 annual releases (37.4 percent of annual releases from State prisons in responding States) reported that they designate one or more facilities for housing inmates receiving treatment for mental disorders. Twenty-one State systems housing 544,926 inmates (66.3 percent of the ADP of all responding States), 306,385 admissions (65.6 percent of annual intakes into State prisons in responding States), and 283,450 annual releases (65.6 percent of annual releases from State prisons in responding States) claimed they maintained data on the number of inmates with mental disorders by diagnoses. Fourteen systems

Table 6. States Reporting They Have Chronic Disease Data by Demographic Characteristics of Recently Released Inmates

State	# of Inmates					
	Total Annual Releases	Facilities	Asthma	Diabetes Mellitus	Hypertension	Heart Disease
Arkansas	4,977	18	315	146	642	128
Florida*	23,866	60	33,829	1,276	—	—
Illinois	25,124	32	2,962	729	—	—
Iowa	3,845	8	172	114	271	58
Maryland	12,000	26	—	—	—	—
North Dakota	520	7	—	—	—	—
Oklahoma	6,582	42	—	—	—	—
Oregon	5,608	12	156	115	284	94
Utah	1,464	2	250	123	318	—
Washington	5,545	12	570	391	1,259	577

* Computed from the percentage of inmates with the diagnosis and the average daily population of inmates.

with 268,741 inmates (32.7 percent of the ADP of all responding States), 130,573 admissions (27.8 percent of annual intakes into State prisons in responding States), and 124,186 annual releases (28.7 percent of annual releases from State prisons in responding States) classify diagnosed mental disorders according to the DSM–IV criteria for Axes 1, 2, and 3.

Few States reported on the number of inmates within their systems with selected mental diagnoses. Table 7 presents the number of responding prison systems and reported prevalence rates for selected mental conditions. All reported prevalence rates are low, ranging from about 3 inmates per 1,000 with panic disorder to 18 per 1,000 with schizophrenia.

Information also was sought on the number of inmates with mental disorders who had co-occurring alcohol dependency and other substance dependency disorders. Only four responses to these questions were received and the accuracy of the data was highly suspect.

Table 8 shows the number of States that could identify inmates with mental conditions according to demographic characteristics and the total ADP of these State prison systems. Fourteen States indicated that they could identify the age, race, and gender of recently released inmates with mental disorders, but only 12 States said they had data on race and 13 said they had data on the gender of the inmates. This incongruity raises questions about the validity of the reported data.

When asked if they had treatment protocols or guidelines for the management of inmates with mental disorders, 15 States responded “yes” and 12 said “no”; the balance did not complete this question. The total ADP of the 15 States with treatment protocols is 317,511 (mean daily population = 21,167), which is larger than the ADP for those responding that they did not have protocols for managing inmates with mental disorders (mean = 13,104).

Table 7. Reported Rates of Selected Mental Disorders

Mental Disorder	# of States	Prevalence per 100 Inmates
Schizophrenia	7	1.81
Affective disorder	6	0.54
Psychotic disorder	6	0.36
Major depression	7	1.72
Bipolar disorder	7	0.67
Dysthymic disorder	8	0.41
Panic disorder	4	0.30
Post-traumatic stress disorder	6	0.33
Delusions, dementia, amnestic cognitive disorder, and organic brain syndrome	5	0.80

Table 8. Number and Average Daily Population of States Able to Identify Recently Released Inmates With Mental Disorders

Characteristics	# of States	Total ADP
Age	14	230,314
Gender	13	308,062
Race	12	271,262
Age/gender/race	14	454,084

Policies covering discharge planning for inmates with mental disorders are in effect in 7 States with a mean ADP of 24,368. These States house more than 414,000 inmates and release a total of 185,337 inmates each year. Nine States that release a total of 47,330 inmates each year responded that they had no policies or procedures for the discharge planning of inmates with mental disorders. About one-half of the responding States left this question blank.

Twenty-three States with total annual releases of 228,646 inmates provide medication to inmates with mental disorders when they are released into the community. Only three States responded that it was not their policy to give inmates with mental disorders a supply of medication on release.

States' capability to identify inmates with mental disorders after they are released into the community is limited. Fifteen States with 113,122 total annual releases indicated they could identify inmates with mental disorders released within the past 3 months. Fourteen States with 108,381 total annual releases could identify inmates with mental disorders released within the past 6 months. Nine States with 86,595 total annual releases could identify inmates with mental disorders released into the community within the past year.

Conclusions

State prison systems were surveyed to collect information on the prevalence of selected chronic medical conditions—asthma, diabetes, hypertension, and heart disease—and mental disorders in the inmate population, and to learn their policies and procedures for discharge planning and providing medications to inmates when they are released into the community. Information was also sought on whether inmates with chronic medical conditions or mental disorders who were released into the community in the past 3, 6, and 12 months could be identified.

The responses received from 41 States were of limited value. Ten States and the Federal Bureau of Prisons did not respond to the survey despite repeated requests from NCCHC and the study organizers. In a study of sexually transmitted diseases, the Centers for Disease Control and Prevention (CDC) were able to obtain a better response rate, but only by sending a CDC representative to the jails to assist correctional personnel in collecting and recording the requested data.[13] In this survey, the 10 nonresponding States house approximately 200,000 inmates, which is a significant percentage of the prison population. Moreover, several of the States that returned their questionnaires provided little usable data. Either questions were not answered or some answers that were provided were clearly erroneous. Missing or erroneous data, particularly in the section of the questionnaire related to mental health, seriously weaken the conclusions that can be reached.

Although the researchers did not learn much of what they wanted to, much was learned about the state of prison health. Many State prison systems cannot report detailed, accurate data on the prevalence of medical problems or mental disorders within their inmate populations. It would appear that State systems have not integrated their inmate databases. Administrative databases that contain information on the demographic profile of the inmate population are not "connected" to databases that contain medical data on diagnosed conditions or medication usage from the pharmacy. Concerns regarding confidentiality of inmates' health conditions undoubtedly contribute to the lack of linkage between these databases.

Notes

1. Bureau of Justice Statistics, *Correctional Populations in the United States, 1995,* Washington, DC: U.S. Department of Justice, Bureau of Justice Statistics, 1997, NCJ 163916.

2. *Estelle* v. *Gamble*, 429 U.S. 97 (1976).

3. Bureau of Justice Statistics, *Correctional Populations in the United States, 1995* (see note 1).

4. Bureau of Justice Statistics, *Correctional Populations in the United States, 1996,* Washington, DC: U.S. Department of Justice, Bureau of Justice Statistics, 1999, NCJ 170013.

5. Hammett, T.M., R. Widom, J. Epstein, M. Gross, S. Sifre, and T. Enos, *HIV/AIDS and STDs in Correctional Facilities: 1994 Update*, Washington, DC: U.S.

Department of Justice, National Institute of Justice; and U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for HIV, STD, and TB Prevention, 1995, NCJ 156832.

6. The Federal Bureau of Prisons did not respond to the survey despite repeated requests. Further, for simplicity, the District of Columbia is included as a State.

7. Bureau of Justice Statistics, *Correctional Populations in the United States, 1997,* Washington, DC: U.S. Department of Justice, Bureau of Justice Statistics, 2000, NCJ 177613.

8. Expert Committee on the Diagnosis and Classification of Diabetes Mellitus, "Report of the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus," *Diabetes Care* 20(7)(1997): 1183–97.

9. Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure, *The Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure,* Bethesda, MD: National Institutes of Health, National Heart, Lung and Blood Institute, 1998, NIH publication No. 98–4080.

10. Some States provided frequency counts, while others responded in terms of percentages of inmates. All frequency counts were converted to percentages based upon the average daily population of the system.

11. National Center for Health Statistics, *National Health and Nutrition Examination Survey III [NHANES–III]*, Washington, DC: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 1997.

12. Hornung, C.A., R.B. Greifinger, and S. Gadre, "A Projection Model of the Prevalence of Selected Chronic Diseases in the Inmate Population," paper prepared for the National Commission on Correctional Health Care, Chicago, Illinois, n.d. (Copy in this volume.)

13. National Center for HIV, STD, and TB Prevention, Division of STD Prevention, *Sexually Transmitted Disease Surveillance, 1998,* Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, September 1999.

The Burden of Infectious Disease Among Inmates and Releasees From Correctional Facilities

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Introduction

It is widely believed that infectious diseases—particularly human immunodeficiency virus and acquired immunodeficiency syndrome (HIV/AIDS), sexually transmitted diseases (STDs), hepatitis, and tuberculosis (TB)—are much more prevalent among correctional inmates than in the total population and that, therefore, a disproportionate share of the burden of infectious disease is found among people who pass through correctional facilities. Largely because of the public health implications of potential transmission of disease from inmates to persons outside prison, there is growing recognition of the importance of improving prevention and treatment interventions in correctional settings. A number of authors have advocated strongly for taking better advantage of this important "public health opportunity."[1] Prevention and treatment programs for infectious disease in prisons and jails have improved in recent years, but there continues to be a general lack of public and political recognition of the importance of correctional settings for health interventions. Thus, the opportunity has yet to be fully exploited.

There is a potentially important two-part strategy for increasing the recognition of the public health problem and opportunity represented by infectious disease in correctional populations and for improving the policy response. It is to develop and disseminate (1) quantitative estimates of the burden of infectious disease among inmates and releasees and (2) quantitative analyses of the costs and benefits of prevention, early identification, and treatment of infectious disease among inmates. Neither of these estimates or analyses has been done systematically.

This paper addresses the first part of the strategy. Comparisons of the prevalence of HIV disease in correctional populations to that in the total population have been done,[2] but, to date, no one has sought to estimate the number of persons with infectious disease in all types of correctional facilities, the numbers of inmates with infectious disease who are being released to the community, or the proportion of the burden of infectious disease found among people who serve time in correctional facilities.

This paper presents national estimates of inmates and releasees with HIV infection and AIDS; syphilis, gonorrhea, and chlamydia infection; hepatitis B and C infection; and TB infection and TB disease. These figures should be considered rough estimates of the burden of infectious disease in correctional populations. It is impossible to present precise statistics because of the lack of systematic surveillance and the resulting paucity of observations on which prevalence estimates for many of the conditions of interest must be based. Moreover, as discussed in greater detail below, the estimates presented in this paper reflect some double counting between prison and jail populations, inmates and releasees, and jail releasees during a given year. The extent of this duplication cannot be quantified precisely, but it should be considered in using the estimates.

Prevalence and Incidence

Before proceeding to a discussion of data sources and estimation methods and presentation of the estimates, it is important to clarify the use of several key epidemiologic terms in this paper. The estimates and analyses presented here are based on point prevalence or period prevalence measures, meaning the percentage of a given population with a condition either at a particular point in time (e.g., at year-end) or over a period of time (e.g., over a 1-year screening period). Measures of prevalence should not be confused with incidence rates, which are intended to represent the risk of development of a condition within a susceptible population, for example, in terms of numbers of new cases per 1,000 or 100,000 individuals during 1 year. A susceptible population generally means those without the condition at the beginning of the period in which incidence is being measured.[3] Prevalence estimates are easier to calculate than incidence rates based on the available data for correctional populations, and they are more policy relevant in this context.

In this paper, the estimates of inmates with AIDS, HIV infection, and TB disease are based on point prevalence data. The estimates of inmates infected with syphilis, chlamydia, gonorrhea, TB, hepatitis B, and hepatitis C are based on period prevalence data. All estimates for releasees are also, in effect, period prevalence estimates that reflect the number of persons with certain infections or diseases who are released to the community during a given year.

Estimates of Numbers of Inmates and Releasees From Correctional Facilities

To estimate the burden of infectious disease among persons passing through correctional facilities, one must know the numbers of inmates and persons being released. The U.S. Department of Justice, Bureau of Justice Statistics (BJS), gathers and publishes statistics on numbers of prison and jail inmates and persons being released from prisons. The statistics on prisoners come from BJS's National Prisoner Statistics.[4] Statistics on jail populations come from BJS's Census of Jails conducted every 5 years and, in each intervening year, a sample-based *Prison and Jail Inmates at Midyear 1997*.[5] BJS's midyear 1997 inmate population statistics and data on 1996 releases (the latest available) were used because these reflect the situation closest to the date on which correctional systems provided data on HIV and AIDS to BJS's *Survey of Inmates in State and Federal Correctional Facilities*[6] and on STDs and TB to the *NIJ/CDC Ninth National Survey of HIV/AIDS, STDs, and TB in Correctional Facilities*,[7] on which many of the estimates are based.

This approach requires an estimate of the number of *unique* individuals released from jails and prisons during a specified year. Although BJS data report the number of releases from jails and prisons, they do not tell us the number of unique individuals. It is common for someone to be arrested and released more than once during a given year. Therefore, BJS data must be adjusted to provide an estimate of the number of releasees.

The National Institute of Justice (NIJ) provided Drug Use Forecasting (DUF, since renamed the Arrestee Drug Abuse Monitoring [ADAM] program) data from five sites. These data reported the number of times that an arrestee had been booked during the year just before the arrest that caused his or her inclusion in the DUF sample. Data were based on self-reports. Reasoning that arrests are generated by a Poisson process with unmeasured heterogeneity, those data were used to estimate that arrestees who admitted using cocaine or heroin weekly were arrested about 0.38 times per year while at liberty. These estimates were for weekly drug users because they are probably at greatest risk for the conditions of interest for this analysis. This estimate suggests that if A represents the number of arrests during a given year, then $A/1.38$ estimates the number of unique individuals who are arrested during the year.

Applying the factor of 1.38 will probably underestimate unique releasees because many of those at risk of arrest are not at liberty for the entire year. Because they are sometimes incarcerated, weekly drug users probably generate fewer than 0.38 arrests per year, so the estimate of the number of unique individuals booked into and

released from local jails is probably too small. On the other hand, people who are booked into and released from jail cannot be distinguished from those who are sentenced to jail. When the two populations are added up, some minor double counting results,[8] because most people serving jail terms must have been booked before being convicted. Dividing by 1.38 does not overcome that double counting. On balance, the convention of dividing BJS's figure for total number of jail releases by 1.38 probably provides an estimate of unique individuals that is close enough to reality for present purposes. Relying on this logic, BJS's estimate of 10 million jail releases was divided by 1.38 to yield an estimate of 7,246,377 individuals who were released from city and county jails during 1996.

The estimates also rely on the number of individuals who are released from State and Federal prisons, which BJS reports to have been 504,289 in 1996.[9] Because people typically spend 1 year or more in prison, the prison population is less likely to overlap the jail population. There may be some overlap because many people enter prison following parole violations. These people were probably arrested before being returned to prison, so there is some degree of overlap between jail releasees and prison releasees. This overlap is probably small, because persons returned to prison following a parole revocation typically serve long terms. A more troubling problem is that parole authorities often use short jail terms in lieu of longer prison terms as a response to technical parole violations. Use of jails for this purpose would certainly result in double counting, but it appears that parole violations account for less than 3 percent of the jail population, so the double counting cannot be severe.[10]

A count of prison releasees includes some duplicate counting because some prisoners are released on parole, have their releases revoked, and then are released again after serving the time attributed to their revocation. Again, because revocations usually result in lengthy prison stays, double counting of prison releasees is negligible. Therefore, BJS's figure for prison releasees has been used.

Overall Approach to Estimating the Burden of Infectious Disease

To estimate the number of unique individuals with condition *D* who pass through jails and prisons, a formula was applied:

$$N_D = 7{,}246{,}377\ P_J + 504{,}289\ P_P$$

Where:

N_D = the number of unique individuals with condition *D* who pass through jails and prisons
P_J = the proportion of people in jail with condition *D*
P_P = the proportion of people in prison with condition *D*

Much of the rest of this paper discusses how P_J and P_P were estimated.

Because of the paucity of data on which some of the estimates are based, their precision is questionable. The gross accuracy of the estimates can be checked on the basis of the epidemiology of the conditions under study. This method is described below and used to evaluate the estimates presented later in the paper.

Assume that a total of T_D people in the U.S. population have condition *D*. Assume, furthermore, that condition *D* always results from injection drug use and never from any other cause. Finally, assume that injection drug users (IDUs) have a 0.32 probability of being released from jail or prison during any given year.[11] Then,

$$N_D/T_D = 0.32$$

This is to say that 0.32 is the approximate upper limit to the ratio of people with condition *D* who are released from any jail or prison during a specified year to all people in the U.S. population with condition *D*.

If condition *D* sometimes results from injection drug use but frequently results from behaviors

that do not put people at high risk of arrest, then the equality does not hold, and instead:

$N_D/T_D \leq 0.32$.

Some concrete illustrations may help make the case. Injection drug use appears to be the major transmission factor for hepatitis C virus (HCV) infection. The equality would apply, so one would expect about 32 percent of all persons with HCV infection to be released from jail or prison during any given year.

In contrast, IDUs account for about 24 percent of current AIDS cases.[12] Thus, the ratio of N_D/T_D would be somewhat greater than 0.32×0.24, or 0.08, because there are other important risk factors for HIV infection, and persons with histories of some of these risk behaviors are overrepresented in correctional populations. Using similar reasoning, those released from prison should account for considerably less than 32 percent of the national burden of other diseases that are transmitted primarily through needle use.

HIV Infection and AIDS

Data sources and limitations

The best sources for statistics on the prevalence of HIV disease in prison and jail populations are the surveys conducted by BJS. Using its annual *Survey of State and Federal Correctional Facilities,* BJS compiles statistics on numbers of inmates with HIV infection and confirmed AIDS at year-end. BJS first compiled and presented these statistics for 1991.[13] The series has been continued annually since then.[14] BJS also conducts a *Census of Jails* every 5 years and an annual sample-based *Survey of Inmates in Local Jails*, from which it develops estimates of the number of jail inmates with HIV infection and the number and proportion of jail inmate deaths due to HIV/AIDS.

The BJS surveys should provide fairly accurate counts of State and Federal inmates with AIDS, assuming that the correctional systems gather and report the statistics accurately. Unfortunately, BJS has no control over the accuracy of the correctional systems' reporting, and it is hard to evaluate that reporting systematically for adjustment or estimation purposes. The BJS statistics have a major limitation with regard to prevalence rates and numbers of inmates with HIV infection in both State and Federal and city and county systems. This limitation makes it necessary to adjust BJS's figures. BJS compiles its statistics on HIV infection from State and Federal prison systems that have different HIV testing policies. Only 16 State correctional systems had mandatory HIV testing of all new inmates in 1997. Most prison systems have voluntary or on-request HIV testing, the aggregate results of which almost certainly underestimate true HIV seroprevalence because some HIV-infected inmates will not accept voluntary testing.[15] The problem is even more pervasive with regard to HIV prevalence among jail inmates, because no major jail systems have mandatory testing.

Estimates and estimation methods

A national point prevalence estimate of inmates with confirmed AIDS and a period prevalence estimate of releasees with confirmed AIDS are presented in table 1, broken down by prison and jail systems. These estimates combine men and women. Regional estimates are provided for State prison systems. The most recent BJS prevalence percentage for State and Federal prison inmates with AIDS was 0.5 percent at year-end 1996. Several systems did not respond to the 1996 BJS survey, so the national and regional prevalence percentages were applied to the total inmate populations at midyear 1997 to obtain the national and regional estimates. It is estimated that more than 6,000 State and Federal prison inmates had AIDS in 1997. Because the national prevalence of AIDS among State and Federal inmates has remained steady at 0.5 percent since 1993,[16] it seems reasonable to apply the 1996 prevalence percentage forward 1 year to obtain the AIDS prevalence estimate for 1997. The national prevalence estimate of 0.5 percent for State and Federal inmates in 1996 was applied to the total jail population in 1997 to develop a national estimate of more than 2,800 jail inmates with AIDS in 1997. The national estimate for prison and jail inmates with AIDS in 1997 is more than 8,900, representing 4 percent of the almost

Table 1. National and Regional Estimates of Inmates and Releasees with AIDS					
Category	Est. % w/ AIDS, 1996[a]	Population, 1997[b]	Est. Inmates w/AIDS, 1997	Releasees, 1996[c]	Est. Releasees w/AIDS, 1996
State/Federal Prison Systems[d]	**0.5**	**1,218,256**	**6,091**	**504,289**	**2,521**
Federal Bureau of Prisons (FBOP)	0.4	110,160	441	24,945	100
States: Northeast	1.3	167,706	2,180	61,293	797
States: Midwest	0.3	212,779	638	93,243	280
States: South[d]	0.5	484,391	2,422	175,695	878
States: West	0.3	243,220	730	149,112	447
City/County Jail Systems	**0.5**	**567,079**	**2,835**	**7,246,337[e]**	**36,232**
Total	**0.5**	**1,785,335**	**8,926**	**7,750,666**	**38,753**

[a] Bureau of Justice Statistics, *Survey of State and Federal Correctional Facilities, 1996*.
[b] Gilliard, D.K., and A.J. Beck, *Prison and Jail Inmates at Midyear 1997*. Bureau of Justice Statistics Bulletin. Washington, DC: U.S. Department of Justice, Bureau of Justice Statistics, January 1998, NCJ 167247.
[c] Bureau of Justice Statistics, *Correctional Populations in the United States, 1996.* Washington, DC: U.S. Department of Justice, Bureau of Justice Statistics, 1999, NCJ 170013.
[d] Includes District of Columbia.
[e] BJS estimate of 10,000,000 jail releasees divided by 1.38. See text for discussion of method.

229,000 people living with AIDS in the total U.S. population at the end of 1997.[17] The 0.5 percent prevalence of AIDS among inmates is more than five times the estimated prevalence of 0.09 percent in the total U.S. population.

To estimate the number of people with AIDS released from State and Federal prison systems, the same 0.5 percent prevalence was applied to the total number of releasees from State and Federal prisons in 1996, the most recent available statistics. The national estimate is more than 2,500 State and Federal prison releasees with AIDS in 1996. To estimate the number of people with AIDS released from city and county jails, the same 0.5 percent prevalence was applied to the estimate of unduplicated jail releasees derived as described above. It is estimated that more than 36,000 jail releasees had AIDS in 1996. The estimated total of prison and jail releasees with AIDS in 1996 is almost 39,000. Seventeen percent of the estimated 229,000 persons living with AIDS in the United States in 1996[18] passed through a correctional facility that year. This ratio is in line with the checking methodology outlined above.

Estimating the number of inmates with HIV infection was more complicated because of variable testing policies. Because of the uncertainties involved, an estimated range based on a range of possible point prevalence rates is presented. These point prevalence estimates are shown in table 2, again broken down by prisons and jails but combined for men and women. Numerous studies have shown that HIV seroprevalence rates for inmates tend to be higher among women than among men. The estimates reflect all HIV-infected inmates, including those with AIDS.

The lower bound of the estimate is based on applying BJS's 2.3-percent national HIV prevalence among State and Federal prison inmates in 1996 to the national total of State and Federal inmates, and BJS's regional prevalence rates to the regional totals of State inmates. The same was done to obtain the lower bound of State and Federal releasees with HIV infection.

Table 2. National and Regional Estimates of Inmates and Releasees with HIV Infection					
Category	Est. % HIV+, 1996 (Range)	Population, 1997	Est. HIV+ Inmates, 1997 (Range)	Releasees, 1996	Est. HIV+ Releasees, 1996 (Range)
State/Federal Prison Systems[a]	**2.3[b]–2.98**	**1,218,256**	**28,020–36,304[d]**	**504,289**	**11,599–15,028[d]**
FBOP	1.0–1.5	110,160	1,102–1,652	24,945	249–374
States: Northeast	7.5–7.85	167,706	12,577–13,165	61,293	4,597–4,812
States: Midwest	1.0–1.26	212,779	2,128–2,681	93,243	932–1,175
States: South[a]	1.9–2.93	484,391	9,203–14,193	175,695	3,338–5,148
States: West	0.8–1.88	243,220	1,946–4,573	149,112	1,193–2,803
City/County Jail Systems	**1.2[c]–1.8**	**567,079**	**6,805–10,207**	**7,246,377**	**86,956–130,435**
Total		**1,785,335**	**34,825–46,511**	**7,750,666**	**98,555–145,463**

[a] Includes District of Columbia.
[b] Bureau of Justice Statistics, *Survey of State and Federal Correctional Facilities, 1996.*
[c] Bureau of Justice Statistics, *1996 Survey of Inmates in Local Jails.*
[d] Regional estimates do not add to these totals due to rounding.

The upper bound was obtained by adjusting upward the aggregate HIV seropositivity rates reported to the BJS survey by the Federal prison system, which does not mandatorily test at intake, and by all but four of the States with voluntary testing. All of these adjustments are shown in table 3. The four voluntary testing States whose BJS figures were not adjusted were New York and Connecticut, whose reported seropositivity rates were very close to those found in blinded seroprevalence studies, and Oregon and Wisconsin, where comparative studies showed that seropositivity in voluntary testing was very similar to seroprevalence in blinded intake studies.[19]

For the other States and the Federal Bureau of Prisons, it was decided to increase the HIV seropositivity rate reported to BJS by 50 percent or by a specific adjustment factor for that system, if available. The adjustment factor was based on comparisons between seropositivity rates found in voluntary testing versus blinded seroprevalence studies. In high-prevalence States such as New York, Maryland, and California, rates from blinded studies were 2–3 times higher than in voluntary testing. In States such as Oregon and Wisconsin, by contrast, rates were similar. The extent of the discrepancy depends on the system's policy in encouraging inmates to be tested voluntarily and the receptivity of the inmates to being tested. Some inmates may be in denial or may fear discrimination, mistreatment, or breach of confidentiality. These conditions vary across and within systems. Therefore, 50 percent was considered a conservative upward adjustment for States without available comparisons of voluntary versus mandatory testing or blinded studies.

For the small number of systems that did not report HIV seropositivity statistics to BJS, BJS's seropositivity rate for the State's region was used if the State had mandatory testing or the regional rate was adjusted upward by 50 percent if the State had voluntary testing. Applying the estimated national prevalence range of 2.3–2.98 percent, which is 8–10 times the prevalence in the total U.S. population, it is estimated that between 28,000 and 36,000 State and Federal inmates had HIV infection in 1997 (table 2).

Because no major jail systems have mandatory HIV testing, the BJS prevalence estimate of 1.2 percent for jail inmates was used as the lower bound. This rate was adjusted upward by 50 percent to 1.8 percent to obtain the upper bound. This estimated national range is much lower than rates found in studies of certain large jail systems, notably New York City's, but is still 4–6 times the estimated prevalence of HIV infection in the total U.S. population.

Table 3. Derivation of HIV Prevalence Estimates for State and Federal Prison Systems					
Jurisdiction	**HIV Testing Policy**	**% HIV+ 1996 (BJS)**	**% HIV+ (Adjusted)**	**Population 1997**	**Est. HIV+ Inmates 1997 (Range)**
Northeast		7.5	7.85	167,706	12,577–13,165[i]
Connecticut	voluntary	4.6	4.6[a]	15,608	718–718
Maine	voluntary	0.3	0.45	1,559	5–7
Massachusetts	voluntary	3.6	5.0[b]	11,907	429–595
New Hampshire	mandatory	0.9	0.9	2,153	19–19
New Jersey	voluntary	3.0	4.5	27,766	833–1,249
New York	voluntary	13.6	13.6[c]	69,530	9,456–9,456
Pennsylvania	voluntary	1.9	2.85	34,703	659–989
Rhode Island	mandatory	3.9	3.9	3,293	128–128
Vermont	voluntary	0.3	0.45	1,187	4–5
Midwest		1.0	1.26	212,779	2,128–2,681[i]
Illinois	voluntary	1.6	2.4	40,425	647–970
Indiana	voluntary	—[d]	1.5	17,549	?–263
Iowa	mandatory	0.4	0.4	6,636	27–27
Kansas	voluntary	0.2	0.3	7,790	16–23
Michigan	mandatory	1.2	1.2	43,784	525–525
Minnesota	voluntary	0.5	0.75	5,348	27–40
Missouri	mandatory	0.9	0.9	23,687	213–213
Nebraska	mandatory	0.5	0.5	3,431	17–17
North Dakota	mandatory	0.4	0.4	739	3–3
Ohio	voluntary	0.7	1.05	47,248	331–496
South Dakota	voluntary	0.2	0.3	2,177	4–7
Wisconsin	voluntary	0.7	0.7[e]	13,965	98–98
South		1.9	2.93	474,652	9,018–13,907[i]
Alabama	mandatory	1.1	1.1	22,076	243–243
Arkansas	voluntary	0.9	1.35	9,539	86–129
Delaware	voluntary	—	2.85	5,313	?–151
Florida	voluntary	3.4	5.1	64,713	2,220–3,300
Georgia	mandatory	2.3	2.3	36,329	836–836
Kentucky	voluntary	0.5	0.75	13,858	69–104
Louisiana	voluntary	2.0	3.0	28,382	568–851
Maryland	voluntary	3.8	11.4[f]	22,415	852–2,555
Mississippi	mandatory	1.3	1.3	14,639	190–190
North Carolina	voluntary	2.0	3.0	32,334	647–970
Oklahoma	mandatory	0.7	0.7	19,931	140–140
South Carolina	voluntary[g]	2.1	3.15	21,021	441–662
Tennessee	voluntary	1.0	1.5	15,827	158–237
Texas	voluntary	1.4	2.1	136,599	1,912–2,869
Virginia	voluntary	1.5	2.25	28,673	430–645
West Virginia	voluntary	0.3	0.45	3,003	9–14

Table 3. Derivation of HIV Prevalence Estimates for State and Federal Prison Systems (continued)					
Jurisdiction	**HIV Testing Policy**	**% HIV+ 1996 (BJS)**	**% HIV+ (Adjusted)**	**Population 1997**	**Est. HIV+ Inmates 1997 (Range)**
West		0.8	1.88	243,220	1,946–4,573[i]
Alaska	voluntary	0.3	0.45	3,741	11–17
Arizona	voluntary	0.9	1.35	23,176	209–313
California	voluntary	0.8	2.4[h]	153,010	1,224–3,672
Colorado	mandatory	0.9	0.9	12,840	116–116
Hawaii	voluntary	0.7	1.05	4,491	31–47
Idaho	mandatory	0.5	0.5	4,105	21–21
Montana	voluntary	0.4	0.6	2,295	9–14
Nevada	mandatory	1.6	1.6	8,617	138–138
New Mexico	voluntary	0.2	0.3	4,692	9–14
Oregon	voluntary	0.5	0.5[e]	7,899	39–39
Utah	mandatory	0.7	0.7	4,154	29–29
Washington	voluntary	0.8	1.2	12,732	102–153
Wyoming	mandatory	0.3	0.3	1,468	4–4
FBOP	voluntary	1.0	1.5	110,160	1,102–1,652
Total		**2.3**	**2.98**		

[a] The rate reported to BJS in 1993 was close to that found in an anonymous mail intake study in the same year and to seroprevalence estimates for women. Therefore, the BJS figure was not adjusted. See Altice, F.L., F. Mostashari, P.A. Selwyn, P.J. Checko, R. Singh, S. Tanguay, and E.A. Blanchette, "Predictors of HIV Infection Among Newly Sentenced Male Prisoners," *Journal of AIDS and Human Retrovirology* 18(5)(1998): 444–453; and Mostashari, F., E. Riley, P.A. Selwyn, and F.L. Altice, "Acceptance and Adherence with Antiretroviral Therapy Among HIV-Infected Women in a Correctional Facility," *Journal of AIDS and Human Retrovirology* 18(4)(1998): 341–348.

[b] Blinded serosurveys, Mass. Department of Public Health, 1997.

[c] Close to blinded study results so not adjusted.

[d] Did not report to BJS Survey.

[e] Studies have shown voluntary and blinded studies yield similar HIV+ rates so not adjusted.

[f] Results of voluntary testing in 1991 reported to BJS—2.5% HIV+ versus results of blinded study in 1991—8.5% HIV+. (See Harlow, C.W. *HIV in U.S. Prisons and Jails.* Bureau of Justice Statistics Special Report. Washington, DC: U.S. Department of Justice, Bureau of Justice Statistics, September 1993, NCJ 143292; and Ruiz, J.D., and J. Mikanda, "Seroprevalence of HIV, Hepatitis B, Hepatitis C, and Risk Behaviors Among Inmates Entering the California Correctional System," California Department of Health Services, Office of AIDS, HIV/AIDS Epidemiology Office, March 1996). Thus, the BJS figure was inflated by 3.

[g] Mandatory testing began in 1998.

[h] Result of voluntary testing in 1994 as reported to BJS—0.8% HIV+ versus results of blinded study of incoming inmates in 1994—2.5% HIV+. (See Brien, P.M. and A.J. Beck, *HIV in Prisons 1994*. Washington DC: U.S. Department of Justice, Bureau of Justice Statistics, 1996, NCJ 158020; and Ruiz, J.D., and J. Mikanda, "Seroprevalence of HIV, Hepatitis B, Hepatitis C, and Risk Behaviors Among Inmates Entering the California Correctional System," California Department of Health Services, Office of AIDS, HIV/AIDS Epidemiology Office, March 1996). Thus the BJS reported rate was inflated by 3.

[i] State estimates do not add to these totals due to rounding.

The HIV prevalence estimate for jails was also compared to an estimate obtained by a different method. The percentage of inmates with self-reported injection drug use in the past 6 months (8.8 percent) in the 25 jail systems that participated in DUF over the period 1989–98 was multiplied by the estimated national HIV seroprevalence of 14 percent among IDUs based on analysis of data from 96 metropolitan areas in the United States.[20] This procedure yielded an estimate of 1.2 percent seroprevalence among jail inmates, identical to the BJS estimate of HIV seroprevalence among jail inmates nationwide.

Applying the range of 1.2–1.8 percent seroprevalence to the total number of jail inmates in 1997 yields an estimate of 6,800–10,200 jail inmates with HIV infection. The total estimate of almost 35,000

to more than 46,500 prison and jail inmates with HIV infection in 1997 represents 5–6 percent of all people living with HIV in the U.S. population.

Estimates of the numbers of prison and jail releasees with HIV infection (table 2) were obtained by applying the above prevalence ranges to the same population and release figures used for the AIDS estimates. This produced an estimate of between 98,000 and 145,000 people with HIV infection released from U.S. prisons and jails in 1996, including those with AIDS. Based on this range, it is estimated that between 13.1 and 19.3 percent of the roughly 750,000 people estimated by the Centers for Disease Control and Prevention (CDC) to be living with HIV infection in the United States in 1996 passed through a correctional facility that year. This range of percentages is within the parameters based on the checking methodology presented above.

Sexually Transmitted Diseases: Syphilis, Gonorrhea, and Chlamydia

Data sources and limitations

The sources for development of national estimates of the prevalence of STDs among correctional inmates are limited. The CDC's national STD surveillance program does not flag cases identified in correctional facilities. There are a few system-specific studies of syphilis and chlamydia prevalence.[21] CDC has recently initiated a system for monitoring prevalence of syphilis, gonorrhea, and chlamydia among jail inmates in the United States. Some early data are available from this system.[22]

The 1994 and 1997 national surveys of HIV/AIDS, STDs, and TB in correctional facilities that were sponsored by the CDC and NIJ sought data on STD screening policies and on the numbers of inmates who were screened and tested positive for syphilis, gonorrhea, and chlamydia during the 12 months before completion of the survey. The most useful data are the results of mandatory and routine screening, which are most representative of the total inmate population. Much data is missing, however, reflecting that many systems do not have mandatory or routine screening and that many of those that do screen (especially for syphilis) could not or would not report the results to the survey. The combination of statistics from the NIJ/CDC survey and the CDC STD Prevalence Monitoring Program provided enough observations with acceptable diversity of size and geographic location to produce supportable national estimates, as described below.

The data used to develop these prevalence estimates represent positive rapid plasma reagin (RPR) serologies for syphilis and positive tests for infection with gonorrhea and chlamydia. A number of qualifications must be noted, especially for the syphilis estimates, the first set of which indicates that the estimates based on such testing data may be overstated. The national incidence of syphilis has declined substantially since 1997; the disease is now concentrated in areas of the Southeast and some large cities outside that region. The sentinel surveillance jurisdictions in the CDC's STD monitoring program are heavily weighted toward those where syphilis remains more prevalent. More generally, the testing data on which estimates are based do not necessarily reflect active disease or infectiousness. The data reflect a combination of testing methodologies that may have different sensitivities. Data reported to the NIJ/CDC surveys probably do not represent confirmed positivity, and thus include some number of biological false positives for syphilis (which are associated with drug use or pregnancy). The data from the CDC's STD prevalence monitoring program are more likely to be based on confirmed positivity. Nevertheless, even confirmed RPR positivity does not indicate syphilis disease stage or infectiousness. Some proportion of confirmed positive results are in individuals with old, already treated infection. In addition, some percentage of inmates who test positive for STDs will be treated successfully during their incarceration. As a result, using estimates of STD positivity among incoming inmates to produce estimates of the number of offenders released with STDs may artificially inflate estimates of STDs among releasees.

On the other hand, intake jail testing usually does not occur until an individual has been in jail for at least 72 hours and, in some jurisdictions, at least 14 days. A large proportion of jail inmates are

probably released on bail or otherwise before receiving any intake screening. Sex workers and others likely to be at highest risk for STDs may be disproportionately represented among those released without having been screened. These circumstances would suggest that statistics on jail intake screening for STDs may understate the true prevalence of STDs among people passing through jails.

Another important consideration is that some STDs such as gonorrhea and chlamydia are often asymptomatic. Infected individuals may act as carriers and vectors of disease without becoming symptomatic or knowing of their own infection.

Estimates and estimation methods

As shown in table 4, it is estimated that between 46,000 and 76,000 prison and jail inmates and between 202,000 and 332,000 releasees had positive RPR serologies for syphilis in 1997. A positive RPR serology is only a crude indication of infection. It does not reflect disease stage or infectiousness. For the reasons enumerated above, these estimates may be overstated. The figures are based on a range of 2.6–4.3 percent prevalence of RPR positivity in prison and jail systems combined. Because of the regional differences in syphilis incidence noted above, two weighted average prevalence estimates were generated, combining statistics for mandatory or routine intake screening from the 1997 NIJ/CDC survey and for routine intake screening from the CDC's STD Prevalence Monitoring Program for 1997. The upper end is based on all observations available, including jurisdictions in the South, while the lower end excludes southern jurisdictions.

The observations used in both calculations are shown in tables 5a and 5b. The average was weighted by total inmate population in each system. Although gender differences are important in STD prevalence and course of infection, it was impossible to calculate separate estimates for men and women because many systems only reported aggregated data.

For gonorrhea and chlamydia, weighted averages were calculated that pooled State and Federal and city and county systems. This yielded estimated prevalence rates of 1.0 percent for gonorrhea and 2.4 percent for chlamydia. The period prevalence estimates shown in tables 6 and 7 suggest that almost 18,000 inmates and 77,000 releasees were infected with gonorrhea, and almost 43,000 inmates and 186,000 releasees were infected with chlamydia. These estimated prevalence rates were derived by calculating weighted averages of system-specific rates based on mandatory or routine intake screening reported to the 1997 NIJ/CDC survey and the CDC's STD Prevalence Monitoring Program in 1997. All of these observations are shown in tables 8 and 9.

Five jurisdictions reported gonorrhea prevalence data for women only to the CDC Prevalence Monitoring Program; seven jurisdictions reported chlamydia prevalence data for women only. These women-only rates were converted to overall rates based on comparison of gender-specific data for gonorrhea screening in San Francisco (1.7 percent of men and 2.5 percent of women) and Cook County (2.0 percent of men and 4.2 percent of women). Based on these comparisons, female gonorrhea prevalence rates were estimated to be 75 percent higher than male rates. The overall prevalence estimate was then calculated based on the gender distribution of jail inmates reported by BJS in 1997—89 percent men and 11 percent women.

Table 4. National Estimates of Inmates and Releasees with Positive RPR Serologies

Category	Est. % RPR+	Population, 1997	Est. RPR+ Inmates, 1997	Releasees, 1996	Est. RPR+ Releasees, 1996
All systems	2.6–4.3	1,785,335	46,597–76,537	7,750,666	202,292–332,271

Table 5a. Derivation of RPR+ Prevalence Estimates (Southern Jurisdictions Excluded)						
Jurisdiction[a]	**# Tested**	**# Positive**	**% Positive**	**Population, 1997**	**Weight**	**Weighted % Positive**
NIJ/CDC Survey *(unless otherwise noted)*						
Idaho	2,540	3	0.1	4,105	0.020	0.001977
Illinois	22,722	246	1.1	40,425	0.195	0.214143
Iowa	4,090	2	0.5	6,636	0.032	0.015979
Kansas	6,540	65	1	7,790	0.038	0.037515
Massachusetts	9,956	530	5.3	11,907	0.057	0.303907
Missouri	14,716	73	0.5	23,687	0.114	0.057035
Nevada	3,384	20	0.6	8,617	0.041	0.024898
Oregon	6,769	34	0.5	7,899	0.038	0.019020
New Jersey	11,880	254	2.1	27,766	0.134	0.280798
Rhode Island	11,157	150	1.3	3,293	0.016	0.020616
West Virginia	1,850	16	0.9	3,003	0.014	0.013015
Wisconsin	5,551	56	1	13,965	0.067	0.067252
Wyoming	807	2	0.2	1,468	0.007	0.001414
Alameda, California	7,128	278	3.9	4,098	0.020	0.076966
Nassau, New York	10,500	276	2.6	1,739	0.008	0.021774
New York City, New York	120,765	11,728	9.7	17,528	0.084	0.818777
Philadelphia, Pennsylvania	21,441	2,322	10.8	5,563	0.027	0.289331
Maricopa, Arizona[b]			2.7	6,732	0.032	0.087533
San Francisco, California[c]	3,594	301	8.4	2,243	0.011	0.090734
Chicago (Cook), Illinois[d]	100,981	3,817	3.8	9,189	0.044	0.168156
Total				**207,653**	**1.000**	
Weighted Average Prevalence Estimate						**2.610839**

[a] Source is NIJ/CDC Survey unless otherwise noted.
[b] CDC STD Prevalence Monitoring Program, 1997.
[c] San Francisco Department of Public Health, STD Prevention and Control Section. September, 1998. *STD Screening: San Francisco County Jails, 1997.*
[d] Chicago Department of Public Health, STD/HIV Prevention Program, unpublished data.

Table 5b. Derivation of RPR+ Prevalence Estimates (Southern Jurisdictions Included)						
Jurisdiction/Source	**# Tested**	**# Positive**	**% Positive**	**Population, 1997**	**Weight**	**Weighted % Positive**
NIJ/CDC Survey						
Arkansas	699	72	10.3	9,539	0.020	0.030
Georgia	13,811	457	3.3	36,329	0.195	0.114
Idaho	2,540	3	0.1	4,105	0.032	0.013
Illinois	22,722	246	1.1	40,425	0.038	0.127
Iowa	4,090	2	0.5	6,636	0.057	0.021
Kansas	6,540	65	1	7,790	0.114	0.025
Massachusetts	9,956	530	5.3	11,907	0.041	0.037
Mississippi	6,718	914	13.6	14,639	0.038	0.046
Missouri	14,716	73	0.5	23,687	0.134	0.075
Nevada	3,384	20	0.6	8,617	0.016	0.027
Oregon	6,769	34	0.5	7,899	0.014	0.025
New Jersey	11,880	254	2.1	27,766	0.067	0.087
Rhode Island	11,157	150	1.3	3,293	0.007	0.010
West Virginia	1,850	16	0.9	3,003	0.020	0.009
Wisconsin	5,551	56	1	13,965	0.008	0.044
Wyoming	807	2	0.2	1,468	0.084	0.005
Alameda, California	7,128	278	3.9	4,098	0.027	0.013
Washington, D.C.	10,568	1,634	15.5	6,873	0.032	0.022
Palm Beach, Florida	12,607	1,200	9.5	2,283	0.011	0.007
Pinellas, Florida	10,938	192	1.8	2,296	0.044	0.007
Dekalb, Georgia	1,682	72	4.3	2,491		0.008
Prince George's, Maryland	5,028	275	5.5	1,297		0.004
Nassau, New York	10,500	276	2.6	1,739		0.005
New York City, New York	120,765	11,728	9.7	17,528		0.055
Philadelphia, Pennsylvania	21,441	2,322	10.8	5,563		0.018
CDC STD Prevalence Monitoring Program						
Jefferson, Alabama			1.8	1,310	0.004	0.007421
Maricopa, Arizona			2.7	6,732	0.021	0.057205
San Francisco, California[a]	3,594	301	8.4	2,243	0.007	0.059297
Orange, Florida			10.4	3,411	0.011	0.111645
Fulton, Georgia			3.6	3,982	0.013	0.045116
Cook (Chicago), Illinois[b]	100,981	3,817	3.8	9,189	0.029	0.109895
Orleans, Louisiana			6.3	6,537	0.021	0.129612
Baltimore, Maryland			6.1	3,598	0.011	0.069074
Hinds, Mississippi			10.1	789	0.002	0.025080
Columbia, South Carolina			5.7	923	0.003	0.016558
Shelby, Tennessee			12.4	5,568	0.018	0.217293
Harris, Texas			6.7	8,224	0.026	0.173414
Total				**317,742**	**1.000**	
Weighted Average Prevalence Estimate						**4.287272**

[a] San Francisco Department of Public Health, STD Prevention and Control Section. September 1998. *STD Screening: San Francisco County Jails, 1997.*

[b] Chicago Department of Public Health, STD/HIV Prevention Program, unpublished data.

Table 6. National Estimates of Inmates and Releasees with Gonorrhea Infection					
Category	**Est. % w/ Gonorrhea Infection**	**Population, 1997**	**Est. Gonorrhea+ Inmates, 1997**	**Releasees, 1996**	**Est. Gonorrhea+ Releasees, 1996**
All systems	1.0	1,785,335	17,853	7,750,666	77,507

Table 7. National Estimates of Inmates and Releases with Chlamydia Infection					
Category	**Est. % w/ Chlamydia Infection**	**Population, 1997**	**Est. Chlamydia+ Inmates, 1997**	**Releasees, 1996**	**Est. Chlamydia+ Releasees, 1996**
All systems	2.4	1,785,335	42,848	7,750,666	186,016

Table 8. Derivation of Gonorrhea Prevalence Estimates					
Jurisdiction	**Year**	**# Tested**	**# Positive**	**% Positive**	**Population, 1997**
NIJ/CDC Survey	1996–97				
Idaho		150	2	1.3	4,105
Wisconsin		2,500	11	0.4	13,965
Wyoming		807	1	0.1	1,468
CDC STD Prevalence Monitoring Program	1997				
San Francisco, California[a]		4,309	82	2.0	2,243
Connecticut		—	—	1.7	15,608
Washington, D.C.		—	—	1.1	6,873
Cook, Illinois[b]		108,941	2,475	2.3	9,189
Shawnee, Kansas		—	—	0.4	275
New York City, New York		—	—	1.4	17,528
Columbia, South Carolina		—	—	4.6	923
Shelby, Tennessee		—	—	0.8	5,568
Weighted Average Prevalence Estimate				**1.0**	

[a] San Francisco Department of Public Health, STD Prevention and Control Section. September 1998. *STD Screening: San Francisco County Jails, 1997.*
[b] Chicago Department of Public Health, STD/HIV Prevention Program, unpublished data.

Table 9. Derivation of Chlamydia Prevalence Estimates					
Jurisdiction	**Year**	**# Tested**	**# Positive**	**% Positive**	**Population, 1997**
NIJ/CDC Survey	1996–97				
Iowa		777	24	3.1	6,636
North Dakota		503	8	1.6	739
CDC STD Prevalence Monitoring Program	1997				
San Francisco, California*		5,106	317	6.2	2,243
Connecticut		—	—	2.8	15,608
Hawaii		—	—	2.3	4,491
Cook, Illinois		—	—	3.6	9,189
Shawnee, Kansas		—	—	1.4	275
New York City, New York		—	—	2.7	17,528
Multnomah, Oregon		—	—	3.6	1,467
King, Washington		—	—	1.8	2,412
Weighted Average Prevalence Estimate				**2.4**	

* San Francisco Department of Public Health, STD Prevention and Control Section. September 1998. *STD Screening: San Francisco County Jails, 1997.*

For chlamydia, San Francisco was the only jurisdiction for which gender-specific prevalence data were available. Because the data showed virtually identical rates for both sexes—6.2 percent among men and 6.1 percent among women—the chlamydia prevalence rate among women was used as the overall prevalence rate.

There are no reliable estimates of the prevalence of syphilis, gonorrhea, or chlamydia infection in the total U.S. population. The only prevalence statistics available are for demonstrably unrepresentative population segments, such as people requesting testing in STD or family planning clinics. Therefore, it is not possible to estimate the percentage of the total burden of these sexually transmitted infections that occurs among correctional populations.

Hepatitis B and C

Data sources and limitations

Data to develop national prevalence estimates of hepatitis B (HBV) and C (HCV) virus infection among correctional inmates are sparse. There is no national surveillance or systematically collected national data on hepatitis among inmates. The only direct data are from a few system-specific studies. The only two recent studies of HBV prevalence among inmates were done in the California State prison system[23] and the New York State prison system from 1987 to 1997.[24] An important issue for the epidemiology of HBV is that different markers have different meanings: reactivity to HBV surface antigen (HBsAg) indicates that a person is currently or chronically infected and possibly infectious, while reactivity to HBV core antibody (anti-HBc) and nonreactivity to HBsAg indicates that a person was infected at some unknown time in the past but is no longer infectious.

More correctional systems have conducted seroprevalence studies of HCV. Data are available from the States of California,[25] Connecticut,[26] Maryland,[27] Rhode Island,[28] and Washington.[29]

Estimates and estimation methods

An indirect method of estimation for HCV was used, given the paucity of direct prevalence data. HCV is thought to be transmitted primarily

through sharing drug injection equipment, although tattooing and body piercing may also be implicated. Sexual transmission of HCV is considered quite rare. According to the CDC, HCV prevalence among injection drug users is approximately 72–86 percent.[30] Available data suggest that about 24 percent of State prison inmates nationwide have histories of injection drug use.[31] A crude estimate of HCV seroprevalence among inmates can be obtained by multiplying these two percentages, yielding a range from 17 to 21 percent. This is substantially lower than the 30–41 percent found in the system-specific studies cited above: California—41 percent among male and female intakes;[32] Connecticut—32 percent among females;[33] Maryland—38 percent among men and women;[34] Rhode Island—33 percent among male and female inmates seeking culinary work assignments;[35] and Washington—30–40 percent among men and women.[36] Therefore the upper bound of national prevalence estimates was increased to 40 percent. Using this range of prevalence rates yields estimates of between 303,000 and 714,000 HCV-infected inmates and between 1.3 and 3.1 million HCV-infected releasees. This estimate of releasees with HCV suggests that an extremely high 29.3–68.9 percent of the estimated 4.5 million HCV-infected people in the U.S. population[37] served time in a correctional facility. The lower end of this ratio (29.3 percent) is within the 32 percent limit produced by the checking methodology presented earlier, but the upper end (68.9 percent) is more than double that limit.

Therefore, the range of prevalence rates was adjusted to produce ratios of correctional cases to total cases that fall within the 32 percent limit, even though this range is below the percentages found in all available system-specific studies. Table 10 presents national period prevalence estimates that 17.0–18.6 percent of prison and jail inmates and releasees were infected with HCV in 1996 and 1997, representing 303,000–332,000 inmates and 1.3–1.4 million releasees. Using the above method, it was not possible to provide separate estimates for prison and jail systems. The 17.0–18.6 percent prevalence range is between 9 and 10 times the estimated HCV prevalence of 1.8 percent in the U.S. population.[38]

The estimate of 1.3–1.4 million releasees with HCV suggests that an extremely high 29–32 percent of all persons with HCV infection passed through a correctional facility in 1996.

Given the extreme paucity of data on HBV prevalence and the different measures involved and reported, estimating national seroprevalence for this condition is perilous. The indirect estimation method used for HCV is not appropriate to HBV because HBV is commonly transmitted both sexually and parenterally.

Table 11 presents a period prevalence estimate that 2 percent of inmates and releasees, representing more than 35,000 inmates and 155,000 releasees, are positive for the HBV surface antigen (HBsAg) indicating current or chronic HBV infection and possible infectiousness. This estimate is based on

Table 10. National Estimates of Inmates and Releasees with Hepatitis C (HCV) Infection

Category	Est. % w/ HCV Infection* (Range)	Population, 1997	Est. Anti-HCV+ Inmates, 1997 (Range)	Releasees, 1996	Est. Anti-HCV+ Releasees, 1996 (Range)
All systems	17–18.6	1,785,335	303,507–332,072	7,750,666	1,317,613–1,441,624

* Defined as HCV antibody positive.

Table 11. National Estimates of Inmates and Releasees with Current or Chronic Hepatitis B Infection

Category	Est. % w/ HBsAg*	Population, 1997	Est. HBsAg+ Inmates, 1997	Releasees, 1996	Est. HBsAg+ Releasees, 1996
All systems	2	1,785,335	35,707	7,750,666	155,013

* Hepatitis B surface antigen.

the 2 State studies in California (1994) and New York (1987–97), which yielded similar results: 2.2 percent in California[39] and 1.8 percent in New York.[40] Time series data from New York indicate that the HBsAg seroprevalence among incoming inmates remained virtually flat between 1987 and 1997.[41] The proposed national estimate is 2 percent, which is 5 times the national prevalence estimate of 0.4-percent positivity to HBsAg.[42] The estimate of 155,000 releasees with HCV infection indicates that 12.4–15.5 percent of the national burden of chronic or current HBV infection (1–1.25 million persons)[43] in 1996 occurred in individuals who passed through a correctional facility that year. This ratio falls within the limit derived from the checking method described above.

Tuberculosis Infection and Disease

Data sources and limitations

The primary source for prevalence estimates of TB infection and disease among inmates is the 1997 NIJ/CDC survey. The survey sought data on the number of inmates screened by purified protein derivative (PPD) and the number who tested positive during the 12 months before the survey was completed, yielding a period prevalence estimate. In addition, the survey sought data on the number of inmates under treatment for active TB disease at the time the survey was completed, yielding a point prevalence estimate. Response rates were good for active TB disease—69 percent of State and Federal systems and 88 percent of city and county systems. They were lower but still probably adequate for TB infection (PPD screening)—47 percent of State and Federal systems and 61 percent of city and county systems.

An additional source of information on the prevalence of TB infection and disease is the CDC TB surveillance data. Since 1994, the CDC surveillance case report for TB disease has included a space to indicate whether the patient was a resident of a correctional facility at the time of diagnosis. The CDC surveillance data can be used to calculate period prevalence of TB disease in correctional settings as well as in the total population.

Estimates and estimation methodology

Prevalence estimates for TB disease and TB infection were calculated from the 1997 NIJ/CDC survey results using the same method applied to syphilis. Weighted average prevalence estimates were calculated on the basis of the inmate populations of the reporting systems. Table 12 presents point prevalence estimates that 0.04 percent of State and Federal prison inmates and 0.17 percent of city and county jail inmates—a total of more than 1,400 inmates in all systems—were under treatment for TB disease in 1997.

These prevalence rates are between 4 times (for State and Federal prison inmates) and 17 times (for city and county jail inmates) the rate of 0.01 percent found in the total U.S. population based on CDC surveillance data for 1996.[44] Applying the estimated prevalence among inmates to releasees indicates that 200 persons were released from State and Federal prisons with active TB in 1996, while more than 12,000 persons with active TB were released from city and county jails that year.

This suggests that 35 percent of the approximately 34,000 persons with active TB disease in

Table 12. National Estimates of Inmates and Releasees with Tuberculosis Disease

Category	Est. % with TB Disease	Population, 1997	Est. Inmates w/TB Disease, 1997	Releasees, 1996	Est. Releasees w/TB Disease, 1996
State/Federal prison systems	0.04	1,218,256	487	504,289	202
City/county jail systems	0.17	567,079	964	7,246,377	12,319
Total		**1,785,335**	**1,451**	**7,750,666**	**12,521**

the United States in 1996 passed through a correctional facility that year.

The prevalence of TB disease in the total U.S. population in 1996 was estimated by using data from the CDC's TB registry and TB surveillance reports. The TB registry reports, which provided data on numbers of prevalent cases of TB disease, were discontinued after 1994. After 1994, only incidence data on TB disease are available. Therefore, ratios of prevalence to incidence were calculated for 1992, 1993, and 1994. The prevalence of TB disease during a given year was taken to be the sum of cases at the start of the year and cases added during the year. The incidence figure was taken from the CDC's TB surveillance reports.[45] The average ratio of 0.627 for the 3 years was applied to the 1996 incidence figure of 21,337 to obtain an estimated prevalence of TB disease in that year of 34,030.

Table 13 shows the data from the prison and jail systems reporting to the 1997 NIJ/CDC survey that were used to calculate the TB disease prevalence estimates. According to the CDC surveillance data, 790 TB cases were diagnosed among correctional inmates in 1996, a figure very close to the 768 inmates reported to the 1997 NIJ/CDC survey as under treatment for active TB disease.

Tables 14 and 15 present the period prevalence estimates and underlying NIJ/CDC survey data for TB infection. It is estimated that 7.4 percent of State and Federal inmates and 7.3 percent of city and county inmates were PPD positive in 1997—more than 90,000 prison inmates and more than 41,000 jail inmates. Applying these prevalence percentages to releasees results in an estimate that more than 37,000 people with TB infection were released from State and Federal prisons in 1996, and almost 529,000 TB-infected people were released from city and county jails in that year. There are no estimates of the prevalence of PPD positivity in the total U.S. population, so it is not possible to calculate the percentage of the national burden of TB infection that is attributable to correctional facilities.

Conclusion

The estimates presented in this paper, as summarized in table 16, demonstrate that the burden of infectious disease among correctional inmates and releasees in the United States is heavy. Available comparative statistics show that the prevalence of AIDS, HIV infection, HCV, and TB disease are many times higher in correctional populations than in the total U.S. population, and that a disproportionate share of the burden of infectious disease is found among people who serve time in correctional facilities. During 1996, about 3 percent of the U.S. population passed through a correctional facility. By contrast, between 12 and 35 percent of the burden of key infectious diseases was found in this relatively small segment of the population.

The policy implication of these findings is clear. Correctional facilities are critical settings in which to provide interventions for the prevention and treatment of infectious diseases. Such interventions stand to benefit not only the inmates and their families and partners, but also the public health of the communities to which the vast majority of inmates return.

Table 13. Derivation of TB Disease Prevalence Estimates, NIJ/CDC Survey				
Jurisdiction	**Year**	**Inmates Under Treatment for TB**	**% w/TB Disease**	**Population, 1997**
State/Federal prison systems	1996–97			
Alaska		2	0.05	3,741
Arizona		5	0.02	23,176
Arkansas		5	0.05	9,539
Connecticut		1	0.006	15,608
Delaware		0	—	5,313
Georgia		17	0.05	36,329
Hawaii		0	—	4,491
Idaho		2	0.05	4,105
Iowa		0	—	6,636
Kentucky		0	—	13,858
Louisiana		6	0.02	28,382
Massachusetts		1	0.008	11,907
Mississippi		0	—	14,639
Missouri		2	0.008	23,687
Nevada		1	0.01	8,617
New Hampshire		0	—	2,153
New Jersey		19	0.07	27,766
New Mexico		0	—	4,692
New York		142	0.2	69,530
North Carolina		8	0.02	32,334
Oklahoma		6	0.03	19,931
Oregon		0	—	7,899
Pennsylvania		0	—	34,703
Rhode Island		2	0.07	3,293
Tennessee		4	0.03	15,827
Texas		74	0.05	136,599
Utah		0	—	4,154
Vermont		0	—	1,187
Virginia		0	—	28,673
West Virginia		6	0.2	3,003
Wisconsin		1	0.007	13,965
Federal Bureau of Prisons		16	0.01	110,160
Weighted Average Prevalence Estimate			**0.04**	

Table 13 (continued)

Jurisdiction	Year	Inmates Under Treatment for TB	% w/TB Disease	Population, 1997
Maricopa, Arizona		0	—	6,732
Alameda, California		3	0.07	4,098
Contra Costa, California		2	0.13	1,574
Fresno, California		2	0.09	2,107
Orange, California		4	0.07	5,368
Los Angeles, California		31	0.14	21,962
Riverside, California		20	0.79	2,528
San Bernardino, California		2	0.05	4,156
San Francisco, California		1	0.04	2,243
Santa Clara, California		1	0.02	4,588
Denver, Colorado		0	—	1,760
Washington, DC		0	—	6,873
Broward, Florida		0	—	4,125
Dade, Florida		0	—	7,320
Duval, Florida		4	0.16	2,507
Hillsborough, Florida		0	—	3,155
Orange, Florida		6	0.18	3,411
Palm Beach, Florida		2	0.09	2,283
Pinellas, Florida		0	—	2,296
Dekalb, Georgia		5	0.2	2,491
Cook, Illinois		9	0.1	9,189
Prince Georges, Maryland		0	—	1,297
Wayne, Michigan		0	—	2,708
Essex, New Jersey		1	0.05	2,025
Passaic, New Jersey		3	0.15	1,942
Nassau, New York		0	—	1,739
New York City, New York		63	0.36	17,528
Cuyahoga, Ohio		0	—	1,705
Franklin, Ohio		2	0.13	1,501
Philadelphia, Pennsylvania		70	1.26	5,563
Shelby, Tennessee		26	0.47	5,568
Bexar, Texas		3	0.08	3,683
Tarrant, Texas		1	0.03	3,366
Travis, Texas		0	—	2,132
King, Washington		0	—	2,349
Weighted Average Prevalence Estimate			**0.17**	

Table 14. National Estimates of Inmates and Releasees with TB Infection*

Category	Est. % PPD+	Population, 1997	Est. PPD+ Inmates	Releasees, 1996	Est. PPD+ Releasees, 1996
State/Federal prison systems	7.4	1,218,256	90,151	504,289	37,317
City/County jail systems	7.3	567,079	41,397	7,246,377	528,986
Total		**1,785,335**	**131,548**	**7,750,666**	**566,303**

* Defined as positive PPD skin test.

Table 15. Derivation of TB Infection Prevalence Estimates

Jurisdiction	Year	# Tested	# PPD+	% PPD+	Population, 1997
State/Federal prison systems	1996–97				
Connecticut		21,660	856	3.9	15,608
Delaware		45,944	324	0.7	5,313
Georgia		15,407	1,089	7.1	36,329
Hawaii		5,447	211	3.9	4,491
Idaho		3,832	76	2.0	4,105
Iowa		8,275	145	1.8	6,636
Kansas		8,069	1,283	15.9	7,790
Maryland		23,095	283	1.2	22,415
Massachusetts		15,525	506	3.3	11,907
Mississippi		10,942	442	4.0	14,639
Missouri		27,238	592	2.2	23,687
Nebraska		1,750	65	3.7	3,431
Nevada		12,617	380	3.0	8,617
New Jersey		10,154	386	3.8	27,766
New York[a]		11,366	2,546	22.4	69,530
North Carolina		17,031	836	4.9	32,334
Oklahoma		12,300	227	1.8	19,931
Oregon		11,428	323	2.8	7,899
Rhode Island		13,000	190	1.4	3,293
Utah		3,537	213	6.0	4,154
Virginia		9,974	489	4.9	28,673
West Virginia		1,850	12	0.6	3,003
Wisconsin		11,463	156	1.4	13,965
Wyoming		696	13	1.9	1,468
Weighted Average Prevalence Estimate				**7.4**	

Table 15 (continued)

Jurisdiction	Year	Number Tested	Number PPD+	% PPD+	Population, 1997
City/County jail systems	1996–97				
Alameda, California		38,510	4,447	11.5	4,098
Contra Costa, California		6,100	405	6.6	1,574
Orange, California		22,749	1,935	8.5	5,368
Riverside, California		8,494	377	4.4	2,528
Washington, D.C		4,716	304	6.4	6,873
Dade, Florida		9,157	1,188	13.0	7,320
Hillsborough, Florida		52,728	2,063	3.9	3,155
Orange, Florida		12,263	289	2.4	3,411
Palm Beach, Florida		12,613	691	5.5	2,283
Pinellas, Florida		5,400	274	5.1	2,296
Dekalb, Georgia		16,094	1,318	8.2	2,491
Cook, Illinois		22,673	954	4.2	9,189
Prince Georges, Maryland		15,365	983	6.4	1,297
Wayne, Michigan		15,562	1,042	6.7	2,708
Clark, Nevada		1,786	171	9.6	2,113
Essex, New Jersey		16,000	960	6.0	2,025
New York City, New York[a]		76,516	8,806	11.5	17,528
Cuyahoga, Ohio		1,316	79	6.0	1,705
Franklin, Ohio		3,948	57	1.4	1,501
Philadelphia, Pennsylvania		20,230	793	3.9	5,563
Shelby, Tennessee		4,573	131	2.9	5,568
Bexar, Texas		41,475	796	1.9	3,683
Tarrant, Texas		15,870	657	4.1	3,366
Travis, Texas		13,800	1,500	10.9	2,132
King, Washington		1,923	224	11.6	2,349
Durham, North Carolina[b]		1,009	89	8.8	477
Weighted Average Prevalence Estimate				**7.3**	

[a] Mikl et al. 1998 (blinded intake studies, 1987–97).
[b] Jones 1998.

Table 16. Burden of Infectious Disease Among Inmates and Releasees

Condition	Est. Prevalence Among Inmates, %		Est. # of Inmates w/ Condition, 1997	Est. # of Releasees w/ Condition, 1996	Total # in U.S. Population w/ Condition, 1996	Releasees w/ Condition as % of Total in U.S. Population w/Condition, 1996
	Prisons	Jails				
AIDS	0.5[a]	0.5[a]	8,900	39,000	229,000[b]	17.0
HIV Infection	2.3–2.98[c]	1.2–1.8[d]	35,000–47,000	98,000–145,000	750,000[e]	13.1–19.3
Positive RPR Serology (Syphilis)	2.6–4.3	2.6–4.3	46,000–76,000	202,000–332,000	N/A	—
Chlamydia Infection	2.4	2.4	43,000	186,000	N/A	—
GC Infection	1.0	1.0	18,000	77,000	N/A	—
HBV (HBsAg+)	2.0	2.0	36,000	155,000	1,000,000–1,250,000[f]	12.4–15.5
HCV (anti-HCV+)	17–18.6[g]	17–18.6[g]	303,000–332,000	1,300,000–1,400,000	4,500,000[h]	28.9–32.0
TB Disease	0.04[i]	0.17[j]	1,400	12,000	34,000[k]	35.3
TB Infection (PPD+)	7.4	7.3	131,000	566,000	N/A	—

[a] >5 times prevalence in U.S. population (0.09%).
[b] Centers for Disease Control and Prevention, *HIV/AIDS Surveillance Report, 1997*.
[c] 8–10 times prevalence in U.S. population (0.3%).
[d] 4–6 times prevalence in U.S. population (0.3%).
[e] CDC estimate, based on midpoint of 1993 estimate (Rosenberg 1995).
[f] CDC, *Morbidity and Mortality Weekly Report*, November 22, 1991.
[g] 9–10 times prevalence in U.S. population (1.8%)
[h] Based on prevalence estimate in McQuillan et al (1997).
[i] 4 times prevalence in U.S. population (0.01%).
[j] 17 times prevalence in U.S. population (0.01%).
[k] Estimated from Centers for Disease Control and Prevention, *TB Registry Reports, 1992–94*. See text for discussion.

Notes

1. Glaser, J.B., and R.B. Greifinger, "Correctional Health Care: A Public Health Opportunity," *Annals of Internal Medicine* 118(2)(1993): 139–145; Polonsky, S., S. Kerr, B. Harris, J. Gaiter, R.R. Fichtner, and M.G. Kennedy, "HIV Prevention in Prisons and Jails: Obstacles and Opportunities," *Public Health Reports* 109(5)(1994): 615–625; Gaiter, J., and L. Doll, "Improving HIV/AIDS Prevention in Prisons is Good Public Health Policy" (editorial), *American Journal of Public Health* 86(9)(1996): 1201–1203; Hammett, T.M., J. Gaiter, and C. Crawford, "Reaching Seriously At-Risk Populations: Health Interventions in Criminal Justice Settings," *Health Education and Behavior* 25(1)(1998): 99–120.

2. Centers for Disease Control and Prevention, "HIV/AIDS Education and Prevention Programs for Adults in Prisons and Jails and Juveniles in Confinement Facilities—United States, 1994," *Morbidity and Mortality Weekly Report* 45(13)(1996): 268–271; Maruschak, L., *HIV in Prisons and Jails, 1995,* Bureau of Justice Statistics Bulletin, Washington, DC: U.S. Department of Justice, Bureau of Justice Statistics, August 1995, NCJ 164260.

3. Lilienfeld, A.M., and D.E. Lilienfeld, *Foundations of Epidemiology* 2d. ed., New York: Oxford University Press, 1980.

4. Gilliard, D.K., and A.J. Beck, *Prison and Jail Inmates at Midyear 1997,* Bureau of Justice Statistics Bulletin, Washington, DC: U.S. Department of Justice, Bureau of Justice Statistics, January 1998, NCJ 167247; Bureau of Justice Statistics, *Correctional Populations in the United States, 1997,* Washington, DC: U.S. Department of Justice, Bureau of Justice Statistics, 2000, NCJ 177613.

5. Gilliard, D.K., and A.J. Beck, *Prison and Jail Inmates at Midyear 1997* (see note 4).

6. Bureau of Justice Statistics, *Correctional Populations in the United States, 1996*, Washington, DC: U.S. Department of Justice, Bureau of Justice Statistics, November 2000, NCJ 177613.

7. Hammett, T.M., P. Harmon, and L. Maruschak, *1996–1997 Update: HIV/AIDS, STDs, and TB in Correctional Facilities,* Issues and Practices in Criminal Justice, Washington, DC: U.S. Department of Justice, National Institute of Justice and Bureau of Justice Statistics; and Centers for Disease Control and Prevention, National Institute for HIV, STD, and TB Prevention, 1999, NCJ 176344.

8. About 322,000 sentenced inmates were in jail on the day of BJS's 1997 annual jail survey (Gilliard, D.K., and A.J. Beck, *Prison and Jail Inmates at Midyear 1997* [see note 4]). If sentenced inmates could serve about X months on average in jail, then one could estimate that roughly 322,000 x 12/X unique sentenced inmates are released during the year. Unfortunately, estimates of the average jail term served by sentenced inmates are not readily available. If the average jail term is 3 months, then roughly 1,288,000 unique sentenced inmates are released from jail every year. Not all of these could have been arrested during that same year. About 322,000 must have begun their jail terms before the year started, reducing the potential overlap to 966,000. But many sentenced jail inmates must also have been arrested before the year started, because there is often a considerable delay between arrest and conviction. If this delay averages 3 months, then the overlap should be reduced by 322,000, leaving a potential overlap of 644,000. Provided this estimate is not grossly wrong, it suggests that the overlap is a small part of the roughly 10 million jail releases estimated by BJS to have occurred during 1996.

9. Bureau of Justice Statistics, *Correctional Populations in the United States, 1996*, Washington, DC: U.S. Department of Justice, Bureau of Justice Statistics, 1999, NCJ 170013.

10. Maguire, K., and A.L. Pastore, eds., *Sourcebook of Criminal Justice Statistics, 1997,* Washington, DC: U.S. Department of Justice, Bureau of Justice Statistics, 1998, NCJ 171147, table 6.30.

11. This analysis assumes that arrests of injection drug users are generated by a Poisson process with parameter 0.38 that is invariant across IDUs. This implies that an IDU has a probability of 0.316 of being arrested at least once during a given year. Therefore, in a steady state, 0.316 is the approximate probability that an IDU will be released from jail or prison during that year.

12. Centers for Disease Control and Prevention, *HIV/AIDS Surveillance Report, 1997* 9(2)(1997): 1–43.

13. Harlow, C.W., *HIV in U.S. Prisons and Jails,* Bureau of Justice Statistics Special Report, Washington, DC: U.S. Department of Justice, Bureau of Justice Statistics, September 1993, NCJ 143292.

14. Maruschak, L., *HIV in Prisons and Jails, 1995* (see note 2); Hammett, T.M., P. Harmon, and L. Maruschak, *1996–1997 Update: HIV/AIDS, STDs, and TB in Correctional Facilities* (see note 7).

15. Maruschak, L., *HIV in Prisons and Jails, 1995* (see note 2).

16. Ibid.

17. Centers for Disease Control and Prevention, *HIV/AIDS Surveillance Report, 1997* (see note 12).

18. Ibid.

19. Hoxie, N.J., J.M. Vergeront, H.R. Frisby, J.R. Pfister, R. Golubjatnikov, and J.P. Davis, "HIV Seroprevalence and the Acceptance of Voluntary HIV Testing Among Newly Incarcerated Male Prison Inmates in Wisconsin," *American Journal of Public Health* 80(9)(1990): 1129–1131; Andrus, J., D.W. Fleming, C. Knox, R.O. McAllister, M.R. Skeels, R.E. Conrad, J.M. Horan, and L.R. Foster, "HIV Testing in Prisoners: Is Mandatory Testing Mandatory?" *American Journal of Public Health* 79(7): 840–842.

20. Holmberg, S.D., "The Estimated Prevalence and Incidence of HIV in 96 Large U.S. Metropolitan Areas," *American Journal of Public Health* 86(5)(1996): 642–654.

21. See, for example, Blank, S., D.D. McDonnell, S.R. Rubin, J.J. Neal, M.W. Brome, M.B. Masterson, and J.R. Greenspan, "New Approaches to Syphilis Control: Finding Opportunities for Syphilis Treatment and Congenital Syphilis Prevention in a Women's Correctional Setting," *Sexually Transmitted Diseases* 24(4)(1997): 218–226; Mikl, J., A. Dzierbicki, P.F. Smith, R. Greifinger, L. Wright, and D.L. Morse, "Trends in HIV Infection Rates Among New York State (NYS) Prison Inmates, 1987–97," poster abstract no. 23516 presented at 12th World AIDS Congress, June 30, 1998, Geneva, Switzerland; Holmes, M.D., S.M. Safyer, N.A. Bicknell, S.H. Vermund, P.A. Hanff, and R.S. Phillips, "Chlamydial Cervical Infection in Jailed Women," *American Journal of Public Health* 83(4)(1993): 551–555.

22. Mertz, K.J., S. Blank, J.G. Courtney, S. Dick, I. Dyer, M.P. Wilson, S. Danos, R. Voigt, K. Hutchins, W.C. Levine, et al., "A System for Monitoring STD Prevalence Among Persons Admitted to Jails and Juvenile Detention Facilities in the United States" (abstract); Centers for Disease Control and Prevention, *Reported Tuberculosis in the United States, 1996,* Atlanta: Centers for Disease Control and Prevention, 1997.

23. Ruiz, J.D., and J. Mikanda, "Seroprevalence of HIV, Hepatitis B, Hepatitis C, and Risk Behaviors Among Inmates Entering the California Correctional System," California Department of Health Services, Office of AIDS, HIV/AIDS Epidemiology Office, March 1996.

24. Mikl, J., A. Dzierbicki, P.F. Smith, R. Greifinger, L. Wright, and D.L. Morse, "Trends in HIV Infection Rates Among New York State (NYS) Prison Inmates, 1987–97" (see note 21).

25. Ruiz, J.D., and J. Mikanda, "Seroprevalence of HIV, Hepatitis B, Hepatitis C, and Risk Behaviors Among Inmates Entering the California Correctional System" (see note 23).

26. Fennie, K.P., P.A. Selwyn, and F.L. Altice, "Hepatitis C Virus Seroprevalence and Seroincidence in a Cohort of HIV+ and HIV- Female Inmates," poster abstract Tu.C.2655 presented at the XI International Conference on AIDS, July 9, 1996, Vancouver, British Columbia.

27. Vlahov, D., K.E. Nelson, T.C. Quinn, and N. Kendig, "Prevalence and Incidence of Hepatitis C Virus Among Male Prison Inmates in Maryland," *European Journal of Epidemiology* 9(5)(1993): 566–569.

28. Spaulding, A., C. Greene, K. Davidson, B.S. Schneiderman, and J. Rich, "Hepatitis C in State Correctional Facilities," *Preventive Medicine* 28(1)(1999): 92–100.

29. Schueler, L., presentation at a Symposium on Current Strategies for the Treatment and Prevention of HIV in Corrections sponsored by Brown University AIDS Program and Yale University HIV in Prisons Program, October 24, 1998, New York.

30. Centers for Disease Control and Prevention, "Recommendations for Prevention and Control of Hepatitis C Virus (HCV) Infection and HCV-Related Chronic Disease," *Morbidity and Mortality Weekly Report* 47(RR–19)(1998): 1–39.

31. National Center on Addiction and Statistics, *Behind Bars: Substance Abuse and America's Prison Population*, New York: National Center on Addiction and Substance Abuse, 1998: 182.

32. Ruiz, J.D., and J. Mikanda, "Seroprevalence of HIV, Hepatitis B, Hepatitis C, and Risk Behaviors Among Inmates Entering the California Correctional System" (see note 23).

33. Fennie, K.P., P.A. Selwyn, and F.L. Altice, "Hepatitis C Virus Seroprevalence and Seroincidence in a Cohort of HIV+ and HIV- Female Inmates" (see note 26).

34. Vlahov, D., K.E. Nelson, T.C. Quinn, and N. Kendig, "Prevalence and Incidence of Hepatitis C Virus Among Male Prison Inmates in Maryland" (see note 27).

35. Spaulding A., C. Greene, K. Davidson, B.S. Schneiderman, and J. Rich, "Hepatitis C in State Correctional Facilities" (see note 28).

36. Schueler, L., presentation at a Symposium on Current Strategies for the Treatment and Prevention of HIV in Corrections (see note 29).

37. Based on the prevalence estimate in McQuillan, G.M., M.J. Alter, L.A. Moyer, S.B. Lambert, and H.S. Margolis, "A Population Based Serologic Survey of Hepatitis C Virus Infection in the U.S.," in *Viral Hepatitis and Liver Disease,* M. Rizzetto, R.H. Purcell, G.L. Gerin, and G. Verne, eds., Turin: Edizioni Minerva Medica, 1997: 267–270.

38. McQuillan, G.M., M.J. Alter, L.A. Moyer, S.B. Lambert, and H.S. Margolis, "A Population Based Serologic Survey of Hepatitis C Virus Infection in the U.S." (See note 37).

39. Ruiz, J.D., and J. Mikanda, "Seroprevalence of HIV, Hepatitis B, Hepatitis C, and Risk Behaviors Among Inmates Entering the California Correctional System" (see note 23).

40. Mikl, J., A. Dzierbicki, P.F. Smith, R. Greifinger, L. Wright, and D.L. Morse, "Trends in HIV Infection Rates Among New York State (NYS) Prison Inmates, 1987–97" (see note 21).

41. Jaromir Mikl, New York State Department of Health, personal communication, November 1998.

42. Patrick Coleman, Centers for Disease Control and Prevention, personal communication, December 3, 1998.

43. Centers for Disease Control, "Hepatitis B Virus: A Comprehensive Strategy for Eliminating Transmission in the United States Through Universal Childhood Vaccination: Recommendations of the Immunization Practices Advisory Committee (ACIP)," *Morbidity and Mortality Weekly Report* 40(RR–13)(1991): 1–25.

44. Centers for Disease Control and Prevention, "HIV/AIDS Education and Prevention Programs for Adults in Prisons and Jails and Juveniles in Confinement Facilities—United States, 1994," *Morbidity and Mortality Weekly Report* 45(13)(1996): 268–271.

45. Centers for Disease Control and Prevention, *Reported Tuberculosis in the United States, 1992–1994,* Atlanta: Author, 1993–1995.

A Projection Model of the Prevalence of Selected Chronic Diseases in the Inmate Population

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Introduction

Little is known about the prevalence of chronic diseases in the inmate population or the potential impact on the community when inmates with chronic diseases are released. To address these unknowns, the National Institute of Justice (NIJ) commissioned a study to investigate the health status of soon-to-be-released inmates and awarded a grant to the National Commission on Correctional Health Care (NCCHC). The project's steering committee[1] named an expert panel on chronic disease and, working with that panel, targeted four chronic diseases for study: asthma, diabetes, hypertension, and heart disease.

Inmates with chronic medical conditions such as those targeted for study in this project do not represent the same kind of threat to the health status of the general community when they are released as do inmates with communicable diseases such as hepatitis, tuberculosis (TB), and human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS). Nonetheless, inmates with chronic disease have a significant effect on the correctional health care system, and it is reasonable to expect that they will affect the health care system in the general community when they are released. Persons who delay or do not receive needed ambulatory care are at increased risk of becoming more seriously ill and requiring hospitalization. Thus, undertreated chronically ill inmates affect the community during incarceration and following release through increased demand for acute care and costly tertiary services.[2]

Providing quality health care services to inmates with chronic diseases can place a significant strain on the correctional health care system in terms of both the manpower required to provide needed services and the costs of treatment. Avoidable hospitalizations have been defined as those that could potentially be avoided in the presence of appropriate and timely ambulatory care. The organizational and budgetary stresses on the prison health system created by chronic disease conditions within the inmate population are expected to increase as the inmate population ages. No less important are the consequences for the health care system in the community when inmates are released after receiving poor quality care within the prison system. The inmate whose diabetes or hypertension is poorly managed while incarcerated is, when released back into the community, more likely to use costly health care services (e.g., dialysis for renal failure or emergency room visits for glucose control or stroke).

The steering committee and the expert panel on chronic disease sought to determine the prevalence of asthma, diabetes, hypertension, and heart disease in the inmate population and the burden of these conditions on both the correctional health care system and the health care system in the community. Measuring the impact of chronic disease among soon-to-be-released inmates requires either accurate data on the prevalence of

disease among inmates or projections of disease prevalence derived from other comparable populations.

Because accurate data on the prevalence of diseases in the inmate population do not exist, an alternative method for estimating the burden of disease and the prevalence of the target conditions in the correctional population must be employed. One method is to use information on the prevalence of the condition or disease in a known population and apply these age-, gender-, and race-specific disease prevalence rates to the target population. This projection model yields estimates of the expected number of prisoners with that disease.

The National Health and Nutrition Examination Survey (NHANES)

The National Health and Nutrition Examination Survey (NHANES) is one of the major health surveys conducted by the National Center for Health Statistics (NCHS).[3] The survey was first conducted between 1971 and 1974 (NHANES–I), redone in 1976–78 (NHANES–II), done in the Hispanic population in 1982–84 (Hispanic NHANES) and conducted most recently between 1988 and 1994 (NHANES–III). NHANES represents the seventh in a series of surveys done on complex multistage samples designed to yield national estimates of the nutrition and health status of the civilian noninstitutionalized population aged 2 months and older in the United States. The most recent NHANES, NHANES–III, was chosen as the reference population to calculate prevalence rates for the four target chronic conditions. These rates were then applied to the inmate population to estimate the expected number of cases of each condition within the prison system.

Estimates of the prevalence of asthma, diabetes, hypertension and heart disease in the civilian noninstitutionalized population were calculated from the NHANES–III data. The principal data from NHANES–III were taken from the Household Adult Questionnaire, physical examinations conducted at mobile examination centers, and laboratory test results. These three data files were merged and a weighted analysis was done using SPSS/PC 7.5 statistical software.

The prevalence of each of the four chronic diseases of interest—asthma, diabetes, hypertension, and coronary heart disease—was examined by age, race and gender. Sampling weights were used to estimate rates representative of the U.S. population. The results obtained in the analyses employing all noninstitutionalized civilian cases are based upon a weighted sample size of 187,644,316 cases. Age-adjusted gender- and race-specific rates for the U.S. population older than 17 were calculated and standardized to the 1990 U.S. Census. These rates were then applied to the 1995 State and Federal prison and local jail population estimates provided by NIJ. Estimates based on calculations involving all NHANES–III cases provide the baseline projections of disease in the system and are referred to in this report as the baseline estimates.

Because the poor and economically disadvantaged are disproportionately present in the prison and jail population, prevalence rates also were determined from NHANES–III for the lowest quartile of socioeconomic status (SES) in the United States. This subset analysis selected from the population all individuals who were receiving public assistance in the form of welfare, supplementary security income (SSI), or food stamps. These filters reduced the weighted sample size to 66,444,192 individuals who can be said to reflect the lowest quartile of SES in the United States. Estimates of disease prevalence in the inmate population based upon calculations involving the lowest quartile of SES constitute a more realistic expectation of the prevalence of disease among incarcerated individuals. Projections of disease prevalence made from the subsample analysis are called the low SES estimates.

Asthma

Asthma is a chronic inflammatory disease of the airways that affects between 14 and 15 million individuals, of whom about 4.8 million are children.[4] As pointed out in the *Expert Panel Report 2: Guidelines for the Diagnosis and Management of Asthma*,[5] asthma results in about 100 million days of restricted activity, 470,000 hospitalizations, and 5,000 deaths annually.

Tables 1 and 2 give the prevalence rates for asthma estimated from the NHANES–III data for the baseline and low SES models, respectively. These rates are based on self-reports of having been diagnosed with asthma and current medical treatment. Baseline race-specific rates shown in table 1 show that Hispanics have the lowest prevalence rate for asthma—about 6.1 cases per 100—while both whites and blacks have rates of about 8 cases per hundred. In the low SES estimates of prevalence (see table 2), whites have the highest prevalence rate for asthma at 9.1/100, followed by blacks at 8.8/100, with Hispanics showing the lowest rate among racial-ethnic groups at 6/100.

Table 1. Baseline Asthma Prevalence Rates in the United States (per 100)

	White 8.0		Black 8.0		Hispanic 6.1	
Age	Male 7.6	Female 8.3	Male 7.3	Female 8.5	Male 6.2	Female 6.1
≤19	6.3	10.4	9.8	14.5	4.3	9.0
20–29	8.5	7.4	9.2	5.3	2.5	4.0
30–39	7.1	9.4	6.0	7.9	11.0	3.3
40–49	0.9	9.1	5.5	11.0	7.8	7.3
50–59	6.6	8.7	8.4	9.0	3.3	9.5
60+	6.9	7.1	5.9	8.8	8.5	10.3

Table 2. Low SES Asthma Prevalence Rates in the United States (per 100)

	White 9.1		Black 8.8		Hispanic 6.0	
Age	Male 9.2	Female 8.9	Male 8.1	Female 9.3	Male 5.7	Female 6.1
≤19	10.0	12.9	11.2	14.4	5.3	10.2
20–29	10.1	9.1	10.8	5.7	1.7	3.2
30–39	9.0	11.3	7.4	9.2	13.3	3.8
40–49	11.2	15.0	5.7	14.3	5.7	5.4
50–59	14.9	5.6	5.6	9.5	5.6	5.3
60+	6.6	7.0	6.8	8.8	4.4	13.5

Applying the baseline and low SES age-, race-, and gender-specific rates presented in tables 1 and 2 to the demographic profile of the State prison population yields the expected number of cases of asthma under the two prevalence models (see tables 3 and 4). Given the race, gender and age composition of the State prison systems, the baseline model predicts higher rates of asthma among white inmates (7.9/100) than among black (7.6/100) and Hispanic (6/100) inmates. The low SES model predicts even higher prevalence rates of asthma for both white (10.1/100) and black (8.8/100) inmates but not Hispanic (6/100) inmates.

The overall rate of asthma in prisons projected by the baseline model is 7.2 cases per 100 inmates. The low SES estimate is 20 percent higher than the baseline model and predicts about 15,000 more cases in the prison systems. The increased number of cases is concentrated among white males (7,576 cases) and black males (5,555 cases).

Tables 5 and 6 present the predicted number of cases of asthma in the inmate population in State prisons, Federal prisons and local jails. The baseline model predicts a total of 118,461 cases of asthma in the incarcerated population (see table 5). The low SES model predicts about 20 percent more cases of asthma among inmates. In both models, approximately 63 percent of the cases are predicted to be in State prisons, and another 31 percent are predicted to be in local jails. Almost 93 percent of the cases are predicted to occur among males; black and white males account for the vast majority of the cases. Fewer than 10 percent of the asthma cases among inmates are predicted to be women.

Table 3. Expected Number of Cases of Asthma in State Prisons: Baseline Estimates (per 100)

	White 7.9		Black 7.6		Hispanic 6.0	
Age	**Male 7.9**	**Female 8.6**	**Male 7.6**	**Female 8.3**	**Male 6.1**	**Female 4.4**
≤19	497	48	2,247	51	252	6
20–29	11,196	656	17,807	667	1,929	147
30–39	8,475	855	9,550	980	6,017	120
40–49	4,854	297	2,740	337	1,422	99
50–59	1,336	88	741	55	183	23
60+	639	20	364	16	111	4
Total	**26,997**	**1,964**	**33,449**	**2,106**	**9,914**	**399**

Table 4. Expected Number of Cases of Asthma in State Prisons: Low SES Estimates (per 100)

	White 10.1		Black 8.8		Hispanic 6.0	
Age	**Male 10.1**	**Female 10.7**	**Male 8.9**	**Female 8.3**	**Male 6.2**	**Female 3.9**
≤19	789	59	2,568	50	311	6
20–29	13,304	807	20,904	717	1,312	118
30–39	10,744	1,028	11,778	1,141	7,001	138
40–49	6,109	489	2,840	438	1,039	73
50–59	3,016	57	494	58	310	13
60+	611	19	420	16	57	5
Total	**34,573**	**2,459**	**39,004**	**2,420**	**10,030**	**353**

Table 5. Expected Number of Cases of Asthma in Correctional Settings: Baseline Estimates					
Sex and Race	National	All Incarcerated	State Prisons	Federal Prisons	Local Jails
White male	5,617,797	43,109	26,998	2,693	13,419
White female	6,685,466	3,848	1,963	166	1,718
Black male	697,645	49,735	33,448	1,858	14,428
Black female	967,783	4,166	2,105	189	1,871
Hispanic male	463,360	16,704	9,913	1,772	5,019
Hispanic female	439,955	899	398	98	403
Total	**14,872,006**	**118,461**	**74,825**	**6,776**	**36,858**
Rate	**7.8**	**7.2**	**7.2**	**7.1**	**7.1**

Table 6. Expected Number of Cases of Asthma in Correctional Settings: Low SES Estimates					
Sex and Race	National	All Incarcerated	State Prisons	Federal Prisons	Local Jails
White male	7,344,857	55,590	34,572	3,642	17,377
White female	7,826,035	4,831	2,459	210	2,162
Black male	768,833	57,846	39,003	2,110	16,734
Black female	1,078,199	4,793	2,420	220	2,153
Hispanic male	448,718	16,878	10,030	1,781	5,067
Hispanic female	416,326	800	353	84	364
Total	**17,882,968**	**140,738**	**88,837**	**8,047**	**43,857**
Rate	**9.4**	**8.5**	**8.6**	**8.5**	**8.5**

Diabetes Mellitus

Diabetes is a chronic condition that contributes significantly to morbidity and mortality. Diabetes is a leading cause of renal failure and the need for dialysis and a major risk factor for cardiovascular disease and blindness.[6]

Data to determine the prevalence of diabetes were taken from the NHANES–III Laboratory Data File. Blood and urine specimens were collected on examinees aged 1 year or older at the mobile examination center by certified phlebotomists or medical technicians. Examinees aged 12 and older were instructed to fast for 10–16 hours if their medical examination was scheduled for the morning or for at least 6 hours if their examination was scheduled for the afternoon. An oral glucose tolerance test was given to examinees aged 40–74 who did not report current insulin therapy. The fasting specimens and the 2-hour glucose levels were determined in accordance with the expert committees' rules for the identification, diagnosis and classification of diabetes mellitus. Individuals with a normal fasting glucose of less than 110 mg/dL are considered not to have diabetes. Those with fasting glucose values greater than 126 mg/dL are considered to have diabetes. Individuals with glucose levels between 110 and 126 mg/dL are defined as having impaired fasting glucose.

Before the publication of new diagnostic guidelines in 1997,[7] a fasting blood glucose of 140 mg/dL or higher was the cutoff point for defining diabetes. The new guidelines lowered

that threshold to 126 mg/dL. Nevertheless, the researchers first analyzed the prevalence of diabetes in the NHANES–III data to predict the number and distribution of cases among inmates according to the 140 mg/dL criteria. Subsequent analysis explored the prevalence and predicted number of "new" cases among inmates whose fasting glucose is between 126 and 139 mg/dL. Finally, the prevalence of impaired fasting glucose, defined by the new diagnostic criteria as 110–125 mg/dL, was analyzed. The results of the glucose tolerance test given to a sample of examinees aged 40–74 were not analyzed because this age group is small in the incarcerated population.

The NHANES–III data in table 7 shows that the prevalence of diabetes according to the former diagnostic criteria of a fasting serum glucose equal to or greater than 140 mg/dL is highest among blacks and females, and increases with age for both males and females and for all races. The highest rates of diabetes are found among blacks, particularly black females older than 60, approximately 20 percent of whom have diabetes. The prevalence of diabetes is known to be highest in lower SES groups as reflected in table 8. In the low SES groups, the prevalence rates for diabetes are also highest among blacks and females and they increase with age.

The increase in prevalence of diabetes with age implies that the prison population, because it is younger than the general population, will have lower rates of diabetes than in the general population. Table 9 shows the number of cases of diabetes by race, gender, and age that are expected in the State prison population based upon the prevalence in the U.S. population according to the >140 mg/dL standard. These baseline rates predict that approximately 21,000 State prison inmates will be found to have diabetes. Predicted cases are concentrated among black male inmates (10,570; 50.3 percent) with about 7,400 (35 percent) occurring among whites.

Table 7. Baseline Diabetes Prevalence Rates in the United States (per 100) (serum glucose >140mg/dL)

	White 4.8		Black 6.4		Hispanic 4.4	
Age	Male 4.7	Female 4.8	Male 5.5	Female 7.2	Male 3.3	Female 5.5
≤19	0.0	1.2	0.6	0.0	0.4	0.2
20–29	0.4	0.0	1.3	0.8	0.1	0.4
30–39	1.8	1.7	1.9	2.3	0.6	2.3
40–49	3.0	3.5	5.5	6.7	3.9	7.0
50–59	9.9	5.3	13.0	14.5	6.7	12.7
60+	11.5	11.9	16.3	22.4	18.6	18.8

Table 8. Low SES Diabetes Prevalence Rates in the United States (per 100) (serum glucose >140 mg/dL)

	White 7.1		Black 8.0		Hispanic 5.1	
Age	Male 6.4	Female 7.5	Male 6.3	Female 9.3	Male 3.5	Female 6.5
≤19	0.0	0.0	1.0	0.0	0.7	0.3
20–29	0.7	0.0	2.3	1.2	0.2	0.3
30–39	2.2	2.3	1.7	3.5	0.7	3.6
40–49	7.0	7.5	6.9	9.0	2.9	8.7
50–59	12.0	9.6	13.3	16.8	9.5	14.3
60+	12.0	13.6	16.1	24.2	18.8	20.6

Table 9. Expected Number of Cases of Diabetes in the State Prison Population: Baseline Estimates (serum glucose >140 mg/dL)						
	White 2.1		Black 2.4		Hispanic 1.2	
Age	Male 2.2	Female 1.6	Male 2.4	Female 2.5	Male 1.1	Female 2.6
≤19	0	6	138	0	23	0
20–29	527	0	2,516	101	77	15
30–39	2,149	155	3,024	285	328	83
40–49	1,636	114	2,740	205	711	95
50–59	2,004	54	1,146	89	371	31
60+	1,065	33	1,006	39	242	7
Total	**7,381**	**362**	**10,570**	**719**	**1,752**	**231**

Table 10 presents the predicted number of cases based upon estimates obtained from the lowest quartile of SES. These higher prevalence rates predict a total of more than 27,600 cases of diabetes among State prison inmates, which is about 30 percent higher than the baseline estimates. The number of white male inmates predicted to have diabetes increases by 47 percent to almost 11,000 (10,906). This total is nearly as many as the predicted number of black male inmates with diabetes (12,992). These increases reflect differences in the age distribution of men in State prisons between blacks and whites. A disproportionate number of older men in State prisons are white.

Tables 11 and 12 show the expected number of cases of diabetes (fasting serum glucose ≥140 mg/dL) in State and Federal prisons and local jails using the baseline and low SES models. The gender- and race-specific age-adjusted rates based on the baseline model are 2.0/100 for State prisons, 3.0/100 for Federal prisons, and 1.8/100 for local jails. Table 11 shows that under this model, an estimated 32,984 diabetics are incarcerated: about 21,000 in State prisons, 2,800 in Federal prisons, and more than 9,000 in local jails.

Table 12 shows the higher estimates of the prevalence of diabetes among inmates obtained from the lowest quartile of SES. The total number of diabetics predicted in this model is 43,557. State prisons are predicted to house more than 27,000 diabetics (2.7 per 100). Federal prisons are predicted to have the highest prevalence (3.8 per 100), with about 3,640 diabetic inmates. Local jails are predicted to have the lowest prevalence (2.4 per 100), with some diabetic 12,305 inmates.

The difference in predicted prevalence rates across Federal, State, and local institutions reflects differences in the age distributions of inmates in these facilities.

The newest guidelines for diagnosing and treating diabetes, published in 1997, lowered the level of fasting serum glucose for the clinical diagnosis of diabetes from 140 to 126 mg/dL and defined serum glucose values between 110 and 125 mg/dL as impaired fasting glucose. Using the laboratory test data for the sample of NHANES cases that were given fasting serum glucose tests, the prevalence rates were calculated by gender, race, and age using all tested cases and those in the lowest quartile of SES. These estimates of undiagnosed diabetes were then applied to the inmate population. Table 13 reports the predicted number of additional cases of diabetes using the baseline model and the lower threshold serum glucose level. Table 14 reports the predicted number of additional cases using the low SES model and the lower threshold serum glucose level.

The baseline model and the new guidelines for diagnosing diabetes (126 mg/dL) together project 22,233 more diabetics in the inmate population in addition to the 32,984 projected with the baseline model and the older 140 mg/dL diagnostic

Table 10. Expected Number of Cases of Diabetes in the State Prison Population: Low SES Estimates (serum glucose >140mg/dL)						
	White 3.1		Black 3.0		Hispanic 1.2	
Age	Male 3.2	Female 2.6	Male 3.0	Female 3.5	Male 1.1	Female 3.3
≤19	0	0	229	0	41	0
20–29	922	0	4,452	151	154	11
30–39	2,626	209	2,706	434	328	130
40–49	3,818	245	3,438	276	529	118
50–59	2,429	97	1,173	103	526	35
60+	1,111	38	994	43	245	7
Total	**10,906**	**589**	**12,992**	**1,007**	**1,823**	**301**

Table 11. Expected Number of Cases of Diabetes in State Prisons, Federal Prisons, and Local Jails: Baseline Estimates (serum glucose >140 mg/dL)					
Sex and Race	National	All Incarcerated	State Prisons	Federal Prisons	Local Jails
White male	3,432,634	11,683	7,381	1,231	3,073
White female	3,860,357	704	361	44	299
Black male	518,147	15,628	10,570	833	4,225
Black female	855,714	1,380	720	81	580
Hispanic male	230,393	3,099	1,753	559	787
Hispanic female	393,971	490	230	77	183
Total	**9,291,426**	**32,984**	**21,015**	**2,825**	**9,147**
Rate	**4.9**	**2.1**	**2.0**	**3.0**	**1.8**

Table 12. Expected Number of Cases of Diabetes in State Prison, Federal Prison and Local Jails: Low SES Estimates (serum glucose >140 mg/dL)					
Sex and Race	National	All Incarcerated	State Prisons	Federal Prisons	Local Jails
White male	4,333,899	17,410	10,906	1,811	4,695
White female	5,214,549	1,139	588	74	477
Black male	563,277	19,236	12,991	983	5,262
Black female	1,006,612	1,943	1,006	109	828
Hispanic male	243,549	3,193	1,823	567	804
Hispanic female	463,221	636	301	96	239
Total	**11,825,107**	**43,557**	**27,615**	**3,640**	**12,305**
Rate	**6.2**	**2.8**	**2.7**	**2.8**	**2.4**

Table 13. Expected Number of Additional Cases of Diabetes: Baseline Estimates (fasting serum glucose 126–139 mg/dL)					
Sex and Race	**National**	**All Incarcerated**	**State Prisons**	**Federal Prisons**	**Local Jails**
White male	2,185,740	6,402	4,037	728	1,637
White female	1,721,532	310	162	21	128
Black male	229,548	8,952	6,002	482	2,467
Black female	482,871	1,192	606	64	522
Hispanic male	227,554	5,008	2,889	759	1,359
Hispanic female	303,596	369	172	66	131
Total	**5,150,841**	**22,233**	**13,868**	**2,120**	**6,244**
Rate	**2.7**	**1.4**	**1.3**	**2.2**	**1.2**

Table 14. Expected Number of Additional Cases of Diabetes: Low SES Estimates (fasting serum glucose 126–139 mg/dL)					
Sex and Race	**National**	**All Incarcerated**	**State Prisons**	**Federal Prisons**	**Local Jails**
White male	2,635,929	7,163	4,535	828	1,801
White female	2,644,042	350	183	24	142
Black male	448,861	14,946	10,200	765	3,981
Black female	806,081	1,630	845	89	696
Hispanic male	276,447	5,678	3,281	885	1,511
Hispanic female	477,591	623	295	103	226
Total	**7,288,951**	**30,390**	**19,339**	**2,694**	**8,357**
Rate	**3.8**	**2.0**	**1.9**	**2.8**	**1.6**

criterion (see table 13). The new criterion for diagnosing diabetes increases the projected prevalence among inmates by 67 percent to a total of 55,217 (3.5/100) cases among all inmates. The increased prevalence is largest among inmates of Federal prisons, where more than 5 percent of inmates are projected to be diabetic.

The increase in the prevalence of diabetes is even greater using the new diagnostic standard and the low SES model (see table 14). Nearly 70 percent more diabetics are projected in the inmate population, giving a projected total of 73,947 (4.8/100). Most of the additional cases are predicted to occur among males and black inmates with the greatest increase in prevalence in Federal prisons. The 1997 diagnostic criteria not only lowered the level of serum glucose from $\geq$140 to $\geq$126 mg/dL for the clinical diagnosis of diabetes, but they also included the category of "impaired fasting glucose," which is defined as a fasting serum glucose from 110 to 125 mg/dL. Tables 15 and 16 show the number of inmates with impaired fasting glucose projected by the baseline and low SES models.

Unlike with diabetes, there is little difference in the number of inmates with impaired fasting glucose projected by the baseline and low SES models. Both models predict between 78,000 (5.0/100) and 80,000 (5.2/100) inmates to have impaired fasting glucose, with about 60 percent of the cases being in State prisons, 12 percent in Federal prisons, and 28 percent in local jails.

Table 15. Expected Number of Cases of Impaired Fasting Glucose: Baseline Estimates (fasting serum glucose 110–125 mg/dL)					
Sex and Race	**National**	**All Incarcerated**	**State Prisons**	**Federal Prisons**	**Local Jails**
White male	6,755,874	33,152	20,784	2,953	9,423
White female	4,267,485	661	344	43	274
Black male	614,312	24,400	16,736	1,165	6,499
Black female	714,564	1,841	939	99	803
Hispanic male	1,067,648	17,471	10,341	2,268	4,862
Hispanic female	369,594	483	231	71	181
Total	**13,789,477**	**78,008**	**49,375**	**6,599**	**22,042**
Rate	**7.3**	**5.0**	**4.8**	**6.9**	**4.3**

Table 16. Expected Number of Cases of Impaired Fasting Glucose: Low SES Estimates (fasting serum glucose 110–125 mg/dL)					
Sex and Race	**National**	**All Incarcerated**	**State Prisons**	**Federal Prisons**	**Local Jails**
White male	6,700,284	33,560	21,067	2,940	9,560
White female	4,239,662	678	353	45	280
Black male	615,687	26,619	18,213	1,266	7,140
Black female	716,207	1,892	964	100	828
Hispanic male	608,166	16,641	9,852	2,145	4,645
Hispanic female	345,101	483	230	68	185
Total	**13,225,107**	**79,873**	**50,679**	**6,564**	**22,638**
Rate	**7.0**	**5.2**	**4.9**	**6.9**	**4.4**

Table 17 summarizes the results obtained from the Low SES model. The pre-1997 definition of clinical diabetes (fasting serum glucose ≥140 mg/dL) predicts about 43,500 cases of diabetes in the inmate population, while the new diagnostic criteria (fasting serum glucose ≥126 mg/dL) predicts about 30,000 more cases. When those predicted to have impaired fasting glucose are added, more than 150,000 inmates are projected to have abnormal glucose metabolism.

Hypertension

The large decline in cardiovascular disease mortality rate that began in the late 1960s, particularly the decline in stroke mortality, is largely due to better diagnosis and treatment of hypertension.[8] Nevertheless, hypertension remains a significant health problem and a leading cause of heart disease, stroke, and renal failure. Hypertension and its consequences disproportionately affect blacks and individuals of low socioeconomic status. Accordingly, even with adjustments for age, the prevalence of hypertension is expected to be a significant health problem among the incarcerated population.

The NHANES–III Adult Interview asked respondents if they were ever told they had high blood pressure. In addition, interviewers were trained to take and record multiple blood pressure measurements. Hypertension projections were compiled from self-reports of a history of high blood pressure and blood pressure measurements taken according to protocols recommended by the American Heart Association. Hypertension was

Table 17. Expected Number of Inmates with Abnormal Glucose Metabolism: Low SES Estimate				
Serum Glucose (mg/dL)	**All Incarcerated**	**State Prisons**	**Federal Prisons**	**Local Jails**
≥140	43,557	27,615	3,640	12,305
126–139	30,390	19,339	2,694	8,357
110–125	79,873	50,679	6,564	22,638
Total	**153,820**	**97,633**	**12,898**	**43,300**

defined according to JNC–VI criteria (≥140 mmHg systolic and/or >90 mmHg diastolic) using the mean systolic and mean diastolic pressures from multiple readings from the adult household survey and/or the physical examination.[9] Also included among those defined as hypertensive were patients who reported a diagnosis of hypertension in the adult household interview.

Table 18 gives gender-, race-, and age-specific rates of hypertension for the U.S. population. More than 30 percent of the black population is hypertensive compared to about 25 percent of whites and 18 percent of Hispanics. The rates are higher for females and increase with age, particularly after age 30. More than one-half of blacks older than 50 are hypertensive. Table 19 shows the gender-, race-, and age-specific prevalence rates for hypertension in the lowest SES quartile of the U.S. population. In the lowest quartile of SES, hypertension rates for blacks are nearly 30 percent higher than for whites.

Tables 20 and 21 show the number of inmates projected to have hypertension based on the baseline and low SES estimates of the prevalence of hypertension in the U.S. population. The projected race- and gender-specific rates among inmates are relatively low, reflecting the younger age distribution of the incarcerated population. Although 24.6 percent of whites in the general population have hypertension (see table 18), the rate among white inmates in State prisons projected by the baseline model is only 16.1 percent (see table 20). The prevalence rates for hypertension for blacks and Hispanics in the general U.S. population are 30.2 percent and 18.0 percent (see table 18); the projected rates among the incarcerated population for these groups are 18.6 percent for blacks and 11.1 percent for Hispanics (see table 20).

Table 21 gives prevalence rates for hypertension derived from the lowest quartile of SES in the U.S. population and applied to State prisons.

Table 18. Baseline Hypertension Rates in the United States (per 100)						
	White 24.6		**Black 30.2**		**Hispanic 18.0**	
Age	**Male 23.7**	**Female 25.5**	**Male 27.5**	**Female 32.3**	**Male 16.7**	**Female 19.3**
≤19	7.3	5.1	2.5	5.5	1.9	2.7
20–29	8.8	12.0	12.8	10.5	5.0	9.0
30–39	15.3	11.2	19.9	21.5	13.9	13.7
40–49	26.2	18.5	32.8	40.8	17.9	24.0
50–59	36.2	34.3	53.2	55.9	44.4	26.8
60+	41.0	50.6	55.8	66.8	36.1	51.2

Table 19. Low SES Hypertension Prevalence Rates in the United States (per 100)						
	White 31.8		Black 32.9		Hispanic 20.0	
Age	Male 26.9	Female 35.3	Male 27.5	Female 36.8	Male 18.9	Female 21.0
≤19	10.0	4.0	2.1	9.6	2.9	3.1
20–29	9.6	17.5	12.6	11.4	6.7	9.6
30–39	19.3	18.7	16.9	21.6	17.0	15.8
40–49	27.9	33.1	37.0	56.2	15.2	24.0
50–59	48.3	37.7	50.6	64.3	51.6	27.3
60+	40.7	53.5	55.1	74.2	42.2	57.3

Table 20. Expected Number of Hypertensives in the State Prison Population: Baseline Estimates						
	White 16.1		Black 18.6		Hispanic 11.1	
Age	Male 16.3	Female 13.9	Male 18.5	Female 19.6	Male 10.9	Female 13.8
≤19	576	23	573	19	111	2
20–29	11,591	1,064	24,775	1,321	3,858	332
30–39	18,264	1,019	31,673	2,667	7,603	496
40–49	14,290	604	16,341	1,250	3,264	325
50–59	7,327	347	4,691	343	2,458	65
60+	3,797	140	3,444	118	470	18
Total	**55,845**	**3,197**	**81,497**	**5,718**	**17,764**	**1,238**

Table 21. Expected Number of Hypertensives in the State Prison Population: Low SES Estimates						
	White 19.2		Black 17.7		Hispanic 14.0	
Age	Male 19.0	Female 21.2	Male 17.7	Female 17.8	Male 14.0	Female 14.9
≤19	789	18	482	24	170	2
20–29	12,645	1,551	24,388	1,585	5,170	354
30–39	23,039	1,701	26,899	1,602	11,213	572
40–49	15,217	1,080	18,434	1,489	2,826	325
50–59	9,775	381	4,462	391	2,856	66
60+	3,769	148	3,401	118	550	21
Total	**65,234**	**4,879**	**78,066**	**5,209**	**22,785**	**1,340**

Although the low SES projected rates of hypertension for whites and Hispanics in State prisons increase by about 3 percent from the baseline model, the rate for blacks in State prisons actually decreases by nearly 1 percent, from 18.6 to 17.7 percent. These differences are related to the age distributions of whites, blacks, and Hispanics in the State prison population (blacks in State prisons tend to be younger than whites and Hispanics). The baseline model predicts that more than 165,000 inmates with hypertension are in State prisons. The number of inmates projected by the low SES model is about 7 percent higher—177,513 hypertensive inmates.

Tables 22 and 23 show the number of hypertensive inmates that are predicted in State prisons, Federal prisons, and local jails. The baseline projection model (table 22) predicts that State prisons, Federal prisons, and local jails together house more than one-quarter of a million inmates with hypertension. In spite of the large number, the rate of hypertension among inmates is predicted to be about 66 percent of the rate for the general population. This relatively low rate is a consequence of the disproportionate share of young persons, in whom hypertension rates are lowest, in the prison population. The lowest rates are predicted for local jails (14.7/100), followed by State prisons (16.0/100), with the highest rate predicted to occur in Federal prisons (19.2/100), which house the oldest inmates.

The low SES model projects more than 283,000 inmates with hypertension. Although this is 9 percent higher than the baseline model projections (n = 259,170), there are no striking differences between the two models. The prevalence of hypertension is still predicted to be highest among Federal prison inmates (21.6/100) and lowest among local jail inmates (16.1/100). Regardless of which projection model is used and in spite of the finding that the projected prevalence of hypertension among inmates is lower than in the general population (as a result of differences in age composition), hypertension is a significant problem among inmates. At least one-quarter of a million inmates are predicted to have hypertension. Both the baseline and low SES projection models may understate the prevalence of elevated blood pressure and hypertension because neither model takes into account the effects of incarceration on stress and the body's reaction to it, which is likely to elevate blood pressure. Hypertension is projected to be a significant problem in the incarcerated population in terms of the number of inmates affected and the demand and need for health services, particularly if the sequelae of hypertension, including heart disease, stroke, and renal failure, are to be in the prison and in the community when inmates are released.

Table 22. Expected Number of Hypertensives in the Incarcerated Population: Baseline Estimates

Sex and Race	National	All Incarcerated	State Prisons	Federal Prisons	Local Jails
White male	17,298,916	89,428	55,845	7,521	26,602
White female	20,511,964	6,170	3,196	306	2,669
Black male	2,598,315	120,003	81,498	5,742	32,764
Black female	3,741,008	11,107	5,717	564	4,825
Hispanic male	1,132,968	29,825	17,764	3,858	8,202
Hispanic female	1,383,541	2,637	1,237	318	1,082
Total	**46,666,712**	**259,170**	**165,257**	**18,309**	**76,144**
Rate	**24.5**	**16.7**	**16.0**	**19.2**	**14.7**

Table 23. Expected Number of Hypertensives in the Incarcerated Population: Low SES Estimates

Sex and Race	National	All Incarcerated	State Prisons	Federal Prisons	Local Jails
White male	19,476,236	104,836	65,235	8,813	30,788
White female	25,437,936	9,438	4,879	461	4,098
Black male	2,548,491	115,207	78,064	5,615	31,528
Black female	4,125,784	12,866	5,208	653	5,593
Hispanic male	1,368,835	37,911	22,788	4,621	10,505
Hispanic female	1,495,490	2,847	1,339	339	1,169
Total	**54,452,772**	**283,105**	**177,513**	**20,502**	**83,681**
Rate	**28.6**	**18.3**	**17.2**	**21.6**	**16.1**

Heart Disease

Heart disease, particularly coronary artery disease or ischemic heart disease, is the leading cause of death in the United States. Although the rate of death from heart disease has declined since 1968 due to advances in diagnosis and treatment and, most importantly, changes in behavior including reduced smoking, less fat and cholesterol in the daily diet, and an increase in the percentage of the population who engage in routine exercise, heart disease continues to account for approximately 50 percent of the deaths in the United States each year. Rates of heart disease are higher in blacks than whites and in men than women, and they increase with age. Consequently, as the number of inmates older than 50 increases, heart disease in the inmate population will become increasingly prevalent.

The NHANES–III interview included the Rose Questionnaire, which was developed more than 30 years ago to distinguish between cardiac and noncardiac chest pain.[10] The questionnaire, administered by an interviewer, includes nine questions about pain or discomfort in the chest including when pain occurs (i.e., when hurrying or walking up hill); how long it lasts; how and when it is relieved, and in what part of the chest, neck, and arms it is located. Scoring algorithms enable the pain to be classified as angina (i.e., due to myocardial ischemia) or not, to be graded for severity, and to be classified associated or not associated with possible myocardial infarction. In studies of the ability of the Rose Questionnaire to differentiate between patients with coronary artery disease and those without, the sensitivity was found to be 81 percent and the specificity was found to be 97 percent.[11] In other words, the Rose Questionnaire correctly identified 81 percent of patients with documented coronary artery disease and 97 percent of those without coronary artery disease.

Tables 24 and 25 show the prevalence rates for coronary artery disease calculated from the Rose Questionnaire using the baseline and low SES models. Rates are higher among blacks than

Table 24. Baseline Heart Disease Prevalence Rates in the United States (per 100)

	White 6.1		Black 6.6		Hispanic 5.2	
Age	Male 6.3	Female 5.8	Male 5.4	Female 7.6	Male 4.2	Female 6.2
≤19	0.0	2.5	1.1	4.1	1.4	1.9
20–29	1.0	2.6	3.3	3.9	2.4	3.9
30–39	1.7	2.3	2.4	5.0	4.2	5.8
40–49	4.4	4.9	4.1	6.7	4.1	6.9
50–59	8.3	4.9	9.1	13.3	5.0	6.9
60+	18.3	12.7	15.3	15.3	12.6	14.3

Table 25. Low SES Heart Disease Prevalence Rates in the United States (per 100)

	White 10.3		Black 8.6		Hispanic 6.1	
Age	Male 10.8	Female 9.9	Male 7.6	Female 9.3	Male 5.1	Female 7.0
≤19	0.0	2.9	1.3	5.1	2.6	1.2
20–29	2.5	2.9	4.6	3.4	3.2	2.7
30–39	2.7	5.8	3.2	6.4	2.1	10.4
40–49	11.0	12.1	6.7	8.2	6.0	5.3
50–59	12.5	7.6	16.3	17.3	7.4	11.8
60+	21.9	15.7	16.6	17.7	16.9	13.9

among whites and Hispanics, and, except among whites, are higher among females than males. The higher rates observed among both black and Hispanic females relative to males of the same age in those racial and ethnic groups reflect false positives arising from the difficulty of identifying coronary artery disease in females by history of chest pain alone without exercise stress testing and the "gold standard" of coronary angiography. Although the predictions from the Rose Questionnaire overstate the prevalence of coronary artery disease in females, the overall impact on the number of prison inmates with coronary artery disease is small owing to the relatively small number of women in the prison population.

Table 26 shows the expected number of cases of heart disease in the State prison population according to the baseline model using the Rose Questionnaire. More than 31,000 inmates in State prisons are predicted to have heart disease. Nearly one-half (45 percent) of the heart disease is predicted to occur among black males, but less than 20 percent is predicted to be in inmates aged 50 or older.

Table 27 shows the expected number of cases of heart disease among inmates in State prisons predicted by the Rose Questionnaire according to the low SES model. The number of cases of heart disease among State prison inmates using the low SES model projections (46,187) is nearly 50 percent higher than under the baseline model, but the distribution across race, age, and gender does not change.

Tables 28 and 29 give the expected number of cases of coronary heart disease among all incarcerated individuals using the baseline and low SES models. The baseline model projects a total of 49,230 cases of coronary heart disease in the incarcerated population, with just more than one-half of those cases occurring in State

Table 26. Expected Number of Cases of Heart Disease in State Prisons: Baseline Estimates

	White 6.1		Black 3.3		Hispanic 3.4	
Age	Male 2.7	Female 3.0	Male 3.2	Female 4.9	Male 3.3	Female 5.1
≤19	0	11	252	14	82	1
20–29	1,317	231	6,387	491	1,852	144
30–39	2,029	209	3,820	620	2,297	210
40–49	2,400	160	2,043	205	748	80
50–59	1,680	50	802	82	277	17
60+	1,695	35	944	27	164	5
Total	**9,121**	**696**	**14,248**	**1,439**	**5,420**	**457**

Table 27. Expected Number of Cases of Heart Disease in State Prisons: Low SES Model Estimates

	White 5.0		Black 4.6		Hispanic 3.5	
Age	Male 5.0	Female 5.7	Male 4.6	Female 5.6	Male 3.4	Female 6.5
≤19	0	13	298	18	152	1
20–29	3,293	257	8,903	428	2,469	100
30–39	3,223	528	5,093	794	1,149	377
40–49	6,000	395	3,338	251	1,094	72
50–59	2,530	77	1,437	106	410	29
60+	2,028	43	1,025	31	220	5
Total	**17,074**	**1,313**	**20,094**	**1,628**	**5,494**	**584**

Table 28. Estimated Number of Cases of Heart Disease in the Incarcerated Population: Baseline Estimates

Sex and Race	National	All Incarcerated	State Prisons	Federal Prisons	Local Jails
White male	4,603,980	14,289	9,121	1,439	3,729
White female	4,729,728	1,354	696	66	592
Black male	509,605	20,780	14,249	930	5,601
Black female	881,048	2,771	1,439	135	1,197
Hispanic male	311,225	9,063	5,420	978	2,665
Hispanic female	444,128	973	457	107	410
Total	**11,479,714**	**49,230**	**31,382**	**3,655**	**14,194**
Rate	**6.03**	**3.2**	**2.5**	**3.8**	**2.7**

Table 29. Expected Number of Cases of Heart Disease in the Incarcerated Population: Low SES Estimates

Sex and Race	National	All Incarcerated	State Prisons	Federal Prisons	Local Jails
White male	6,802,573	26,978	17,074	2,577	7,328
White female	7,230,465	2,563	1,313	133	1,117
Black male	691,860	29,488	20,095	1,373	8,020
Black female	1,040,499	3,167	1,628	156	1,382
Hispanic male	501,800	9,364	5,494	858	2,837
Hispanic female	523,364	1,056	582	138	492
Total	**16,790,561**	**72,616**	**46,186**	**5,235**	**21,176**
Rate	**8.8**	**4.7**	**4.5**	**5.5**	**4.1**

prisons (see table 28). Although the greatest number of cases is predicted to be in State prisons, the highest predicted rate of coronary heart disease is in Federal prisons (3.8 cases per 100 inmates). Given a sensitivity of 0.87 and a 13-percent false negative rate for the Rose Questionnaire, the adjusted number of cases from the baseline model is about 56,600.

The low SES model projects 72,616 inmates with coronary heart disease in the incarcerated population (see table 29). Adding the false negatives from the Rose Questionnaire raises this estimate to about 83,500. The estimate of the relative prevalence of coronary heart disease among black and white males generated by the low SES model differs significantly from that generated by the baseline model. The baseline model predicts about three cases of heart disease among black male inmates for every two cases among white male inmates. In contrast, the low SES model predicts about a 1:1 ratio of cases for black and white male inmates with virtually no change in the projected number of cases of coronary heart disease in Hispanic male inmates.

Conclusion

Statistical estimation and projection models are only as good as their underlying assumptions and the data that are used as input. Two models have been applied here with differing assumptions concerning the demographics and social characteristics of the incarcerated population. In the baseline model, race- and gender-specific age-adjusted disease prevalence rates in the inmate population were projected from prevalence rates calculated from the NHANES–III survey of the noninstitutionalized civilian U.S. population of the United States. These projections constitute a

baseline estimate of disease prevalence. They predict the number of cases of disease in the inmate population if that population is comparable to the noninstitutionalized population.

Clearly, the institutionalized and noninstitutionalized populations differ in gender and race composition and the distribution of behaviors, attitudes, and other risk factors associated with the distribution of disease in the human population. In an effort to account for at least some of the differences between the institutionalized and noninstitutionalized populations, a subsample of the NHANES–III data was analyzed involving persons currently on welfare or other public assistance. This group represents approximately 66 million Americans and approximates the lowest quartile of socioeconomic status in the U.S. population. Because disease prevalence, particularly asthma, diabetes, hypertension, and heart disease, is greater among lower SES individuals, the projections of disease prevalence obtained from this subsample probably more accurately reflect the real health status of the inmate population. Nonetheless, key variables related to disease prevalence (i.e., educational status, health behaviors) are not included in the model, which affects the resulting prevalence estimates.

The prevalence estimates may also be biased by differences in definitions of disease. Self-reported asthma rates measured as the response to a single question posed by an interviewer in the context of a national health survey such as NHANES are likely to be considerably higher than clinically diagnosed asthma rates recorded in patients' medical records. Accordingly, the estimates of asthma prevalence and the expected number of cases projected by the baseline and low SES models can be compared to clinically diagnosed prevalence rates of asthma in the incarcerated population only with caution. Inmates with a history of asthma before incarceration may not be recorded as having asthma in the prison system unless and until they have an attack that comes to the attention of prison health care workers. Mild intermittent and mild persistent asthmatics would not necessarily be detected in a medical record review. Consequently, estimates of prevalence of asthma in the incarcerated population are likely to understate the true prevalence of asthma and be quite a bit smaller than the estimates from self-reports as made here.

The same caveats do not apply to the estimates of prevalence and projected number of cases of diabetes and hypertension. The prevalence estimates for these conditions were taken from laboratory measurements according to established measurement guidelines. The analysis of diabetes was compared to figures reported by the National Institutes of Health that were based upon the NHANES–III data. The estimates of prevalence rates conformed to those reported by the NIH authors, validating the measurement of diabetes and impaired fasting glucose. No comparable analysis exists for the prevalence of hypertension. Prevalence rates were calculated according to established diagnostic criteria using the medical examination record and the mean systolic and mean diastolic values from multiple measurements of blood pressure. Consequently, the estimated prevalence rates and projected number of cases of impaired glucose metabolism and hypertension in the incarcerated population are based upon valid measurement and methodology. These estimates and projections may differ from the actual prevalence and number of cases in the incarcerated population to the extent that the assumptions underlying the baseline and low SES models are flawed.

Rates of coronary heart disease calculated from responses to the Rose Questionnaire apply only to the prevalence of ischemic heart disease (e.g., coronary artery disease). They do not capture other forms of heart disease (e.g., valvular disease, congestive heart failure). The Rose Questionnaire has a known sensitivity of 0.81 and a known specificity of 0.97. That is, the questionnaire will detect 81 percent of cases with ischemic heart disease, and will correctly classify as negative 97 percent of cases without disease. Although only 81 percent of individuals with coronary artery disease test positive on the Rose Questionnaire, its sensitivity is likely higher than that achieved with one or two questions about a previous diagnosis of heart disease in an inmate intake assessment. At least some cases defined as positive on the Rose Questionnaire are preclinical and would not be detected in a history and physical examination in the prison setting.

Although the Rose Questionnaire will detect more true cases of heart disease than self-reports of a physician diagnosis, projections of the number of cases of heart disease in the incarcerated population are not without peril. The Rose Questionnaire is sensitive to ischemic heart disease (ICD 410–414.9) and does not adequately identify other forms of cardiac disease. Most important, it is particularly difficult to identify coronary artery disease in women based on a history of chest pain alone. Several studies have shown that chest pain has a poor positive predictive value for diagnosing ischemic heart disease in women. Similarly, many elderly patients experience the pain associated with myocardial ischemia differently than younger patients. Elderly patients experiencing myocardial ischemia often report pain indicative of gastroesophageal reflux disease or pain in the middle of their back, as opposed to the more common report among younger patients of substernal pain radiating into the neck, jaw, and left arm.

The Rose Questionnaire may not detect forms of cardiac disease other than myocardial ischemia, and it may overstate coronary disease prevalence among women inmates and understate coronary heart disease prevalence among older inmates. Its application in the NHANES–III data to the incarcerated population, however, provides the first estimates of the prevalence of coronary heart disease among inmates.

Notes

1. The Steering Committee consisted of Edward Harrison, National Commission on Correctional Health Care; R. Scott Chavez, M.P.A., National Commission on Correctional Health Care; Robert B. Greifinger, M.D., Principal Investigator; B. Jaye Anno, Ph.D., Carlton A. Hornung, Ph.D., M.P.H., University of Louisville School of Medicine; John Miles, M.P.A., Centers for Disease Control and Prevention; Cheryl Crawford, M.P.A., J.D., National Institute of Justice; Andrew Goldberg, M.A., National Institute of Justice; Marilyn Moses, M.S., National Institute of Justice; and Laura Winterfield, Ph.D., National Institute of Justice.

2. McDonald, D.C., *Managing Prison Health Care and Costs,* Issues and Practices, Washington, DC: U.S. Department of Justice, National Institute of Justice, 1995, NCJ 152768.

3. National Center for Health Statistics, *National Health and Nutrition Examination Survey III. 1988–1994 [NHANES–III]*, Washington, DC: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 1996.

4. Adams, P.F., and M.A. Marano, "Current Estimates From the National Health Interview Survey, 1994," *Vital Health Statistics* 10(1995): 94.

5. National Asthma Education and Prevention Program, *Expert Panel Report 2: Guidelines for the Diagnosis and Management of Asthma,* Bethesda, MD: National Institutes of Health, National Heart, Lung, and Blood Institute, 1997, NIH pub 97–4051.

6. Harris, M.I., K.M. Flegal, C.C. Cowie, M.S. Eberhardt, D.E. Goldstein, R.R. Little, H.M. Wiedmeyer, and D.D. Byrd-Holt, "Prevalence of Diabetes, Impaired Fasting Glucose, and Impaired Glucose Tolerance in U.S. Adults: The Third National Health and Nutrition Examination Survey, 1988–1994," *Diabetes Care* 21(4)(1998): 518–524.

7. The Expert Committee on the Diagnosis and Classification of Diabetes Mellitus, "Report of the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus," *Diabetes Care* 20(7)(1997): 1183–1197.

8. National Center for Health Statistics, *Health, United States, 1996,* Hyattsville, MD: U.S. Public Health Service, 1997.

9. Joint National Committee on Prevention, Detection, Evaluation and Treatment of Low Blood Pressure, *The Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of Low Blood Pressure,* Bethesda, Maryland: National Institutes of Health, National Heart, Lung, and Blood Institute, 1997, NIH pub 98–4080.

10. Rose, G.A., and H. Blackburn, *Cardiovascular Survey Methods,* Geneva: World Health Organization, 1968.

11. Heyden, S., A.G. Bartel, E. Tabesh, J.C. Cassel, H.A. Tyroler, J.C. Cornoni, and C.G. Hames, "Angina Pectoris and the Rose Questionnaire," *Archives of Internal Medicine* 128 (6)(1971): 961–964.

Prevalence Estimates of Psychiatric Disorders in Correctional Settings

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Overview

The true prevalence and incidence of psychiatric disorders in criminal justice populations have been difficult to estimate. There have been several significant barriers to gathering data for these estimations. First and foremost, well-designed and rigorous epidemiological studies are costly and labor intensive. Correctional facilities are currently overwhelmed by the numbers of inmates being processed through the system. This pressure makes it difficult, if not impossible, for researchers to gain entry and administrative support for large studies of incarcerated populations. Each point of the criminal justice system presents different difficulties in determining rates of disorder. Jail psychiatry, for example, is concerned with identifying and treating acute episodes. Because jails have constant, high-volume turnover, prevalence studies of a single-point-in-time census are impossible. Further, the projected utilization of jail services must be estimated on the need of a large percentage of individuals who may remain for less than 48 hours. Basing prevalence and utilization estimates on a longer term group does not necessarily reflect the actual need for care for this population. Epidemiological studies of jail populations, therefore, should be made on admissions (i.e., bookings). Only one such study has been conducted to date.[1] All other estimates of mental illnesses in jails have been based on persons using or requiring mental health services who were already identified by jail personnel.

The study by Teplin, Abram, and McClelland[2] was conducted in the Cook County (Chicago), Illinois jail and represents the best estimates to date (see table 1). Analyses were conducted on males and females separately, but have been weighted to represent the racial/ethnic composition of the jail.[3] As table 1 shows, the rates of disorders differ substantially among men and women. These data reveal that acute symptoms of serious mental illnesses requiring treatment are present in about 6 percent of males[4] and 15 percent of females[5] at booking.

Table 1. Estimated 6-Month and Lifetime Diagnosis (Cook County)

	Current Illness		Lifetime Illness	
Diagnosis	**Female**	**Male**	**Female**	**Male**
Schizophrenia	1.8	3.0	2.5	3.8
Major depression	13.7	3.4	16.9	5.1
Bipolar manic	2.2	1.2	2.6	2.2
Dysthymia	6.5	—	9.6	8.5
Post-traumatic stress	22.3	—	33.5	—
Anxiety/other	3.5	11.6	4.0	21.0

Source: Teplin, L.A., "Psychiatric and Substance Abuse Disorders Among Male Urban Jail Detainees," *American Journal of Public Health* 84(2)(1994): 290–293; Teplin, L.A., K.M. Abram, and G.M. McClelland, "Prevalence of Psychiatric Disorders Among Incarcerated Women: 1. Pretrial Jail Detainees," *Archives of General Psychiatry* 53(8)(1996): 505–512.

Prison facilities present fewer problems in gathering data and estimating the need for services. First, prisons have relatively stable populations. Therefore, it is possible to conduct a census-based study. Most prisons do not have the onsite capacity to provide psychiatric inpatient hospitalization. Ninety-two percent of State prisons do not provide inpatient care within the facility, and 2.3 percent of the inmate population is in inpatient or residential care at any given time.[6] The challenge for research, therefore, is to account for the individuals who are currently offsite due to an inpatient stay.

Like estimates of mental illness in jails, most estimates of mental illnesses in prisons are based on those utilizing services. These studies typically estimate that between 6 and 15 percent of the prison population has a serious and persistent mental illness. Recent epidemiological studies of specific disorders indicate, however, that 22.5 percent of a male prison population exhibited symptoms of major depression.[7] Among opiate-dependent males, anxiety disorders were found in 32 percent of the population and affective disorders were found among 25 percent of the population.[8] Jordan and colleagues conducted a study of female prisoners and found statistics similar to the Teplin, Abram, and McClelland 1996 study.[9]

The Epidemiological Catchment Area study[10] conducted during the early 1980s estimated the prevalence of mental disorders in the American public. In addition to the large community sample, the study also contained samples from institutionalized populations, including prison inmates. This study revealed that the 1-year prevalence rate of serious mental illnesses was as follows: 5 percent exhibited symptoms of schizophrenia, 6 percent suffered from bipolar disorder, and 9 percent from unipolar depression.[11]

To date, no estimates have been made regarding the prevalence of mental illness in community corrections populations. One study of State probation and parole authorities estimated that the percentage of probationers with mental illnesses varied from 3 to 23 percent (with a mean of 6 percent) across States that maintained records, and that the percentage of parolees with mental illnesses varied from 1 to 11 percent (with a mean of 5 percent) across these same States.[12] This study is not comparable to the others noted above and does not estimate the true prevalence of mental disorders in these community corrections populations. No scientifically rigorous prevalence study has been conducted to date on this population. This is primarily because community corrections departments have no obligation to provide mental health services or access to those services. Therefore, these departments need not know the psychiatric status of persons under their supervision.

National Comorbidity Survey

To remain consistent with the methodology employed by the other monographs in this report, a national community-based epidemiological study was used to estimate psychiatric disorders in correctional settings.

Taking advantage of the wealth of secondary data available for social science research, this study used the U.S. National Comorbidity Survey (NCS)[13] to generate estimated prevalence rates for various diagnoses among the incarcerated population. The NCS was mandated by Congress to provide information about the prevalence and risk factors of substance abuse and psychiatric disorders among the general population. This landmark survey is the first nationally representative psychiatric epidemiologic survey based on a community sample.

Using a comprehensive diagnostic interview, trained interviewers who were not clinicians collected histories of psychiatric symptoms and use of substances from noninstitutionalized individuals, many of whom had not been previously diagnosed. The detailed questions combined multiple items based on the American Psychiatric Association's Diagnostic and Statistical Manual (DSM–III–R) with questions that allow for comparisons with the International Classification of Diseases (ICD–10). The resulting national sample of 8,098 persons aged 15 to

54 was selected from the 48 coterminous States. General findings suggest that lifetime and recent psychiatric morbidity are more prevalent than previously thought. The survey revealed that 48 percent of the sample had at least 1 psychiatric disorder at some time in their life and 29 percent had evidence of a disorder within the past year.[14]

Methodology

Seven diagnoses were examined: psychotic disorder, major depression, bipolar mania, dysthymia, post-traumatic stress disorder, anxiety,[15] and antisocial personality disorder. The prevalence of each of the seven diagnoses was weighted by age, race, and gender in a manner similar to that used by Hornung, Greifinger, and Gadre.[16] Using the community-based sample, three rates (the community sample, the poverty sample, and the poverty and substance abuse sample) were estimated for lifetime prevalence and 6-month prevalence for each diagnosis. Thus, six tables were created for each diagnosis and stratified by race and ethnicity, sex, and age group. (Appendix A displays these tables.) First, prevalence rates for the entire sample created a baseline model (n = 7,828).[17] Because the lowest socioeconomic strata of society represent a disproportionate amount of the incarcerated population and because poverty and mental disorder appear to be correlated, a subsample of respondents with a reported income below the poverty line was used to create a second set of prevalence rates (n = 977).[18] This second model is expected to produce superior estimates of psychiatric diagnosis among inmate populations, for it provides a closer approximation of the sociodemographic profile of inmates. A notable exception is the greater percentage of white-collar offenders, who are typically from a higher socioeconomic stratum incarcerated in Federal institutions. This second set is identified as "Distressed Rate I."

Finally, a third set of rates were computed based on the fact that a majority of arrestees test positive in urine screens for illicit substance use.[19] Approximately 65 percent have evidence of at least 1 substance at the time of arrest. This statistic does not include those who abused alcohol, were under the influence of alcohol at the time of arrest, or were drug addicted but not recent users. Since the vast majority of jail and prison inmates abuse substances, a subsample (n = 247) of those in poverty with a comorbid substance use disorder were used to estimate rates of mental illnesses among an extremely distressed population (Distressed Rate II).

Appendix B displays the cell frequencies for the three samples. Because small sample sizes can create unstable estimates, all cells with fewer than 10 cases (shaded areas) are calculated from the prior table weighted by the marginal rates for race and sex. Empty cells in the community sample are assigned a value of 0.1.

From the 39 tables in appendix A, rates were weighted by the 1995 age, gender, and race distributions in Federal and State prisons, local jails, and community corrections populations consistent with those used by previous researchers.[20] Instead of creating point estimates, the expected prevalence of cases should be taken as the range of values between two models. Because jails must focus on acute psychiatric conditions, jail estimates are based on the 6-month prevalence rates of each disorder (except antisocial personality disorder) and range from the rates for the poverty sample (Distressed Rate I) to the rates for the poverty and substance abuse sample (Distressed Rate II). State prison rates utilize the same samples (Distressed Rates I and II), but are based on lifetime occurrence. Because Federal prisoners tend to be more economically advantaged, lifetime prevalence rates use the Community and Distressed Rate I samples. These same parameters are used for community corrections populations.

Demographic Characteristics of Offender Populations

The demographic characteristics of offender populations vary only moderately across the five categories of correctional settings listed here (see table 2).[21] Males are disproportionately represented in all correctional populations, varying from a high of 94 percent in State prisons

to a low of 79 percent under probation supervision.

The racial and ethnic distributions in correctional populations reflect an overrepresentation of persons of color. This degree of overrepresentation differs depending on the setting. More than one-half of probationers are white, but the proportion of white inmates incarcerated in correctional facilities is notably lower. The ethnic and racial distribution is fairly consistent across facility type, with at least 60 percent of inmates in each facility classified as nonwhite. Jails and State prisons have similar racial and ethnic distributions. Federal prisons, however, have a substantially greater proportion of Hispanic inmates than the other types of correctional settings.

The age distribution of the inmate populations varies somewhat across types of correctional facilities. In general, jails and State prisons have similar age distributions, except for the larger percentage of jail detainees under the age of 19. Federal prisoners are typically older than those held in other types of facilities. Federal prisons had the largest proportion of middle-aged and older inmates. Thirty-eight percent of Federal inmates are more than 40 years old compared with 17 percent for jails and 18 percent for State prisons.

Prevalence Estimates of Psychiatric Morbidity in the General Population

Table 3 shows the prevalence of psychiatric morbidity in the general U.S. population. Lifetime occurrence of disorders vary from low-rate disorders, such as schizophrenia (0.8 percent) and bipolar disorder (1.5 percent) to disorders that occur at a relatively high rate, such as anxiety disorders (25 percent), major depression (18 percent), and antisocial personality or conduct disorder (15 percent). Recent episodes of psychiatric disorders have similar patterns across diagnostic categories, but at about half the rate of lifetime prevalence.

Table 2. Characteristics of Inmate Populations, 1995

	State/Local Probation	Local Jails	State Prisons	Federal Prisons	Parole
Number	2,620,560	507,044	1,026,882	100,250	648,921
Gender					
% Male	79.1	89.8	93.7	92.8	90.0
% Female	20.9	10.2	6.3	7.2	10.0
Ethnicity					
% White	58.3	40.1	33.3	29.9	48.6*
% Black	27.9	43.5	46.5	37.8	42.8
% Hispanic	11.3	14.7	17.0	27.3	—
% Other	2.4	1.7	3.2	5.0	8.6
Age	n/a				n/a
% ≤ 19		10.6	3.7	0.3	
% 20–29		39.6	42.7	25.2	
% 30–39		34.1	35.5	37.0	
% 40–49		13.2	12.9	24.7	
% 50+		3.5	5.3	12.8	

* Racial distributions in the parole population do not break out persons of Hispanic heritage. These individuals are represented within the racial categories of white, black and other. Therefore, direct comparisons with other correctional populations are not possible.

Source: Maguire, K., and A.L. Pastore, eds., *Sourcebook of Criminal Justice Statistics, 1996.* Washington, DC: U.S. Department of Justice, Bureau of Justice Statistics, 1997, NCJ 165361.

Table 3. Six-Month and Lifetime Prevalence of Diagnoses		
Disorder	**6-Month Estimates**	**Lifetime Estimates**
Schizophrenia/psychosis	0.4	0.8
Major depression	8.4	18.1
Bipolar (manic)	1.0	1.5
Dysthymia	2.0	7.1
Post-traumatic stress	3.4	7.2
Anxiety	14.6	24.6
Antisocial personality	—	14.8

Gender

As the rates of psychiatric disorder vary across diagnostic categories, they also vary by sex, race, and age. Statistically significant differences between men and women are evident in both 6-month and lifetime prevalence rates of several psychiatric disorders (see table 4). Women have higher rates of major depression, dysthymia, post-traumatic stress disorder, and anxiety disorders. Men are diagnosed with antisocial personality disorder (or conduct disorder during childhood) at nearly three times the rate of women.

Age

Six-month and lifetime prevalence rates of diagnostic categories vary across the lifespan (see table 5). In these data, 6-month rates of major depression and anxiety disorders are significantly higher among the youngest age category (age 19 and younger) and decrease with age. Six-month rates of post-traumatic stress disorder are highest in the 20- to 29-year-old range and decrease thereafter with age. Significant age differences also exist in the lifetime occurrence of psychiatric disorders. The prevalence of major depression and dysthymia increase with age, but the lifetime rates of anxiety disorders and antisocial personality or conduct disorders decrease with age.

Race and ethnicity

Table 6 presents 6-month and lifetime prevalence rates of psychiatric disorders by racial and ethnic category. The NCS data include race and ethnicity data separately. These data also include a four-category race and ethnicity variable coded into "white—non-Hispanic," "black—non-Hispanic," "Hispanic," and "other." Because the correctional weights break out only white, black, and Hispanic, the category of "other" was dropped from these analyses.

Overall, a smaller percentage of black respondents than white or Hispanic respondents met the criteria for any mental disorder, except schizophrenia. Two diagnostic categories revealed significant racial and ethnic differences in 6-month rates. Blacks and Hispanics had higher rates of schizophrenia than whites, and Hispanics

Table 4. Six-Month and Lifetime Prevalence Rates of Diagnoses by Gender						
Disorder	**6-Month Rate**			**Lifetime Rate**		
	Male	**Female**	**sig**	**Male**	**Female**	**sig**
Schizophrenia/psychosis	0.3	0.4	ns	0.8	0.8	ns
Major depression	5.9	10.6	.000	13.5	22.0	.000
Bipolar (manic)	1.1	0.9	ns	1.6	1.5	ns
Dysthymia	1.6	2.4	.010	5.8	8.2	.001
Post-traumatic stress	2.2	4.6	.000	4.8	9.6	.000
Anxiety	10.6	18.2	.000	20.0	28.7	.000
Antisocial personality	—	—	—	22.5	7.7	.000

Table 5. Six-Month and Lifetime Prevalence Rates of Diagnoses by Age												
	6-Month Rate						Lifetime Rate					
Disorder	≤19	20–29	30–39	40–49	50+	sig	≤19	20–29	30–39	40–49	50+	sig
Schizophrenia	0.4	0.5	0.1	0.6	0.4	ns	0.6	1.1	0.6	1.1	0.6	ns
Major depression	10.5	8.4	8.6	7.9	5.9	.022	14.0	17.0	19.1	19.7	17.1	.000
Bipolar (manic)	1.2	1.1	1.0	1.1	0.6	ns	1.2	1.6	1.7	1.7	0.9	ns
Dysthymia	1.7	1.4	2.2	2.4	2.3	ns	3.8	4.7	7.5	9.5	10.7	.025
Post-traumatic stress	3.0	4.4	3.5	2.7	2.9	.032	5.4	7.7	7.6	7.9	5.6	ns
Anxiety	20.4	15.5	14.1	12.4	12.3	.000	27.2	24.9	25.6	23.0	20.9	.001
Antisocial personality	—	—	—	—	—	—	19.5	17.5	15.2	11.1	8.1	.000

Table 6. Six-Month and Lifetime Prevalence Rates of Diagnoses by Race/Ethnicity*								
Disorder	6-Month Rate				Lifetime Rate			
	White	Black	Hispanic	sig	White	Black	Hispanic	sig
Schizophrenia	0.3	0.7	0.7	.032	0.7	1.2	1.0	ns
Major depression	8.2	7.8	11.1	.025	19.0	12.8	17.7	.000
Bipolar (manic)	1.1	0.6	1.0	ns	1.7	0.8	1.6	ns
Dysthymia	2.0	2.2	2.3	ns	7.5	5.1	6.7	.025
Post-traumatic stress	3.5	3.6	2.7	ns	7.3	6.6	7.5	ns
Anxiety	14.7	12.8	16.0	ns	25.3	19.8	25.6	.001
Antisocial personality	—	—	—	—	14.4	13.5	20.1	.000

* Persons of other racial/ethnic groups are not reported here.

had higher rates of major depression than whites and blacks. Whites had the highest lifetime rates of major depression and dysthymia, and Hispanics had the highest rates of antisocial personality disorder (including childhood conduct disorder). Rates of anxiety disorders were similar for whites and Hispanics and significantly lower for blacks.

Level of distress

Not surprisingly, rates of psychiatric disorders vary directly by level of distress. In comparison to the general community sample, holding constant the demographic distribution of the sample, persons living in poverty have higher rates of all disorders (see table 7). Persons living in poverty who meet the criteria for substance abuse or dependence have higher 6-month and lifetime rates of all disorders than either the general community or the poverty sample.

In summary, the rates of psychiatric disorders vary from rare to relatively common. Schizophrenia and bipolar disorder are relatively rare, but other diagnoses, such as anxiety and major depression, affect approximately two of every five Americans over the course of their lives. Diagnoses also vary across age, gender, and racial and ethnic categories and across levels of distress. Because correctional populations also differ by these factors and the average length of confinement of offenders, correctional rates must be weighted. The following section presents the synthetic estimates of psychiatric disorders for each of the correctional settings.

Estimated Rates of Psychiatric Diagnoses in Correctional Populations

As noted earlier, rates were estimated by selecting either the 6-month (i.e., jail) or the lifetime (i.e., State and Federal prisons and community corrections) rates and the lower and higher brackets

for the range of estimates based on the theoretically appropriate population samples. Community Sample-Distressed Rate I estimates were applied to Federal prisons and community corrections and Distressed Rate I-Distressed Rate II estimates were applied to jails and State prisons. Finally, these estimates were weighted by the 1995 age, gender, and race distributions in each setting. The projected number of individuals estimated to have a diagnosable psychiatric disorder cannot simply be added up to derive a total of persons in need of care. Comorbidity of disorders cannot be disentangled in the current analyses.

Jail

In correctional facilities, serious and persistent psychiatric disorders that are often treated by medication are distinguished from those considered less serious. Schizophrenia, bipolar disorders, and major (unipolar) depression fall into the first category. Other conditions may cause significant distress to inmates and may or may not be identified or treated. Antisocial personality disorder is especially troubling to administrators, but, because of its intractibility, is usually not the focus of treatment.

Table 8 shows estimates of the number and prevalence of psychiatric disorders among jail inmates. On any given day, approximately 1 percent of offenders booked into U.S. jails are estimated to have schizophrenia or other psychotic disorder; 2–3 percent are estimated to have bipolar disorder (manic episode); and 8–15 percent are estimated to exhibit symptoms of major depression. Further, 3–4 percent are predicted to have dysthymia. Fourteen to 20 percent are estimated to have some type of anxiety disorder, excluding post-traumatic stress disorder, which is estimated independently at 4–8 percent. Finally, 26–46 percent of jail inmates are estimated to have antisocial personality disorder.

Table 7. Six-Month and Lifetime Prevalence Rates of Diagnoses by Level of Distress

Disorder	6-Month Rate			Lifetime Rate		
	Comm	Distrs I	Distrs II	Comm	Distrs I	Distrs II
Schizophrenia	0.4	0.9	0.8	0.8	1.6	1.6
Major depression	8.4	11.6	20.6	18.1	20.1	33.6
Bipolar (manic)	1.0	1.5	3.6	1.7	2.0	5.3
Dysthymia	2.0	3.5	7.3	7.1	8.5	15.8
Post-traumatic stress	3.4	6.7	10.5	7.2	11.0	18.2
Anxiety	14.6	18.5	28.3	24.6	28.9	41.3
Antisocial personality	—	—	—	14.8	20.7	45.3

Table 8. Jail Estimates (*n* = 500,483)

Disorder	Distressed Rate I (6-month)		Distressed Rate II (6-month)	
	Number	Percent	Number	Percent
Schizophrenia/psychotic	4,955	1.0	5,589	1.1
Major depression	39,690	7.9	76,229	15.2
Bipolar (manic)	7,755	1.5	12,920	2.6
Dysthymia	13,644	2.7	21,040	4.2
Post-traumatic stress	19,770	4.0	41,509	8.3
Anxiety	70,613	14.1	100,098	20.0
Antisocial personality	131,501	26.3	231,115	46.2

State prisons

Prisons, like the general community, must have the capacity to provide both acute and long-term care to persons with psychiatric disorders. Therefore, as table 9 shows, State prison estimates are based on lifetime prevalence rates and are substantially higher than jail rates. On any given day, 2–4 percent of State prison inmates are estimated to have schizophrenia or other psychotic disorder, 2–4 percent to have bipolar disorder (manic episode), and 13–18 percent to have major depression.

A substantial percent of inmates exhibit symptoms of other disorders as well, including 8–13 percent with dysthymia, 6–12 percent with an anxiety disorder, and 22–30 percent with post-traumatic stress disorder. As in jails, 26–45 percent of inmates are predicted to have antisocial personality disorder.

Federal prisons

Federal inmates are estimated to have lower rates of psychiatric disorders than State inmates across all diagnostic categories. Table 10 shows estimates of the number and prevalence of psychiatric disorders among Federal prison inmates. One to 3 percent are estimated to have schizophrenia or another psychotic disorder, 2–3 percent to have bipolar disorder (manic episode), and 14–16 percent to exhibit symptoms of major depression. Seven to 12 percent are predicted to have dysthymia, 18–23 percent are estimated to have an anxiety disorder, and 5–7 percent to have post-traumatic stress disorder. Antisocial personality disorder is predicted to be fairly low at a rate of 21–28 percent.

Community corrections

Community corrections have been weighted by sex and race marginals. Because age distributions are unknown, rates of disorders are assumed to be evenly distributed across sex and race categories. Table 11 shows the estimates of the number and prevalence of psychiatric disorders among offenders in community corrections.

One to 2 percent of offenders in community corrections are estimated to have schizophrenia or another psychotic disorder, 1–2 percent to have bipolar disorder (manic episode), and 15–19 percent to have major depression. In addition, 7–12 percent are predicted to have dysthymia, 22–27 percent are estimated to have an anxiety disorder, and 6–9 percent to have post-traumatic stress disorder. As with Federal inmates, antisocial personality disorder is predicted to be fairly low at a rate of 17–26 percent.

Summary

The predicted rates of psychiatric disorders across correctional settings are synthetic estimates based on a complex theoretical and empirical weighting scheme. The estimates are similar to those found in single-site correctional facility epidemiological studies and have the added advantage of being based on a nationally representative sample.

Table 9. State Prison Estimates (*n* = 1,010,228)

	Distressed Rate I (lifetime)		Distressed Rate II (lifetime)	
Disorder	Number	Percent	Number	Percent
Schizophrenia/psychotic	22,994	2.3	39,262	3.9
Major depression	132,619	13.1	188,259	18.6
Bipolar (manic)	21,468	2.1	43,708	4.3
Dysthymia	85,018	8.4	135,121	13.4
Post-traumatic stress	62,388	6.2	118,071	11.7
Anxiety	222,147	22.0	303,936	30.1
Antisocial personality	262,349	26.0	449,107	44.5

Table 10. Federal Prison Estimates (*n* = 91,506)				
	Community Rate (lifetime)		Distressed Rate I (lifetime)	
Disorder	Number	Percent	Number	Percent
Schizophrenia/psychotic	763	0.8	2,326	2.5
Major depression	12,378	13.5	14,363	15.7
Bipolar (manic)	1,393	1.5	2,475	2.7
Dysthymia	6,253	6.8	10,652	11.6
Post-traumatic stress	4,466	4.9	6,257	6.8
Anxiety	16,638	18.2	21,079	23.0
Antisocial personality	19,493	21.3	25,781	28.2

Table 11. Community Corrections Estimates (*n* = 3,269,481)				
	Community Rate (lifetime)		Distressed Rate I (lifetime)	
Disorder	Number	Percent	Number	Percent
Schizophrenia/psychotic	26,194	0.8	70,156	2.1
Major depression	497,424	15.2	631,443	19.3
Bipolar (manic)	44,304	1.4	79,360	2.4
Dysthymia	218,614	6.7	381,350	11.7
Post-traumatic stress	192,128	5.9	303,884	9.3
Anxiety	731,708	22.4	885,761	27.1
Antisocial personality	542,672	16.6	834,855	25.5

These findings suggest that a minimum of 8 percent of short-term jail detainees have psychiatric conditions requiring medical intervention, with a substantial additional percentage who will experience significant distress due to psychiatric conditions. State and Federal prisons have a minimum of 13 percent who will require psychiatric care for an acute episode of a serious mental illness at some time during their incarceration. Although community corrections incur no duty to provide psychiatric care, it is important for administrators to know that a significant percentage of persons under community supervision have serious mental illnesses and may require ongoing or acute care during their community sentence. Psychiatric illnesses are not as rare as was once thought. Acknowledging the prevalence of these disorders in corrections is only the first step toward providing appropriate comprehensive care.

Notes

1. Teplin, L.A., "Psychiatric and Substance Abuse Disorders Among Male Urban Jail Detainees," *American Journal of Public Health* 84(2)(1994): 290–293.

2. Teplin, L.A., K.M. Abram, and G.M. McClelland, "Prevalence of Psychiatric Disorders Among Incarcerated Women: 1. Pretrial Jail Detainees," *Archives of General Psychiatry* 53(8)(1996): 505–512.

3. Teplin, L.A., "Psychiatric and Substance Abuse Disorders Among Male Urban Jail Detainees" (see note 1); Teplin, L.A., K.M. Abram, and G.M. McClelland, "Prevalence of Psychiatric Disorders Among Incarcerated Women: 1. Pretrial Jail Detainees" (see note 2).

4. Teplin, L.A., "Psychiatric and Substance Abuse Disorders Among Male Urban Jail Detainees" (see note 1).

5. Teplin, L.A., K.M. Abram, and G.M. McClelland, "Prevalence of Psychiatric Disorders Among Incarcerated Women: 1. Pretrial Jail Detainees" (see note 2).

6. Manderscheid, R.W., and M.A. Sonnenschein, eds., *Mental Health, United States, 1992,* Rockville, MD: U.S. Department of Health and Human Services, Substance Abuse and Mental Health Services Administration, 1992, DHHS (SMA) 92–1942.

7. Eyestone, L.L., and R.J. Howell, "An Epidemiological Study of Attention-Deficit Hyperactivity Disorder and Major Depression in a Male Prison Population," *Bulletin of the American Academy of Psychiatry and the Law* 22(1994): 181–193.

8. Kokkevi, A., and C. Stefanis, "Drug Abuse and Psychiatric Comorbidity," *Comprehensive Psychiatry* 36(5)(1995): 329–337.

9. Jordan, B.K., W.E. Schlenger, J.A. Fairbank, and J.M. Caddell, "Prevalence of Psychiatric Disorders Among Incarcerated Women: II. Convicted Felons Entering Prison," *Archives of General Psychiatry* 53(6)(1996): 513–519; Teplin, L.A., "Psychiatric and Substance Abuse Disorders Among Male Urban Jail Detainees" (see note 1).

10. Robins, L.N., and D.A. Regier, eds., *Psychiatric Disorders in America: The Epidemiological Catchment Area Study,* New York: Free Press, 1991.

11. Ibid.

12. Boone, H.N., "Mental Illness in Probation and Parole Populations: Results from a National Survey," *Perspectives* (Fall 1995): 32–39.

13. Kessler, R.C., "The National Comorbidity Survey," *International Review of Psychiatry* 6(1994): 365–376.

14. Ibid.

15. Five anxiety variables from the original study were combined to form a comprehensive anxiety category. Respondents were coded with a value of 1 if they had a diagnosis for one of the following disorders: agoraphobia, generalized anxiety, simple phobia, social phobia, or panic disorder. The variable was not additive. This process was repeated for both the 6-month and lifetime estimates.

16. Hornung, C., R. Greifinger, and S. Gadre, "A Projection Model of the Prevalence of Selected Chronic Diseases in the Inmate Population," paper prepared the National Commission on Correctional Health Care, Chicago, Illinois, n.d. (Copy in this volume.)

17. This total differs from the total sample size reported above because there were missing cases for some of the variables; 3.3 percent of the cases were missing (n = 270).

18. Because of missing values, this subsample lost 49 or 4.8 percent of the cases.

19. National Institute of Justice, *Drug Use Forecasting: 1994 Annual Report on Adult and Juvenile Arrestees,* Washington, DC: U.S. Department of Justice, National Institute of Justice, 1995, NCJ 157644.

20. Hornung, C., R. Greifinger, and S. Gadre, "A Projection Model of the Prevalence of Selected Chronic Diseases in the Inmate Population" (see note 16).

21. Maguire, K., and A.L. Pastore, eds., *Sourcebook of Criminal Justice Statistics, 1996,* Washington, DC: U.S. Department of Justice, Bureau of Justice Statistics, 1997, NCJ 165361.

Appendix A

Table A–1. Lifetime Prevalence of Psychotic Disorder in the General Population (*n* = 7,828)

Psychotic Disorder (lifetime)=0.8						
Age	White=0.7		Black=1.2		Hispanic=1.0	
	Male=0.8	Female=0.7	Male=0.7	Female=1.5	Male=0.8	Female=1.1
≤19	0.4	0.4	0.1	1.8	0.1	3.4
20–29	1.4	0.6	1.0	1.7	0.9	0.9
30–39	0.4	0.6	0.8	0.1	1.9	0.8
40–49	0.9	1.0	1.0	3.1	0.1	0.1
50+	0.4	0.6	0.1	2.2	0.1	0.1

Table A–2. Lifetime Prevalence of Psychotic Disorder Among Those in Poverty (*n* = 977)

Psychotic Disorder (lifetime)=1.6						
Age	White=1.3		Black=2.7		Hispanic=1.1	
	Male=2.9	Female=0.3	Male=1.6	Female=3.4	Male=.8	Female=1.1
≤19	0.4	0.4	0.1	4.2	0.1	3.4
20–29	4.6	0.6	1.0	3.9	4.3	0.9
30–39	0.4	1.2	0.8	0.1	6.7	0.8
40–49	6.9	1.0	2.3	9.5	0.1	0.1
50+	0.4	0.6	0.2	5.0	0.1	0.1

Table A–3. Lifetime Prevalence of Psychotic Disorder Among Persons with Poverty and Substance Abuse (*n* = 247)

Psychotic Disorder (lifetime)=1.6						
Age	White=1.6		Black=2.7		Hispanic=2.9	
	Male=3.6	Female=0.4	Male=1.6	Female=3.4	Male=2.3	Female=3.2
≤19	0.4	0.4	0.1	4.2	0.3	9.9
20–29	6.7	0.6	1.0	3.9	12.5	2.6
30–39	0.4	1.2	0.8	0.1	19.4	2.3
40–49	6.9	1.2	2.3	9.5	0.3	0.3
50+	0.5	0.7	0.2	5.7	0.3	0.3

Table A–4. Six-Month Prevalence of Psychotic Disorder in the General Population (*n* = 7,828)

Psychotic Disorder (6-month)=0.4						
Age	White=0.3		Black=0.7		Hispanic=0.7	
	Male=0.3	Female=0.2	Male=0.2	Female=1.0	Male=0.3	Female=1.1
≤19	0.4	0.1	0.1	0.1	0.1	3.4
20–29	0.5	0.2	1.0	1.1	0.1	0.9
30–39	0.1	0.1	0.1	0.1	1.0	0.8
40–49	0.4	0.4	0.1	2.3	0.1	0.1
50+	0.4	0.3	0.1	2.2	0.1	0.1

Table A–5. Six-Month Prevalence of Psychotic Disorder in Those in Poverty (*n* = 977)

Psychotic Disorder (6-month)=0.9						
Age	White=0.7		Black=2.0		Hispanic=0.7	
	Male=0.7	Female=0.5	Male=0.6	Female=2.9	Male=0.3	Female=1.1
≤19	0.4	0.1	0.1	0.1	0.1	3.4
20–29	3.4	0.2	1.0	2.6	0.1	0.9
30–39	0.1	0.1	0.1	0.1	1.0	0.8
40–49	3.4	0.4	0.3	9.5	0.1	0.1
50+	0.4	0.3	0.3	6.3	0.1	0.1

Table A–6. Six-Month Prevalence of Psychotic Disorder by Age for Those with Poverty and Substance Abuse (*n* = 247)

Psychotic Disorder (6-month)=0.8						
Age	White=1.1		Black=2.0		Hispanic=0.7	
	Male=1.1	Female=0.8	Male=0.6	Female=2.9	Male=0.3	Female=1.1
≤19	0.4	0.1	0.1	0.1	0.1	3.4
20–29	4.4	0.2	1.0	2.6	0.1	0.9
30–39	0.1	0.1	0.1	0.1	1.0	0.8
40–49	3.4	0.6	0.3	9.5	0.1	0.1
50+	0.6	0.5	0.3	6.3	0.1	0.1

Table A–7. Lifetime Prevalence of Major Depression by Age in the General Population (*n* = 7,828)

Major Depression (lifetime)=18.1						
Age	White=19.0		Black=12.8		Hispanic=17.7	
	Male=14.2	Female=23.4	Male=8.7	Female=15.8	Male=13.3	Female=22.1
≤19	9.4	21.9	3.1	3.6	9.7	22.4
20–29	14.0	22.7	5.9	15.1	6.6	19.0
30–39	15.5	23.3	13.5	20.5	20.2	19.5
40–49	16.5	25.0	10.2	14.0	17.7	28.8
50+	8.7	23.0	3.2	20.0	11.1	41.2

Table A–8. Lifetime Prevalence of Major Depression in Those in Poverty (*n* = 977)

Major Depression (lifetime)=20.1						
Age	White=25.0		Black=9.8		Hispanic=20.0	
	Male=21.0	Female=27.4	Male=6.4	Female=11.2	Male=9.6	Female=27.1
≤19	22.7	17.9	4.5	8.3	7.4	26.1
20–29	16.1	33.1	4.2	9.1	4.3	17.9
30–39	18.8	26.5	11.1	14.9	20.0	27.6
40–49	41.4	26.5	7.5	9.5	12.7	50.0
50+	7.7	20.8	2.4	14.2	8.0	50.7

Table A–9. Lifetime Prevalence of Major Depression in Those with Poverty and Substance Abuse (*n* = 247)

Major Depression (lifetime)=33.6						
Age	White=34.6		Black=13.3		Hispanic=45.7	
	Male=28.1	Female=41.9	Male=6.7	Female=20.0	Male=31.3	Female=57.9
≤19	53.3	27.3	4.7	14.9	24.1	55.9
20–29	17.8	42.9	4.4	16.3	14.0	38.3
30–39	25.0	47.1	11.7	26.7	65.2	59.1
40–49	50.0	40.5	7.9	17.0	41.4	99.0
50+	10.3	31.8	2.5	25.4	26.1	99.0

Table A–10. Six-Month Prevalence of Major Depression in the General Population (*n* = 7,828)

Major Depression (6-month)=8.4						
Age	White=8.2		Black=7.8		Hispanic=11.1	
	Male=5.9	Female=10.4	Male=4.7	Female=10.1	Male=7.7	Female=14.3
≤19	6.8	16.2	3.1	1.8	9.7	17.2
20–29	6.4	10.8	4.0	10.1	3.8	12.1
30–39	6.0	9.6	7.5	14.8	10.6	15.6
40–49	6.0	9.8	4.1	7.8	8.1	13.5
50+	2.6	8.2	0.1	8.9	5.6	11.8

Table A–11. Six-Month Prevalence of Major Depression in Those in Poverty (*n* = 977)

Major Depression (6-month)=11.6						
Age	White=13.1		Black=6.6		Hispanic=13.9	
	Male=14.0	Female=13.1	Male=3.8	Female=7.9	Male=5.5	Female=19.6
≤19	18.2	10.7	4.5	4.2	7.4	26.1
20–29	8.0	15.8	4.2	5.2	3.8	10.3
30–39	12.5	15.7	5.6	10.6	6.7	24.1
40–49	17.2	14.7	3.3	9.5	5.8	28.6
50+	2.6	4.2	0.1	6.9	4.0	16.2

Table A–12. Six-Month Prevalence of Major Depression in Those with Poverty and Substance Abuse (*n* = 247)

Major Depression (6-month)=20.6						
Age	White=18.7		Black=13.3		Hispanic=37.1	
	Male=19.8	Female=17.4	Male=6.7	Female=20.0	Male=18.8	Female=52.6
≤19	53.3	10.7	7.9	10.6	25.3	69.9
20–29	11.1	16.3	7.4	13.2	13.0	10.3
30–39	18.8	29.4	9.9	26.8	22.9	64.6
40–49	21.4	19.6	5.8	24.0	19.8	76.6
50+	3.7	5.6	0.2	17.5	13.7	43.4

Table A–13. Lifetime Prevalence of Bipolar Disorder in the General Population (*n* = 7,828)

Bipolar Disorder (lifetime)=1.5						
Age	White=1.7		Black=0.8		Hispanic=1.6	
	Male=1.8	Female=1.6	Male=0.9	Female=0.7	Male=1.7	Female=1.6
≤19	0.1	1.9	0.1	0.1	2.8	5.2
20–29	1.9	1.8	1.0	1.7	0.1	0.9
30–39	2.0	1.6	0.8	0.1	2.9	1.6
40–49	2.1	1.5	2.0	0.8	1.6	0.1
50+	1.7	0.6	0.1	0.1	0.1	0.1

Table A–14. Lifetime Prevalence of Bipolar Disorder in Those in Poverty (*n* = 977)

Bipolar Disorder (lifetime)=2.0						
Age	White=2.2		Black=0.8		Hispanic=3.3	
	Male=2.4	Female=2.1	Male=0.9	Female=0.7	Male=2.7	Female=3.7
≤19	0.1	1.8	0.1	0.1	3.7	8.7
20–29	3.4	2.2	1.0	2.6	0.1	0.9
30–39	3.1	2.4	0.8	0.1	6.7	6.9
40–49	2.1	2.9	2.0	0.8	2.5	0.1
50+	7.7	0.6	0.1	0.1	0.2	0.2

Table A–15. Lifetime Prevalence of Bipolar Disorder in Those with Poverty and Substance Abuse (*n* = 247)

Bipolar Disorder (lifetime)=5.3						
Age	White=3.8		Black=0.8		Hispanic=17.1	
	Male=2.1	Female=5.8	Male=0.9	Female=0.7	Male=12.5	Female=21.1
≤19	0.1	1.8	0.1	0.1	17.1	49.6
20–29	3.4	4.1	1.0	2.6	0.5	5.1
30–39	6.3	11.8	0.8	0.1	31.0	39.3
40–49	2.1	8.0	2.0	0.8	11.6	0.6
50+	6.8	1.7	0.1	0.1	0.9	1.1

Table A–16. Six-Month Prevalence of Bipolar Disorder in the General Population (*n* = 7,828)

Bipolar Disorder (6-month)=1.0						
Age	White=1.1		Black=0.6		Hispanic=1.0	
	Male=1.3	Female=1.0	Male=0.9	Female=0.3	Male=0.6	Female=1.3
≤19	0.1	1.9	0.1	0.1	2.8	5.2
20–29	1.4	1.1	1.0	1.1	0.1	0.9
30–39	1.5	0.9	0.8	0.1	0.1	0.8
40–49	1.5	0.8	2.0	0.1	0.1	0.1
50+	0.9	0.6	0.1	0.1	0.1	0.1

Table A–17. Six-Month Prevalence of Bipolar Disorder in Those in Poverty (*n* = 977)

Bipolar Disorder (6-month)=1.5						
Age	White=1.8		Black=0.4		Hispanic=2.2	
	Male=2.4	Female=1.5	Male=0.6	Female=0.2	Male=1.4	Female=2.8
≤19	0.1	1.8	0.1	0.1	3.7	8.7
20–29	3.4	1.4	1.0	1.3	0.1	0.9
30–39	3.1	1.2	0.8	0.1	0.1	3.4
40–49	1.5	2.9	1.3	0.1	0.2	0.1
50+	7.7	0.6	0.1	0.1	0.2	0.2

Table A–18. Six-Month Prevalence of Bipolar Disorder in Those with Poverty and Substance Abuse (*n* = 247)

Bipolar Disorder (6-month)=3.6						
Age	White=2.7		Black=0.4		Hispanic=11.4	
	Male=2.1	Female=3.5	Male=0.6	Female=0.2	Male=6.3	Female=15.8
≤19	0.1	1.8	0.1	0.1	16.7	49.1
20–29	3.4	2.0	1.0	1.3	0.5	5.1
30–39	6.3	5.9	0.8	0.1	0.5	19.2
40–49	1.5	6.8	2.0	0.1	0.9	0.6
50+	6.8	1.4	0.1	0.1	0.9	1.1

Table A–19. Lifetime Prevalence of Dysthymia in the General Population (*n* = 7,828)

Dysthymia (lifetime)=7.1						
Age	White=7.5		Black=5.1		Hispanic=6.7	
	Male=5.9	Female=8.9	Male=4.0	Female=6.0	Male=7.5	Female=5.9
≤19	2.9	6.2	3.1	0.1	2.8	5.2
20–29	4.2	5.8	3.0	3.9	3.8	4.3
30–39	5.9	9.1	5.3	8.0	10.6	4.7
40–49	8.1	11.7	5.1	6.2	11.3	9.6
50+	8.7	12.5	0.1	13.3	16.7	17.6

Table A–20. Lifetime Prevalence of Dysthymia in Those in Poverty (*n* = 977)

Dysthymia (lifetime)=8.5						
Age	White=11.6		Black=2.3		Hispanic=7.8	
	Male=11.7	Female=11.6	Male=1.3	Female=2.8	Male=8.2	Female=7.5
≤19	4.5	7.1	4.5	0.1	3.7	8.7
20–29	6.9	7.9	3.0	2.6	4.3	2.6
30–39	15.6	15.7	5.3	2.1	13.3	6.9
40–49	31.0	23.5	1.7	4.8	12.3	14.3
50+	15.4	12.5	0.1	6.3	18.2	22.4

Table A–21. Lifetime Prevalence of Dysthymia in Those with Poverty and Substance Abuse (*n* = 247)

Dysthymia (lifetime)=15.8						
Age	White=17.6		Black=3.3		Hispanic=17.1	
	Male=15.6	Female=19.8	Male=1.9	Female=4.0	Male=25.0	Female=10.5
≤19	13.3	18.2	6.4	0.1	11.3	12.2
20–29	8.9	12.2	4.3	3.7	13.1	3.6
30–39	18.8	23.5	7.6	3.0	40.6	9.7
40–49	35.7	40.2	2.4	6.9	37.5	20.0
50+	20.5	21.4	0.1	9.0	55.5	31.4

Table A–22. Six-Month Prevalence of Dysthymia in the General Population (*n* = 7,828)

Dysthymia (6-month)=2.0						
Age	White=2.0		Black=2.2		Hispanic=2.3	
	Male=1.5	Female=2.4	Male=1.6	Female=2.6	Male=2.8	Female=1.9
≤19	1.4	1.9	1.6	0.1	2.8	3.4
20–29	0.8	1.9	0.1	2.2	0.9	2.6
30–39	1.6	2.6	3.0	4.0	3.8	0.8
40–49	2.2	2.7	2.0	0.8	3.2	1.9
50+	0.9	2.9	0.1	6.7	5.6	0.1

Table A–23. Six-Month Prevalence of Dysthymia in Those in Poverty (*n* = 977)

Dysthymia (6-month)=3.5						
Age	White=4.8		Black=1.2		Hispanic=2.8	
	Male=3.9	Female=5.4	Male=0.9	Female=1.4	Male=2.7	Female=2.8
≤19	2.3	1.8	1.6	0.1	3.7	8.7
20–29	2.3	4.3	0.1	1.3	0.9	2.6
30–39	1.6	7.2	3.0	2.1	3.8	0.8
40–49	13.8	11.8	1.1	0.8	3.1	7.1
50+	7.7	4.2	0.1	3.6	5.4	1.5

Table A–24. Six-Month Prevalence of Dysthymia in Those with Poverty and Substance Abuse (*n* = 247)

Dysthymia (6-month)=7.3						
Age	White=8.2		Black=1.2		Hispanic=8.6	
	Male=6.3	Female=10.5	Male=0.9	Female=1.4	Male=6.3	Female=10.5
≤19	6.7	1.8	1.6	0.1	8.6	32.6
20–29	4.4	6.1	0.1	1.3	2.1	9.8
30–39	1.6	17.6	3.0	2.1	8.9	3.0
40–49	14.3	22.9	1.1	0.8	7.2	26.6
50+	12.5	8.1	0.1	3.6	12.6	5.6

Table A–25. Lifetime Prevalence of Post-Traumatic Stress Disorder in the General Population (*n* = 7,828)

Post-Traumatic Stress Disorder (lifetime)=7.2						
Age	White=7.3		Black=6.6		Hispanic=7.5	
	Male=4.9	Female=9.6	Male=3.7	Female=8.7	Male=3.9	Female=11.1
≤19	1.8	10.4	1.6	3.6	2.8	6.9
20–29	4.6	10.0	1.0	12.3	4.7	10.3
30–39	5.6	9.2	5.3	10.2	1.9	14.1
40–49	5.6	10.7	7.1	5.4	6.5	9.6
50+	4.4	6.7	0.1	4.4	5.6	11.8

Table A–26. Lifetime Prevalence of Post-Traumatic Stress Disorder in Those in Poverty (*n* = 977)

Post-Traumatic Stress Disorder (lifetime)=11.0						
Age	White=13.7		Black=6.3		Hispanic=9.4	
	Male=8.3	Female=17.0	Male=2.6	Female=7.9	Male=2.7	Female=14.0
≤19	4.5	14.3	1.6	4.2	2.8	8.7
20–29	8.0	19.4	1.0	9.1	4.3	10.3
30–39	12.5	16.9	5.6	10.6	1.9	20.7
40–49	13.8	14.7	5.0	4.8	4.5	14.3
50+	4.4	12.5	0.1	4.0	3.9	14.9

Table A–27. Lifetime Prevalence of Post-Traumatic Stress Disorder in Those with Poverty and Substance Abuse (*n* = 247)

Post-Traumatic Stress Disorder (lifetime)=18.2						
Age	White=19.2		Black=13.3		Hispanic=17.1	
	Male=10.4	Female=29.1	Male=6.7	Female=20.0	Male=12.5	Female=21.1
≤19	6.7	9.1	4.1	10.6	12.9	13.1
20–29	8.9	28.6	2.6	23.0	19.9	15.5
30–39	12.5	35.3	14.4	26.8	8.8	31.1
40–49	21.4	25.1	12.9	12.1	20.8	21.5
50+	5.5	21.4	0.3	10.1	18.0	22.4

Table A–28. Six-Month Prevalence of Post-Traumatic Stress Disorder in the General Population (*n* = 7,828)

Post-Traumatic Stress Disorder (6-month)=3.4						
Age	White=3.5		Black=3.6		Hispanic=2.7	
	Male=2.1	Female=4.7	Male=2.3	Female=4.5	Male=1.4	Female=4.0
≤19	0.7	6.2	1.6	0.1	2.8	3.4
20–29	2.6	5.9	0.1	8.4	2.8	2.6
30–39	2.0	4.8	3.0	4.5	0.1	7.0
40–49	2.5	3.0	5.1	2.3	0.1	1.9
50+	1.7	4.4	0.1	0.1	0.1	0.1

Table A–29. Six-Month Prevalence of Post-Traumatic Stress Disorder in Those in Poverty (*n* = 977)

Post-Traumatic Stress Disorder (6-month)=6.7						
Age	White=8.9		Black=3.9		Hispanic=3.9	
	Male=3.9	Female=11.9	Male=2.6	Female=4.5	Male=1.4	Female=5.6
≤19	2.3	10.7	1.6	0.1	2.8	8.7
20–29	2.3	15.8	0.1	5.2	4.3	2.6
30–39	6.3	9.6	5.6	6.4	0.1	13.8
40–49	10.3	5.9	5.8	4.8	0.1	1.9
50+	1.7	8.3	0.1	0.1	0.1	0.1

Table A–30. Six-Month Prevalence of Post-Traumatic Stress Disorder in Those with Poverty and Substance Abuse (*n* = 247)

Post-Traumatic Stress Disorder (6-month)=10.5						
Age	White=11.0		Black=10.0		Hispanic=8.6	
	Male=5.2	Female=17.4	Male=6.7	Female=13.3	Male=6.3	Female=10.5
≤19	6.7	10.7	4.1	0.3	12.6	16.4
20–29	2.2	24.5	0.3	15.6	19.4	4.9
30–39	6.3	11.8	14.4	19.2	0.5	25.9
40–49	14.3	8.4	14.9	14.4	0.5	3.8
50+	2.3	11.9	0.3	0.3	0.5	0.2

Table A–31. Lifetime Prevalence of Anxiety Disorder in the General Population (*n* = 7,828)

Anxiety Disorder (lifetime)=24.6						
Age	White= 25.3		Black=19.8		Hispanic=25.6	
	Male=21.3	Female=29.1	Male=12.9	Female=24.8	Male=18.8	Female=32.3
≤19	23.7	33.1	12.5	25.5	22.2	36.2
20–29	20.3	29.1	13.9	26.3	22.6	28.4
30–39	22.6	30.2	16.5	27.3	18.3	28.9
40–49	21.1	28.1	8.2	20.9	9.7	42.3
50+	15.7	24.8	9.7	20.0	16.7	41.2

Table A–32. Lifetime Prevalence of Anxiety Disorder in Those in Poverty (*n* = 977)

Anxiety Disorder (lifetime)=28.9						
Age	White=32.2		Black=19.5		Hispanic=32.2	
	Male=26.8	Female=35.4	Male=15.4	Female=21.3	Male=23.3	Female=38.3
≤19	29.5	42.9	18.2	20.8	29.6	56.5
20–29	21.8	36.0	12.5	22.1	21.7	30.8
30–39	37.5	31.3	22.2	17.0	26.7	31.0
40–49	31.0	32.4	9.8	23.8	12.0	42.9
50+	15.4	33.3	11.5	17.2	20.7	49.0

Table A–33. Lifetime Prevalence of Anxiety Disorder with Poverty and Substance Abuse (*n* = 247)

Anxiety Disorder (lifetime)=41.3						
Age	White=40.1		Black=30.0		Hispanic=57.1	
	Male=35.4	Female=45.3	Male=20.0	Female=40.0	Male=43.8	Female=68.4
≤19	60.0	63.6	23.7	39.1	55.6	99.0
20–29	26.7	32.7	16.3	41.5	40.8	55.1
30–39	43.8	70.6	28.9	32.0	50.2	55.5
40–49	28.6	41.5	12.7	44.7	22.6	76.8
50+	20.3	42.6	11.5	32.3	38.9	87.7

Table A–34. Six-Month Prevalence of Anxiety Disorder in the General Population (*n* = 7,828)

Anxiety Disorder (6-month)=14.6						
Age	White=14.7		Black=12.8		Hispanic=16.0	
	Male=11.1	Female=18.0	Male=5.6	Female=18.0	Male=11.6	Female=20.2
≤19	14.7	26.5	4.7	23.6	19.4	31.0
20–29	11.7	18.1	6.9	21.2	15.1	17.2
30–39	11.2	17.8	8.3	17.0	7.7	17.2
40–49	9.4	16.5	3.1	14.7	4.8	21.2
50+	9.6	15.5	0.1	11.1	5.6	23.5

Table A–35. Six-Month Prevalence of Anxiety Disorder in Those in Poverty (*n* = 977)

Anxiety Disorder (6-month)=18.5						
Age	White=21.1		Black=12.9		Hispanic=18.9	
	Male=15.6	Female=24.4	Male=9.0	Female=14.6	Male=15.1	Female=21.5
≤19	13.6	30.4	4.5	16.7	22.2	47.8
20–29	16.1	26.6	8.3	16.9	13.0	10.3
30–39	15.6	18.1	22.2	12.8	13.3	13.8
40–49	17.2	23.5	5.0	9.5	6.2	28.6
50+	15.4	20.8	0.3	9.0	7.3	24.9

Table A–36. Six-Month Prevalence of Anxiety Disorder in Those with Poverty and Substance Abuse (*n* = 247)

Anxiety Disorder (6-month)=28.3						
Age	White=28.6		Black=16.7		Hispanic=31.3	
	Male=21.9	Female=36.0	Male=6.7	Female=26.7	Male=42.1	Female=37.1
≤19	26.7	54.4	3.3	30.6	61.9	82.7
20–29	22.2	28.6	6.1	30.9	36.3	17.8
30–39	18.8	47.1	16.4	23.4	37.1	23.9
40–49	14.3	34.8	3.7	17.4	17.3	49.5
50+	21.6	30.8	0.1	16.5	20.4	43.1

Table A–37. Lifetime Prevalence of Antisocial Personality Disorder in the General Population (*n* = 7,828)

Antisocial Personality Disorder (lifetime)=14.8						
Age	White=14.4		Black=13.5		Hispanic=20.1	
	Male=22.2	Female=7.1	Male=19.7	Female=8.9	Male=29.3	Female=11.1
≤19	25.9	10.8	29.7	7.3	31.9	12.1
20–29	25.1	9.6	23.8	15.1	32.1	11.2
30–39	22.8	7.8	18.0	8.5	29.8	9.4
40–49	19.3	4.1	12.2	2.3	21.0	13.5
50+	14.4	2.3	16.1	6.7	27.8	11.8

Table A–38. Lifetime Prevalence of Antisocial Personality Disorder in Those in Poverty (*n* = 977)

Antisocial Personality Disorder (lifetime)=20.7						
Age	White=22.6		Black=14.8		Hispanic=23.3	
	Male=34.1	Female=15.5	Male=21.8	Female=11.8	Male=31.5	Female=17.8
≤19	36.4	17.9	36.4	8.3	25.9	21.7
20–29	31.0	18.0	16.7	15.6	30.4	17.9
30–39	31.3	14.5	22.2	10.6	40.0	17.2
40–49	41.4	8.8	13.5	4.8	22.7	7.1
50+	38.5	8.3	17.9	8.9	30.0	18.9

Table A–39. Lifetime Prevalence of Antisocial Personality Disorder in Those with Poverty and Substance Abuse (*n* = 247)

Antisocial Personality Disorder (lifetime)=45.3						
Age	White=46.7		Black=33.3		Hispanic=48.6	
	Male=60.4	Female=31.4	Male=33.3	Female=33.3	Male=56.3	Female=42.1
≤19	86.7	45.5	55.7	23.4	46.4	51.4
20–29	46.7	28.6	25.6	44.1	54.4	42.4
30–39	62.5	35.3	34.0	29.8	71.6	40.8
40–49	71.4	17.9	20.7	13.5	40.6	16.8
50+	68.1	16.8	27.4	25.0	53.7	44.8

Appendix B

Table B–1. Cell Sizes for the Community Sample From the National Comorbidity Survey (*n* = 7,828)

Age	Cell Size					
	White		Black		Hispanic	
	Male	Female	Male	Female	Male	Female
≤19	278	260	64	55	72	58
20–29	738	832	101	179	106	116
30–39	1,007	1,007	133	176	104	128
40–49	679	711	98	129	62	52
50+	229	343	31	45	18	17

Table B–2. Cell Sizes for the Poverty Sample From the National Comorbidity Survey (*n* = 977)

Age	Cell Size					
	White		Black		Hispanic	
	Male	Female	Male	Female	Male	Female
≤19	44	56	22	24	27	23
20–29	87	139	24	77	23	39
30–39	32	83	18	47	15	29
40–49	29	34	8	21	5	14
50+	13	24	6	9	3	2

Table B–3. Cell Sizes for the Poverty and Substance Use Sample From the National Comorbidity Survey (*n* = 247)

Age	Cell Size					
	White		Black		Hispanic	
	Male	Female	Male	Female	Male	Female
≤19	15	11	1	1	2	6
20–29	45	49	5	6	7	6
30–39	16	17	4	5	3	5
40–49	14	7	2	3	3	2
50+	6	2	3	0	1	0

Cost-Effectiveness of Routine Screening for Sexually Transmitted Diseases Among Inmates in United States Prisons and Jails

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Introduction

> *When the famous bank robber Willie Sutton was asked why he robbed banks, he answered, "Because that's where the money is." Well, jails are where infectious diseases are that most threaten public health.*
>
> —Thomas J. Conklin, M.D.
> Director of Health Services for the
> Hampden County Correctional Center,
> Ludlow, Massachusetts

The above quote expresses the sentiments of sexually transmitted disease (STD) prevention and treatment specialists regarding the need for routine screening programs for inmates of corrections facilities in the United States. Sexually transmitted diseases are among the group of infectious diseases whose prevalence is estimated to be higher among inmates than in the general U.S. population.[1] These high prevalence rates are due to a concentration of STD risk behaviors and factors in incarcerated populations. These include substance abuse, high-risk sexual activity (including commercial sex work), and the limited access to health care that is associated with poverty. Although the National STD Surveillance Program of the Centers for Disease Control and Prevention (CDC) does not flag cases identified in corrections facilities, CDC's STD division started an annual Jail STD Prevalence Monitoring Project in 1997 to develop a national picture of STD prevalence in these facilities. In addition, there have been numerous local studies of STD prevalence within these institutions. These studies have found prevalence of the three most commonly reported bacterial STDs—chlamydia, gonorrhea, and syphilis—to be much greater among inmates than in the general U.S. population.[2] The rate of infectious syphilis in Los Angeles County's main jail facility was found to be more than 11 times higher than the rate in the county's general population.[3] In jailed women in New York City, the prevalence of chlamydia was as high as 27 percent, and that of gonorrhea was as high as 8 percent. The prevalence of chlamydia and gonorrhea in asymptomatic male detainees in New Orleans was 6 percent. A recent study of the prevalence of chlamydial and gonococcal infections in women entering jails found that in Chicago, 13 percent screened positive for chlamydia and 9 percent screened positive for gonorrhea; in Birmingham, Alabama, 11 percent screened positive for chlamydia and 8 percent screened positive for gonorrhea; and in San Francisco, 10 percent screened positive for chlamydia and 5 percent screened positive for gonorrhea.[4] In contrast, in 1996, 1.7–8.4 percent of women age 15–34 who were tested at family planning clinics screened positive for chlamydia, and 3.3 percent screened positive for gonorrhea.

Among women age 15–34 who were screened at STD clinics, about 15.2–17.7 percent screened positive for chlamydia and 1.8–22.4 percent screened positive for gonorrhea.[5] Family planning clinics tend to screen both symptomatic and asymptomatic individuals, whereas STD clinics screen and treat only symptomatic individuals. Therefore, STD prevalence rates are expected to be higher in STD clinic populations than in family planning clinic populations or in any other population that is screened routinely (i.e., symptomatic and asymptomatic individuals). The high prevalence of STDs in the incarcerated population has implications not only for the personal health of the individual inmates but also for the general public. The population in corrections facilities has been growing rapidly over the past decade, and many of these inmates are released back into the community each year. If inmates are released without treatment, they increase the prevalence of disease in a community and may promote further transmission of STDs to their sex partners.

The National Commission on Correctional Health Care (NCCHC) has recommended offering universal, routine screening to all inmates in corrections facilities regardless of behavioral risk profile for STD for two reasons. First, many individuals with sexually transmitted infections may be asymptomatic and therefore unaware that they are infected. A recent study found high rates of asymptomatic bacterial sexually transmitted infections in a high-risk STD cohort: 62 percent of chlamydia infections were unrecognized in both men and women, 28 percent of gonorrhea infections in men and 51 percent in women were unrecognized, and 40 percent of syphilis infections in men and 100 percent of syphilis infections in women were unrecognized.[6] Second, most of the population that enters the corrections system does not have continuous access to quality primary health care outside of these institutions. Therefore, routine screening would enable an underserved population at high risk for STDs to receive health care that otherwise might be unavailable.

Despite NCCHC's recommendation, many facilities, particularly jails, do not routinely screen all inmates.[7] Some facilities screen inmates only if signs or symptoms are present or an inmate requests testing. Even in facilities that fully implement routine screening policies, routine screening may be delayed for up to 14 days past intake. Many jail inmates are released back into the community within 48 hours, so the opportunity to screen and treat those inmates is lost. Therefore, earlier screening, particularly routine screening on intake, may be a more effective strategy to decrease morbidity and the transmission of STDs.

Questions remain about which of the many strategies for STD prevention and control activities in jails and prisons is most cost effective: testing on an inmate's request only, testing only if signs or symptoms are present or there is a sexual contact with a partner suspected to be infected, routine screening any time before release, routine screening within 12–48 hours after intake, or presumptive treatment without testing of persons with signs or symptoms. The higher prevalence of STDs in incarcerated populations and the need for routine screening are widely documented, but information on the economic feasibility of routine STD screening programs within corrections facilities is limited. This report examines the cost-effectiveness of providing routine screening *on intake* of inmates in U.S. prisons and jails for syphilis, gonorrhea, and chlamydia as compared with a presumptive treatment strategy, often found in many corrections facilities.[8] Because the following analyses are based on jails and prisons, the focus is on adult inmates as distinguished from incarcerated adolescents, who generally reside in juvenile detention facilities that follow different rules and policies.

Methods

An intervention may reduce adverse health outcomes and the medical costs associated with these outcomes. For the purposes of this study, the net cost of an intervention is the difference

between the intervention's costs and the averted medical costs. If the averted medical costs exceed the intervention's costs, then the intervention is cost saving. Conversely, if the averted medical costs are less than the intervention's costs, then the intervention is not cost saving. An intervention that is not cost saving may be cost effective if the reduction in adverse health outcomes is judged to be worth the net cost of the program. An intervention is considered cost effective if the benefits it will achieve are worth the costs, even if those costs are greater than the money that is saved as a result of averted illness.

Decision tree analysis models[9] are used to examine the cost-effectiveness of routine screening for syphilis, gonorrhea, and chlamydia. Disease-specific analyses are conducted because each infection requires different testing and treatment approaches and results in different medical sequelae. Each set of analyses uses a health care system perspective that considers all medical costs associated with a screening program (i.e., testing and treatment). This perspective was used because most, if not all, of this population has little or no access to continuing primary health care outside of the corrections facility.[10] Inmates who are released from corrections facilities with undiagnosed or untreated illnesses may compete with other members of their communities for limited public-sector funds (e.g., Medicaid, publicly funded hospital emergency rooms), shifting the costs to facilities outside the prison or jail. Therefore, each model considers all disease-related costs and health events that occur over the lifetimes of the members of the cohort as they move into or out of a corrections facility. A health care system perspective differs from a societal perspective, which includes *all* benefits of a program and *all* costs: direct medical, nonmedical, indirect (e.g., employment productivity losses), and intangible (e.g., pain and suffering) costs.

A modified health-care system perspective was adopted because this is most useful for decisionmakers in corrections and public health. Productivity losses of incarcerated populations were not addressed because these populations experience high rates of unemployment and illegal employment that are difficult to quantify. Intangible costs of STDs were not addressed because these costs have not been quantified in the economic or health literature. Outcomes and costs associated with primary infection of inmates were addressed, but not the costs of secondary transmission of STDs because their associated costs are difficult to quantify. All analyses were conducted on hypothetical cohorts of 10,000 inmates.

Syphilis

Syphilis is a sexually transmitted infection caused by *Treponema pallidum*. The disease has both acute and chronic manifestations that typically occur in distinct, sequential disease stages. Syphilis is transmitted by direct contact with infectious exudates from skin lesions, mucous membranes, and genital secretions of infected individuals. Ten days to 3 months after exposure to the agent, an infected person may develop a lesion at the site of the initial inoculum. The primary lesion resolves spontaneously in 1–5 weeks. This stage, characterized by genital lesions, is referred to as primary syphilis.[11]

After the primary lesion has healed, the organism spreads through the body, leading to mild signs and symptoms such as malaise, low-grade fever, and a generalized rash (with lesions) on the palms and soles. The stage characterized by these generalized signs or symptoms is known as secondary syphilis. Without treatment, these symptoms resolve spontaneously within 2–6 weeks, although they may recur as long as 4 years after infection. Secondary syphilis is generally followed by a symptom-free stage, or latency. This stage generally lasts from 10 to 20 years and is characterized by a lack of signs or symptoms. Transmission may occur during primary, secondary, and, although rarely, in the early latent stage. During the later stage of latency, it is not infectious. The infection may remain latent in individuals until death.[12]

Clinical complications may occur after this latent stage in about one-third of persons, possibly because of waning immunity. They include

complications in the cardiovascular system, in the central nervous system (neurosyphilis), on the skin, in the mucous membranes, and in the skeletal system (benign). These late-stage complications can cause mild to severe morbidity and premature mortality. Central nervous system and cardio-vascular system complications can lead to expensive treatment, surgery, hospitalization, or long-term care.[13] Late-stage complications rarely develop because the infection is often diagnosed and treated during an earlier stage or because undiagnosed syphilis is cured when the person takes a course of penicillin for another purpose that is also effective in treating syphilis.

Syphilis infections present serious risks during pregnancy.[14] Congenital transmission can occur before or at delivery regardless of a woman's stage of disease. Infection may lead to spontaneous abortion, stillbirth, preterm birth, or congenital infection. Congenital syphilis may result in blindness, deafness, or other nervous and musculoskeletal abnormalities in the infant.

Primary and secondary syphilis can facilitate the transmission of HIV in sexual partnerships involving individuals of discordant HIV serostatus.[15] Therefore, the incidence of HIV transmission is directly linked to syphilis rates.

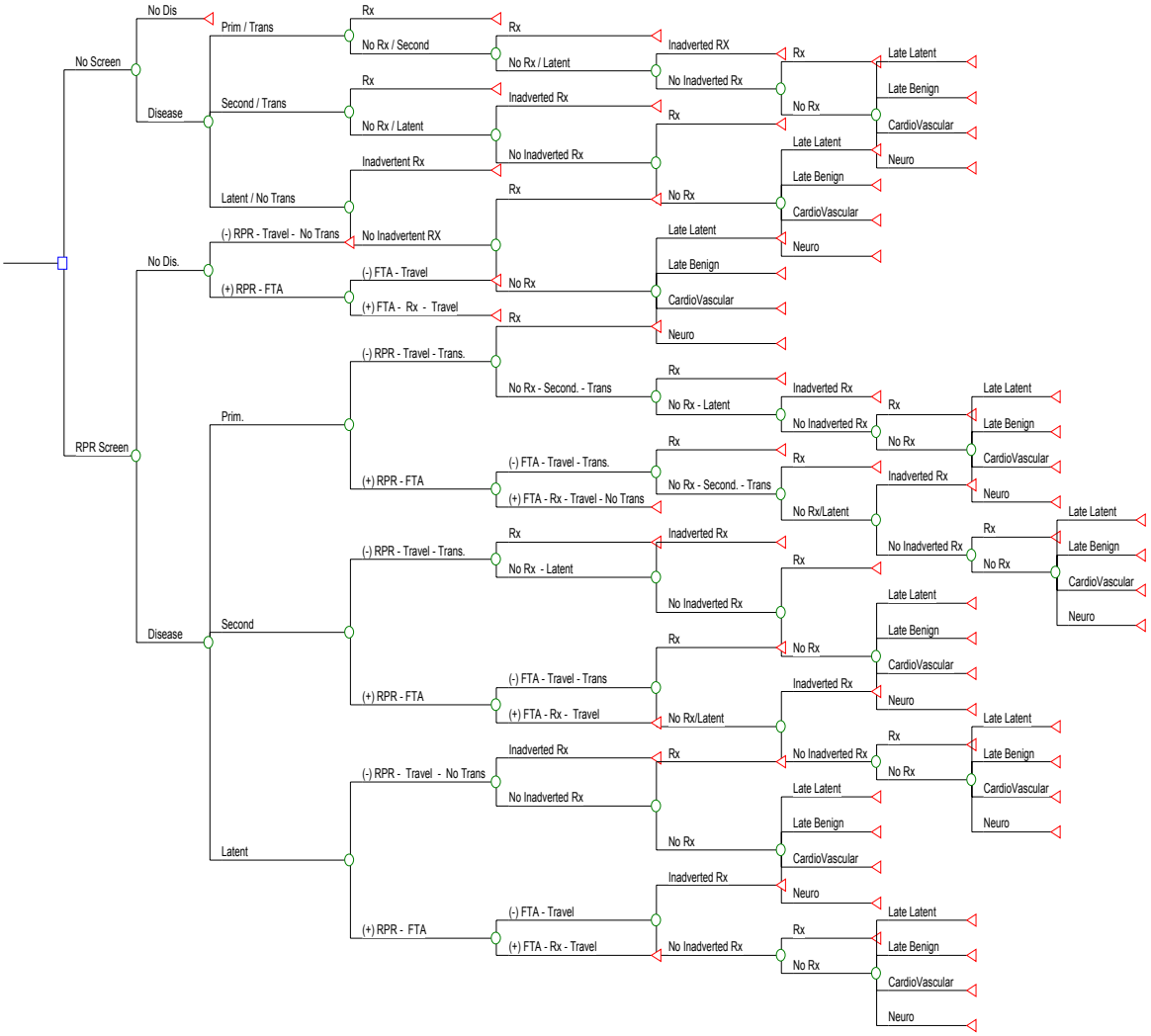
In most prison settings that test for syphilis, individuals are first tested with either the rapid plasma reagin (RPR) or the Venereal Disease Research Laboratory (VDRL) test. Because of the large number of false positive results with these tests, positive tests are confirmed with more specific tests such as the Fluorescent Treponemal Antibody Absorption test (FTA–ABS).[16] Persons with positive confirmatory tests are offered antibiotic treatment.[17] In jails, effective screening policies have been altered to account for the probability that detainees will be released before confirmed test results are available. In these settings, detainees are tested upon admission with the STAT RPR (a 15-minute onsite test of a detainee's blood). Detainees with a reactive test are treated. In some jails that have onsite laboratory facilities, such as the Cook County Jail in Chicago, a routine quantitative RPR is performed on samples that are reactive to STAT RPR. Jail personnel then review an online syphilis registry to determine whether detainees with reactive serologies are in the registry and require treatment.[18] All positive STAT RPR tests are confirmed and staged with RPRs and FTAs, which allows appropriate entry into the syphilis registry. Because most jails do not have onsite laboratories and immediate access to registries, the model assumes that detainees are treated based only on results of the STAT RPR without additional testing to prevent persons with syphilis from being released before they get treatment.

Decision tree

A decision tree is a graphic representation of how all possible events relate (stochastically) to possible outcomes.[19] The decision tree used to analyze the cost-effectiveness of routine syphilis screening in jails and prisons compares the health effects and costs of two options: (1) no routine universal screening for syphilis on intake, and (2) routine universal screening on intake. The decision tree used for the prison setting is shown in figure 1.[20] In the prison setting, the screening is done with an RPR test on intake, followed by a FTA–ABS confirmation of positive RPR tests and treatment of inmates with confirmed tests. In jails, screening is done with a STAT RPR, followed by treatment of inmates with reactive serologies. The models include FTA–ABS confirmation of positive tests, but do not include costs associated with entry into and verification with the syphilis registry. Because clinical manifestations of the disease are similar for men and nonpregnant women, a single model was developed for both sexes. Pregnant women were not considered here.

The decision tree follows a hypothetical cohort of 10,000 individuals throughout their lifetimes. The model was based on several assumptions. The first assumption was that at any point during infection, syphilis might be diagnosed and an infected person treated for it after release from jail or prison. The second assumption was that all inmates who tested positive with either the STAT RPR alone (jail) or both the RPR and FTA (prison) tests would receive treatment before release and that the treatment had a 100-percent

Figure 1. Decision Analysis Tree for Examining the Cost-Effectiveness of Screening Men and Women in Prisons for Syphilis



cure rate. The third assumption was that infected individuals in whom syphilis was not diagnosed because those persons were not screened or were screened but had a false-negative test would develop the standard stages of syphilis. The fourth assumption was that inadvertent treatment of syphilis with an antibiotic prescribed for other reasons might cure the syphilis infection in some infected individuals.

Because the length of the interval between infection and onset of complications affects the present value of the costs, certain assumptions were made about time of onset of primary infection and when complications might occur. The model assumes that cardiovascular syphilis requiring surgery or neurosyphilis with general paresis would result in death 10 years earlier than without the complication. The model assumes also that patients with cardiovascular syphilis or neurosyphilis would require extended medical followup ranging from 9 to 42 years and that 2 percent of those with neurosyphilis would require nursing home care over the remainder of their lifetimes.

All persons in the hypothetical cohort progress through the decision tree from the point at which

they enter a jail or prison until their deaths. Persons with untreated syphilis are followed throughout the course of the disease, including latent infection without clinical manifestations, benign latency, infection with cardiovascular complications, and infection with central nervous system complications. The health outcome in the decision models is the number of undetected syphilis infections by stage of disease in inmates after they have passed through intake in the jail or prison. The model is used also to calculate the number of persons with syphilis at the time of intake into the jail or prison whose syphilis eventually would develop into late-stage clinical disease.

Key parameters

The probabilities used in the syphilis decision tree are in table 1. Probabilities include the prevalence of syphilis in jail and prison inmates at the time of intake. The base-case scenario uses a prevalence of 8 percent (primary, secondary, and early latent). Because this prevalence estimate is likely to vary in different jail and prison settings, this value was varied in sensitivity analyses.

The model also includes the probability of the stage of disease in infected persons and probabilities of progression to different stages of disease. The tree includes the probability of diagnosis and treatment at all stages of the disease during an individual's lifetime, regardless of incarceration status. The program option that includes routine universal screening considers the sensitivity and specificity of STAT RPR (jail model only), RPR, and confirmatory FTA–ABS testing for detecting the following three stages of infection: primary, secondary, and latent.

One-way sensitivity analyses, in which the value of only one parameter at a time was changed, were performed on all variables in the model to determine the effect of small changes in parameter estimates on the cost-effectiveness of the two program options. Sensitivity analyses on the prevalence of syphilis infection in the hypothetical cohort of inmates were reported to allow the results to be generalized to jail and prison settings with different prevalence levels.

Key costs

Table 2 shows the costs (in 1996 dollars) used in the syphilis decision analyses. Future costs are discounted to present value at an annual rate of 3 percent. The models include the cost of routine universal screening with the STAT RPR and RPR tests; confirmation testing of positive RPRs with FTA–ABS tests; and treatment of individuals who test positive with STAT RPR (jail model) or RPR and FTA–ABS (prison model). Treatment costs include all components of treatment specific to each stage of infection of persons with primary, secondary, early latent, late latent, late benign, cardiovascular, and neurosyphilis. Because the models do not consider pregnant women or transmission to sex partners, costs associated with congenital syphilis and new syphilis cases in sex partners are not included. Also, costs of HIV infections acquired as a result of the increased susceptibility to HIV caused by syphilis are not included.

Treatment costs were estimated by constructing a clinical treatment plan for each stage of the disease and then applying costs to each health care service utilized. Costs for health care services are based on the Medicare reimbursement rate reported in the *Physicians' Fee and Coding Guide* published by HealthCare Consultants of America.[21]

Results

Syphilis—males and females. Tables 3 and 4 show the results of routinely screening all male and female inmates upon intake in jails and prisons. At an 8-percent prevalence rate of syphilis in the hypothetical cohort of 10,000 inmates, a routine universal screening program would detect and treat 774 inmates with syphilis, and 542 with infectious primary or secondary disease. Of the 774 inmates whose syphilis was detected by the screening program, 42 would have eventually developed late-stage clinical disease; 4 persons would have developed cardiovascular syphilis and 3 persons would have developed neurosyphilis (not shown). With the routine universal screening program, 26 inmates would pass through intake with undetected

Table 1. Parameter Estimates for Syphilis Screening Decision Tree			
Variable	**Estimate (%)**	**Range (%)**	**References**
Prevalence	8	0.05–25	
Stage of Infection on Intake			
Primary infection	30		Assumption[a]
Secondary infection	40		Assumption
Latent infection	30		Assumption
Risk of Progression of Latent Syphilis Without Treatment			
No progression (late latent)	72	50–100	Clark and Danbolt 1964
CV, late benign	21.5	15–30	Clark and Danbolt 1964
Neurosyphilis	6.5	2–10	Clark and Danbolt 1964
Infected Individual Seeks Treatment			
Primary infection	10	5–15	Assumption
Secondary infection	60	40–80	Assumption
Late latent infection	10	5–15	Assumption
Late benign, CV, CNS infection	100	80–100	Assumption
Inadvertent Treatment	70	60–80	Assumption
Treatment Success	100	80–100	Assumption
Sensitivity of STAT RPR[b]	94	93–97	Blank et al. 1997
Specificity of STAT RPR	88	86–90	Blank et al. 1997
Sensitivity of RPR			
Primary infection	86	84–88	Larsen et al. 1995
Secondary infection	100	98–100	Larsen et al. 1995
Latent infection	98	96–100	Larsen et al. 1995
Specificity of RPR	98	96–100	Larsen et al. 1995
Sensitivity of FTA			
Primary infection	84	82–86	Larsen et al. 1995
Secondary infection	100	98–100	Larsen et al. 1995
Latent infection	100	98–100	Larsen et al. 1995
Specificity of FTA	97	95–99	Larsen et al. 1995

[a] The assumptions in this table are based on personal communication with Vicki Pope, CDC.
[b] Sensitivity and specificity of tests do not vary by disease stage in this model.
Sources: Blank, S., D.D. McDonnell, S.R. Rubin, J.J. Neal, M.W. Brome, M.B. Masterson, and J.R. Greenspan, "New Approaches to Syphilis Control: Finding Opportunities for Syphilis Treatment and Congenital Syphilis Prevention in a Women's Correctional Setting," *Sexually Transmitted Diseases* 24(1997): 218–228; Clark, E.G., and N. Danbolt, "The Oslo Study of the Natural Course of Untreated Syphilis: An Epidemiologic Investigation Based on a Restudy of the Boeck-Brusgaard Material," *Medical Clinic North America* 48(1964): 613; Larsen, S.A., B.M. Steiner, and A.H. Rudolph, "Laboratory Diagnosis and Interpretation of Tests for Syphilis," *Clinical Microbiology Review* 8(1995); 1–21.

Table 2. Undiscounted Costs of Syphilis Screening and Treatment of Initial Infection and Complications	
Cost	**Estimate[a] (1996 $)**
Screening Program Costs	
Blood draw	$10.00
STAT RPR	3.00
RPR screening test	3.00
FTA confirmation test	4.50
Treatment (at intake)	33.00
Disease Costs by Stage of Infection[b]	
Primary and secondary stage	331.00
Late latent stage	422.00
Late benign stage	1,491.00
Cardiovascular syphilis	
Initial treatment—no surgery	3,900.00
Initial treatment—surgery	32,641.00
Annual followup	740.00
Neurosyphilis	
Initial treatment	8,899.00
Meningovascular complications	213,615.00
General paresis	159,470.00

[a] All cost estimates were varied 20% higher and lower in sensitivity analyses.
[b] Costs are for diagnosis and treatment outside the jail or prison setting.

Table 3. Number of Syphilis Infections After Intake Into Jails and Prisons With and Without Routine Universal Screening			
	No-Screening Option	**Routine Universal Screening Option**	**Infections Treated***
Primary syphilis infections	240	8	232
Secondary syphilis infections	320	10	310
Latent syphilis infections	240	8	232
Total	**800**	**26**	**774**

* Infections Treated = No-Screening Option – Routine Universal Screening Option.

Table 4. Costs of Screening and No-Screening Options for Syphilis in Prisons and Jails			
Cost	**No-Screening Option**	**Routine Universal Screening Option**	**Additional Cost/Savings of Routine Universal Screening Option***
Prisons			
Program cost	$0	$160,648	$160,648
Disease costs	1,975,087	140,065	–1,835,022*
Total costs	**1,975,087**	**300,713**	**–1,674,374**
Jails			
Program cost	$0	$196,600	$196,600
Disease costs	1,975,087	140,065	–1,835,022
Total costs	**1,975,087**	**336,665**	**–1,638,422**

* Negative value indicates savings.

syphilis, 18 of whom would have primary or secondary infections. Only 1 person whose syphilis was not detected on intake into the jail or prison would eventually develop late-stage clinical disease, with a 16-percent chance of developing either cardiovascular or neurosyphilis.

In the prison setting with no routine universal screening program, the lifetime cost of syphilis in the hypothetical cohort would approach $2 million (see table 4). Implementing a routine universal screening program that included treatment of persons identified as infected would cost $160,648. Disease costs associated with routine universal screening would be only $140,065. Thus, a routine universal screening program might save almost $1.7 million compared to the no-screening option (see table 4).

In jail settings, the cost of a routine universal screening program might be slightly higher because of overtreatment associated with the low specificity (88 percent) of the STAT RPR test. The cost of the routine universal screening option would be $196,600. Approximately 1,104 inmates who tested positive for syphilis but who were not infected would receive treatment for an added cost of $30,360. Savings associated with the jail program also would approach $1.7 million (see table 4).

Sensitivity analyses indicate that the finding that routine universal screening saves costs is stable under reasonable variations in parameter estimates. Results indicate that routine universal screening programs would save money in both jails and prisons in which the prevalence of syphilis in new inmates was greater than 1 percent. In jails, where release before treatment can result from delayed diagnosis, overtreatment costs would be offset by savings in disease costs if immediate treatment based on a positive STAT RPR prevented at least five inmates with syphilis from being released untreated and lost to followup.

Discussion. Routine universal screening for syphilis upon intake in jails and prisons is a cost-saving strategy for identifying and treating disease in high-risk populations. Although such programs require initial investments, the savings in downstream medical costs of syphilis should more than pay for the program. Although the cost-effectiveness of routine universal screening only for costs borne by government was not analyzed, such an analysis would likely have a similar result. This population may have limited access to private health insurance, therefore, government programs will pay much of the downstream medical costs.

The syphilis analyses have several limitations. First, the analysis did not account for the transmission of syphilis during pregnancy. Thus, the costs and health outcomes associated with spontaneous abortions, stillbirths, neonatal mortality, neonatal treatment, and long-term complications of congenital syphilis were not included. These costs and health consequences can be significant. In a 1993 study of female inmates in the New York City Jail, of the 727 women examined upon admission, more than 2 percent were pregnant and had syphilis.[22] Infants born with congenital syphilis remain hospitalized 7–9 days longer than uninfected infants, at an additional cost of $5,000–$9,000.[23] If costs associated with congenital syphilis had been included, the routine universal screening option would have saved even more money.

The analysis also did not include the cost of HIV infections attributable to syphilis in inmates. Identifying and treating syphilis in inmates in jails and prisons before release has the potential to prevent transmission of new HIV infections. Using the model developed by Chesson and colleagues,[24] it was estimated that the jail and prison screening programs modeled in this paper also would prevent 10–11 new HIV infections attributable to syphilis. The lifetime medical cost of HIV is an estimated $195,188 per infected person.[25] Including these costs would increase the cost savings of a routine universal screening program.

Finally, the model did not include transmission of syphilis to sex partners of members of the hypothetical cohort. The cost-saving nature of a routine universal screening program results overwhelmingly from medical costs prevented

by detecting infection before it progresses to another stage or late-stage disease. The benefits of interrupting transmission in the community have not been captured. Public health benefits of a routine screening program are likely to be far greater than those projected in this study.

Gonorrhea and Chlamydia

The same decision tree model was used for both gonorrhea and chlamydia because the only significant difference between these diseases for purposes of this study is the treatment regimen. The model was applied to men and women separately because men and women experience different health outcomes and sequelae. Undiagnosed or untreated gonorrhea and chlamydia may lead to epididymitis in men and pelvic inflammatory disease (PID) in women. Therefore, separate gonorrhea and chlamydia models were devised for men and women.

Each model considers two program options: (1) universal, routine screening at intake followed by treatment of inmates who test positive and (2) no routine screening, but an offer of presumptive treatment to inmates who request it because of symptoms. Each model follows individuals in the cohort as they are diagnosed and treated before release or as they progress undiagnosed or untreated for the disease. The models are used to estimate the difference between a routine screening program and a program in which inmates are treated presumptively for an STD. The difference between the programs is expressed in terms of total and incremental (moving from presumptive treatment to routine screening) health care costs and two health outcomes: (1) the number of cases of sequelae and (2) the number of inmates with cases of undiagnosed or uncured gonorrhea or chlamydia. The first health outcome shows the benefit of the routine screening program in terms of the number of cases of sequelae prevented (i.e., the difference between the number of resulting cases of sequelae with a presumptive treatment program and a routine screening program). The second health outcome shows the benefits of a routine screening program in terms of the number of gonorrhea and chlamydia infections detected.

Decision tree models

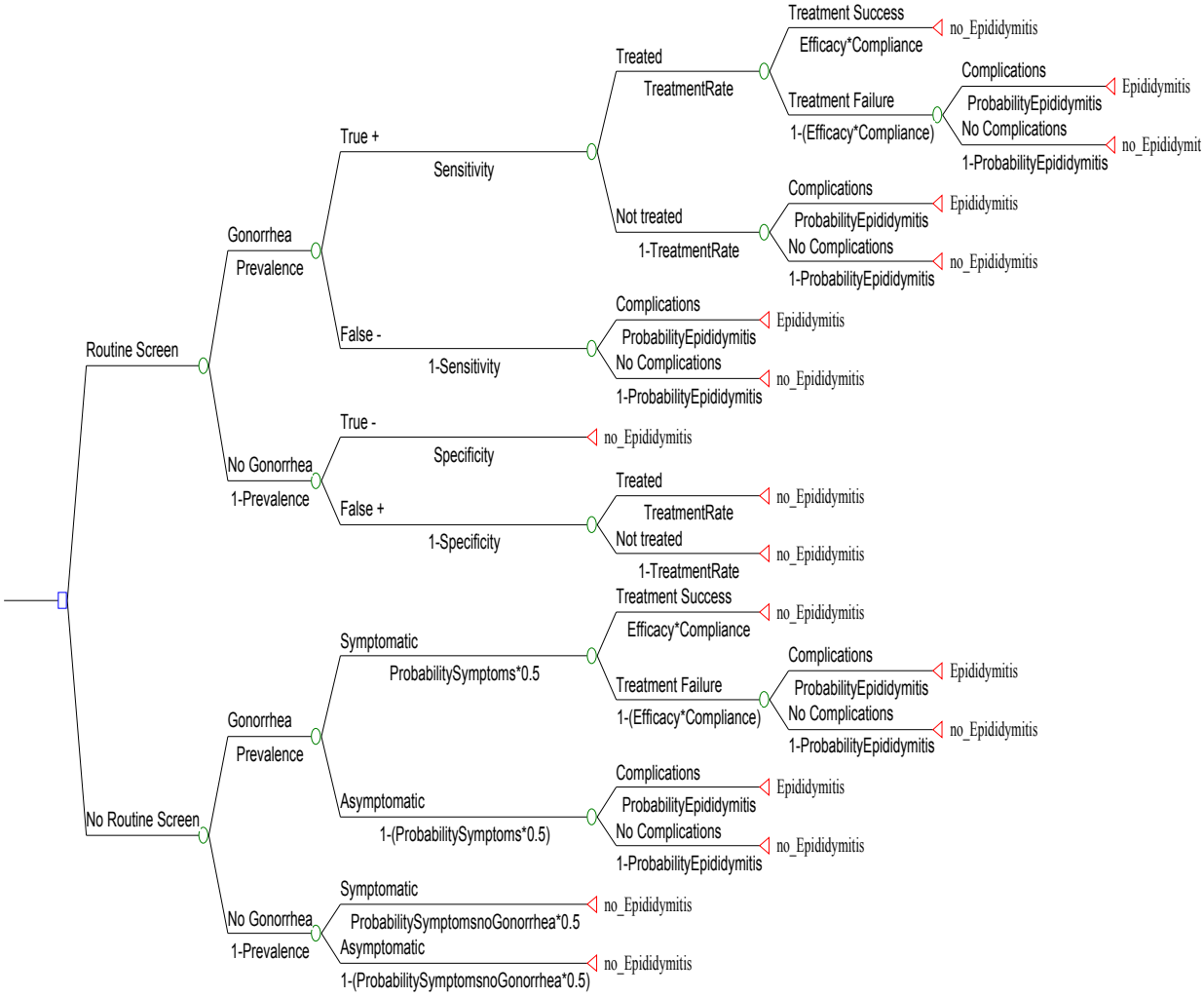
Figures 2 and 3 show the decision models used to examine gonorrhea screening in men and women. Figures 4 and 5 show the models used to examine chlamydia screening in men and women. The structure of each model is described before the data chosen for each probability and cost value is discussed. This is because even though the same model structure is used to describe the programs in prisons and jails, the environments in these two types of corrections facilities vary, causing different probabilities to be used.

Data on the probabilities of events and the costs of the STD tests, treatment, and sequelae were collected from a variety of sources, including published studies, working papers, and expert opinion. All costs are expressed in 1996 dollars. Costs that were collected from reports before or after 1996 were adjusted using the Medical Component of the Consumer Price Index.[26] To check the robustness of the assumptions, sensitivity analyses were conducted to assess the effect of varying values of uncertain parameters on the results in all of the models.

Decision tree models—men. Figures 2 and 4 show the decision trees for screening male inmates in prisons and jails for gonorrhea and chlamydia. There are two program options: (1) routine screening on intake or (2) no routine screening on intake, instead presumptively treating based on symptoms. The tree is further divided between those who are and those who are not truly infected with gonorrhea or chlamydia to consider all of the different outcomes for each of these groups. Those who are truly infected may or may not display symptoms, but with the first program option, all inmates will be screened.

Starting with the routine-screening-on-intake program option, the results of a test of truly infected men may be either positive (true positive) or negative (false negative). If the test results are positive and those tested receive treatment, the

Figure 2. Decision Analysis Tree for Examining the Cost-Effectiveness of Screening Men for Gonorrhea

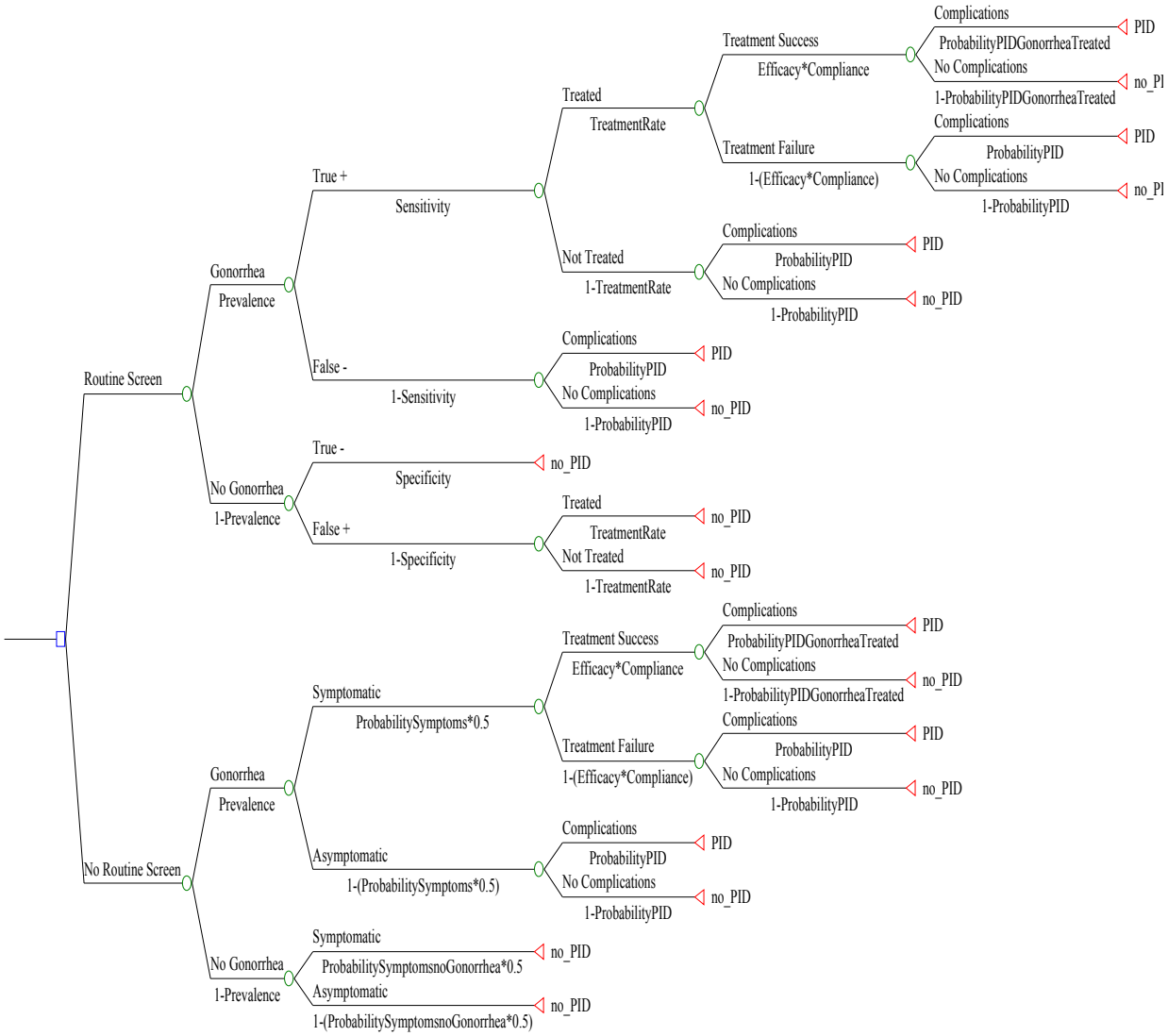


treatment either does or does not treat the infection. If the treatment fails to cure the infection, men may develop epididymitis, a sequela of both gonorrhea and chlamydia. If a man has a positive test result and is not treated for some reason (e.g., he is no longer incarcerated when test results are received), then it is assumed that he has a probability of developing epididymitis. If men are truly infected, but their test results are negative, then they are not treated and may develop epididymitis.

Truly uninfected men also will be tested with a routine screening on intake. If the test results are negative (true negative), then there is no more interaction between the health staff and the inmates. If the test results are positive (false positive) and the inmates are still incarcerated at the time of test results, then they will be treated. Since these men are truly uninfected, there is no chance of developing sequelae of gonorrhea or chlamydia.

In the absence of a routine screening program, treatment is administered only if inmates have symptoms and request it. It is assumed that one-half of symptomatic inmates will request treatment, but that inmates will not request treatment in the absence of symptoms. The truly infected may be either symptomatic or asymptomatic. The truly infected who are symptomatic and who request treatment are treated, and the treatment is successful or not successful. If the treatment fails, there is a possibility of developing sequelae of

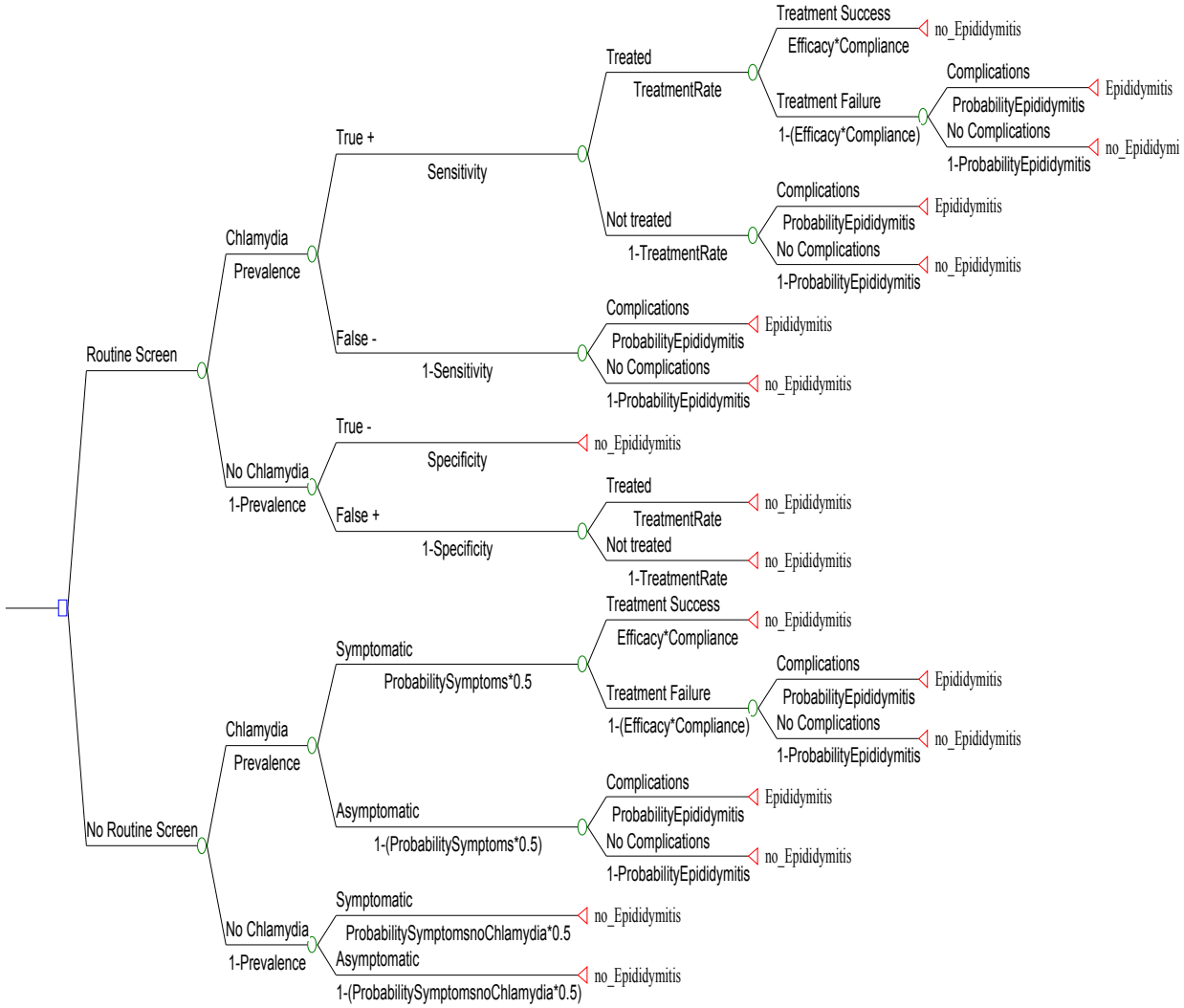
Figure 3. Decision Analysis Tree for Examining the Cost-Effectiveness of Screening Women for Gonorrhea



gonorrhea or chlamydia. The truly infected who are asymptomatic are not tested or treated and may or may not develop epididymitis. The truly uninfected inmates may have nonspecific symptoms that cause them to present for treatment for gonorrhea or chlamydia. They may present painful urination in women and men, and vaginal discharge in women, which may be nonspecific and indicate infections other than gonorrhea and chlamydia. Because these inmates would be symptomatic, it is assumed that they would be treated presumptively. Since they are truly uninfected, they will not develop sequelae. The uninfected who do not have symptoms are assumed never to present or request treatment.

Decision tree models—women. Figures 3 and 5 show the decision trees for gonorrhea and chlamydia applied to female inmates. These decision trees are similar to those applied to male inmates except for two differences. First, undiagnosed, untreated, or undertreated gonorrhea and chlamydia can lead to PID in women. Second, for men, it is assumed that if treatment is provided and successful, then men are cured of gonorrhea or chlamydia and have no chance of developing

Figure 4. Decision Analysis Tree for Examining the Cost-Effectiveness of Screening Men for Chlamydia



sequelae. For women, there is a slight risk of developing PID even if they are treated successfully for gonorrhea or chlamydia, if treatment is provided after the infection has already ascended to the uterus and fallopian tubes.

Key parameters—men and women. Table 5 shows the data values used as probabilities in base case (column 2) and sensitivity (column 3) analyses. Based on previous site- and sex-specific studies, the models assume a 6-percent prevalence of symptomatic or asymptomatic gonorrhea infection and an 8-percent prevalence of symptomatic or asymptomatic chlamydia infection in both the male and female cohorts. These assumptions are varied in sensitivity analyses. Although many gonorrheal and chlamydial infections may be asymptomatic, when symptoms are present they are much more noticeable to men than to women. The models include probabilities associated with the development of sequelae for inmates that are undiagnosed and untreated (including treatment failures).

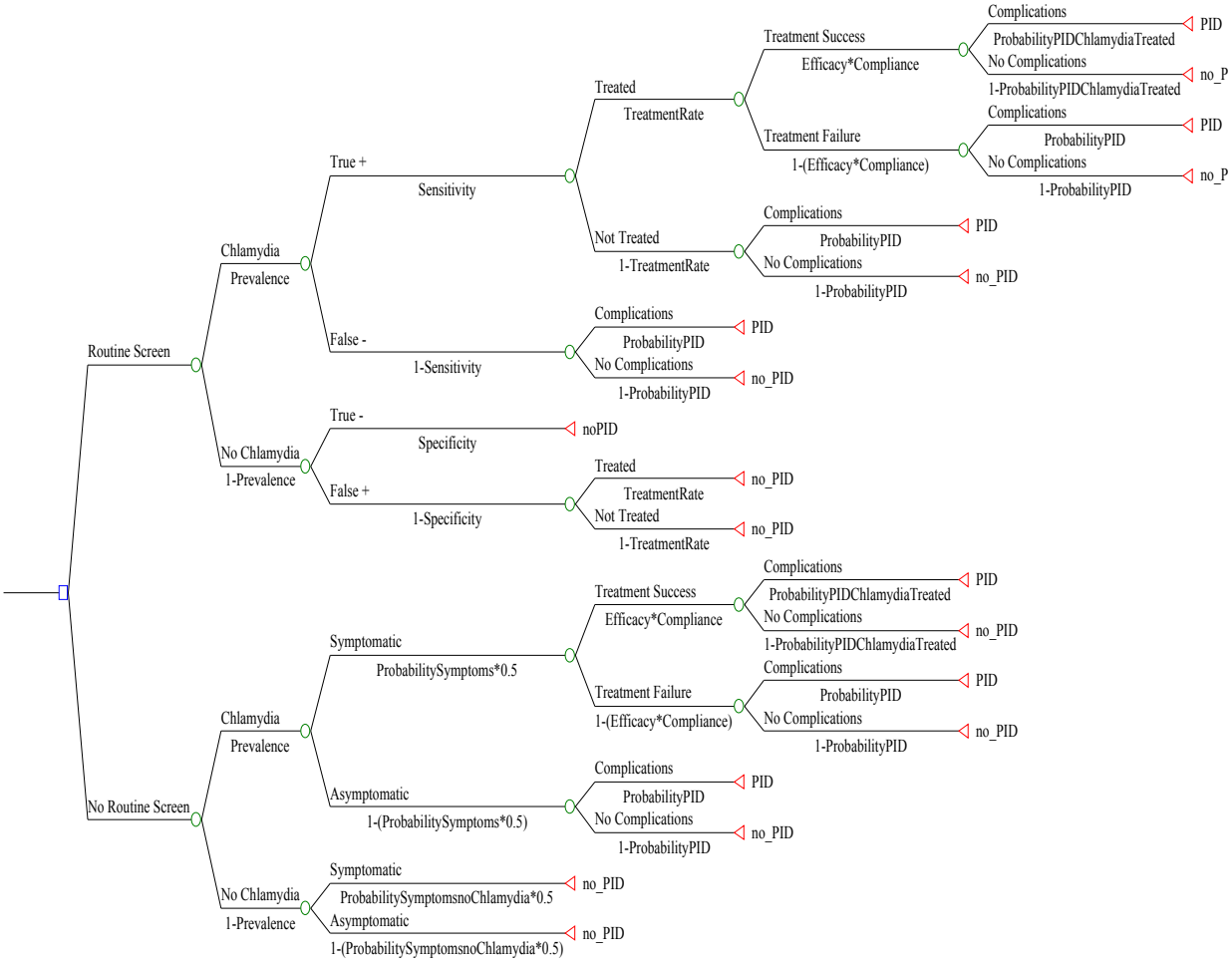
The routine screening program for gonorrhea and chlamydia includes the use of a nucleic acid amplification test, Ligase Chain Reaction (LCR).[27] LCR is an FDA-approved urine test that is highly sensitive and specific. An additional advantage is a noninvasive specimen collection process.

Table 5. Probabilities Used in Baseline and Sensitivity Analyses			
Parameter	**Probabilities***	**Probability Ranges***	**Sources**
Prevalence			
Gonorrhea	0.06	0.01–0.20	Glaser and Greifinger 1993
Chlamydia	0.08	0.01–0.30	Glaser and Greifinger 1993
Progression to Adverse Sequelae			
Epididymitis	0.02	0.01–0.04	Holmes et al. 1993; Washington, Johnson, and Sanders 1987
PID			
If disease is untreated			
Gonorrhea	0.15	0.10–0.20	Holmes et al. 1993
Chlamydia	0.15	0.10–0.40	Haddix, Hillis, and Kassler 1995
If disease is treated	0.06	0.01–0.10	
Probability of Symptoms			
Truly infected			
Gonorrhea	0.95 (M), 0.35 (W)	0.90–0.99 (M), 0.20–0.80 (W)	Holmes et al. 1993
Chlamydia	0.67 (M), 0.30 (W)	0.15–0.80 (M), 0.30–0.50 (W)	Washington, Johnson, and Sanders 1987
Uninfected			
Gonorrhea	0.07 (M), 0.07 (W)	0.10–1.00 (M), 0.10–1.00 (W)	Haddix, Hillis, and Kassler 1995
Chlamydia	0.07 (M), 0.07 (W)	0.10–1.00 (M), 0.10–1.00 (W)	Haddix, Hillis, and Kassler 1995
LCR Urine Test			
Sensitivity			
Gonorrhea	0.98 (M), 0.96 (W)	0.96–1.00 (M), 0.72–1.00 (W)	Koumans et al. 1998; Black 1997
Chlamydia	0.86 (M), 0.90 (W)	0.83–0.95 (M), 0.86–0.96 (W)	VanDoornum et al. 1995
Specificity			
Gonorrhea	0.99 (M), 0.99 (W)	0.98–1.00 (M), 0.96–1.00 (W)	Koumans et al. 1998
Chlamydia	0.98 (M), 0.99 (W)	0.97–1.00 (M), 0.99–1.00 (W)	VanDoornum et al. 1995
Treatment Before Release			
Jail	0.50	0.01–1.00	Glaser and Greifinger 1993
Prison	1.00	—	Glaser and Greifinger 1993
Treatment			
Efficacy			
Cefixime (GC)	0.97	0.94–1.00 (M), 0.50–1.00 (W)	Friedland et al. 1996
Azithromycin (CT)	0.97	0.93–0.98 (M), 0.97–1.00 (W)	Martin et al. 1992 Haddix, Hillis, and Kassler 1995
Compliance	1.00	0.50–1.00	Glaser and Greifinger 1993

* M = Men, W = Women

Sources: Glaser, J.B., and R.B. Greifinger, "Correctional Health Care: A Public Health Opportunity," *Annals of Internal Medicine* 118(2)(1993): 139–145; Holmes, M.D., S.M. Safyer, N.A. Bickell, S.H. Vermund, P.A. Hanff, and R.S. Phillips. "Chlamydial Cervical Infection in Jailed Women," *American Journal of Public Health* 83(4)(1993): 551–55; Washington, A.E., R.E. Johnson, and L.L. Sanders, "*Chlamydia trachomatis* Infections in the United States: What Are They Costing Us?" *Journal of the American Medical Association* 257(15)(1987): 2070–2072; Haddix, A.C., S.D. Hillis, and W.J. Kassler, "The Cost-Effectiveness of Azithromycin for *Chlamydia trachomatis* Infections in Women," *Sexually Transmitted Diseases* 22(1995): 274–280; Koumans, E.H., R.E. Johnson, J.S. Knapp, and M.E. St. Louis, "Laboratory Screening for *Neisseria gonorrhoeae* by Recently Introduced Non-Culture Tests: A Performance Review With Clinical and Public Health Considerations," *Clinical Infectious Diseases* 27(1998): 1171–1180; Van Doornum, G.J.J., M. Buimer, M. Prins, C.J.M. Henquet, R.A. Coutinho, P.K. Plier, S. Tomazic-Allen, H. Hu, and H. Lee, "Detection of *Chlamydia trachomatis* Infection in Urine Samples From Men and Women by Ligase Chain Reaction," *Journal of Clinical Microbiology* 33(1995): 2042–2047; Friedland, L.R., R.M. Kulick, F.M. Biro, and A. Patterson, "Cost-Effectiveness Decision Analysis of Intramuscular Ceftriaxone Versus Oral Cefixime in Adolescents With Gonococcal Cervicitis," *Annals of Emergency Medicine* 27(1996): 299–304; Martin, D.H., T.F. Mroczkowski, Z.A. Dalu, J. McCarty, R.B. Jones, S.J. Hopkins, and R.B. Johnson, "A Controlled Trial of a Single Dose of Azithromycin for the Treatment of Chlamydial Urethritis and Cervicitis," *New England Journal of Medicine* 327(13)(1992): 921–925.

Figure 5. Decision Analysis Tree for Examining the Cost-Effectiveness of Screening Women for Chlamydia



The substantially shorter sentences in jail settings may have an important effect on the effectiveness of routine STD screening upon intake. The turnaround for test results is typically longer than 48 hours, but more than one-half of jail inmates are released within 48 hours of intake. Given these constraints, it was assumed that jail inmates who tested positive upon intake would be present in the corrections facility for test results and treatment less than 50 percent of the time, whereas those in prisons would be in the correctional facility 100 percent of the time.

The model includes also the efficacy and compliance associated with specific treatments for gonorrhea and chlamydia. Following the 1998 CDC STD Treatment Guidelines, the use of a single-dose oral treatment regimen of cefixime for gonorrhea and a single-dose oral treatment regimen of azithromycin for chlamydia to ensure full compliance was assumed. Dispensing single-dose treatments may be considered safer and more feasible than multiple-dose regimens in jails and prisons.

Key costs—men and women

Table 6 shows the costs used in base case (column 2) and sensitivity (column 3) analyses. All costs are valued in 1996 dollars. Costs and benefits that would be incurred after the first year are discounted at an annual rate of 3 percent. The costs of gonorrhea and chlamydia urine testing, the treatment of cases diagnosed at intake, and the lifetime costs of disease not detected upon intake or treated during a late stage of disease have been included.

Table 6. Costs Used in Baseline and Sensitivity Analyses			
Component	**Cost per Inmate***	**Cost Ranges***	**Sources**
Program Costs (public sector prices)			
Urine test	$8.18	$5.00–15.00	Walsh 1998
Cefixime (Gonorrhea)	5.45	2.00–10.00	Friedland et al. 1996
Azithromycin (Chlamydia)	9.50	5.00–20.00	Haddix, Hillis, and Kassler 1995
Lifetime Costs of Sequelae			
Epididymitis	527.00	300–1,000	Washington, Johnson, and Sanders 1987
Pelvic inflammatory disease (PID)	1,430.00	1,100–5,500	Rein et al. 2000

* Valued in 1996 dollars

Sources: Walsh, C., "Model for Resource Allocation to Prevent Pelvic Inflammatory Disease Due to Infection with *Chlamydia trachomatis,*" Ph.D. diss., University of North Carolina, Chapel Hill, 1998; Friedland, L.R., R.M. Kulick, F.M. Biro, and A. Patterson, "Cost-Effectiveness Decision Analysis of Intramuscular Ceftriaxone Versus Oral Cefixime in Adolescents With Gonococcal Cervicitis," *Annals of Emergency Medicine* 27(1996): 299–304; Haddix, A.C., S.D. Hillis, and W.J. Kassler, "The Cost-Effectiveness of Azithromycin for *Chlamydia trachomatis* Infections in Women," *Sexually Transmitted Diseases* 22(1995): 274–280; Washington, A.E., R.E. Johnson, and L.L. Sanders, "*Chlamydia trachomatis* Infections in the United States: What Are They Costing Us?" *Journal of the American Medical Association* 257(15)(1987): 2070–2072; Rein, D., W. Kassler, K. Irwin, and L. Rabiee, "Direct Medical Cost of Pelvic Inflammatory Disease and its Sequelae: Decreasing, but Still Substantial," *Obstetrics and Gynecology* 95(2000): 397–402.

The program costs include testing and treatment costs. In particular, the testing costs include costs of the LCR urine test materials and labor for processing these tests.[28]

The expected lifetime costs of a case of epididymitis[29] and a case of PID[30] were derived from the literature. The cost of PID includes the direct medical costs of PID and three of its most common sequelae: chronic pelvic pain, ectopic pregnancy and tubal-factor infertility. Because of the controversy over the representativeness of medical claims data on which Rein and colleagues' estimate is based, the estimate for the baseline amount for PID was increased by 30 percent.

Results

Gonorrhea—men

Table 7 shows the results of routinely screening male inmates at intake for gonorrhea. For a hypothetical cohort of 10,000 male prison inmates with a prevalence of 6 percent, a routine screening program would prevent 5 cases of epididymitis and detect 296 cases of undiagnosed or untreated gonorrhea. A routine screening program for men in prisons and jails would not be cost saving in terms of cases of epididymitis averted. An important concern with gonorrhea and chlamydia infections in men is ensuring treatment of men in order to prevent transmission to their sex partners, especially female sex partners who experience more serious and costly sequelae than men. Therefore, the most important outcome among men is the number of untreated infectious gonorrhea cases that may be detected by routinely screening on intake.

This program would detect a substantial number of untreated infectious cases of gonorrhea and perhaps decrease rates of transmission to sex partners. It would cost approximately $267 to detect a case of gonorrhea. This is not cost saving but may be considered cost effective.

A routine screening program costs more in jails because the health care system may invest substantially in testing but may not be able to treat all detected cases of gonorrhea owing to the high rate and quick turnover of the inmates. Therefore, the full benefits of screening may not be realized.

Table 7. Cost-Effectiveness of a Program to Screen Men Routinely for Gonorrhea, by Setting			
	Total Costs	**Number of Cases of Epididymitis Averted**	**Number of Cases of Untreated Infectious Gonorrhea Detected**
Prisons			
Additional costs of routine screening on intake*	$78,900	—	—
Number of cases averted/detected by routine screening on intake	—	5	296
Net cost per case averted/detected	**—**	**$15,780**	**$267**
Jails			
Additional costs of routine screening on intake*	$80,100	—	—
Number of cases averted/detected by routine screening on intake	—	0.19	10
Net cost per case averted/detected	**—**	**$421,579**	**$8,010**

* As compared with presumptive treatment strategy option.

Table 8. Cost-Effectiveness of a Program to Screen Women Routinely for Gonorrhea, by Setting			
	Total Costs	**Number of Cases of Pelvic Inflammatory Disease (PID) Averted**	**Number of Cases of Untreated Infectious Gonorrhea Detected**
Prisons			
Additional costs of routine screening on intake*	$24,000	—	—
Number of cases averted/detected by routine screening on intake	—	41	458
Net cost per case averted/detected	**—**	**$585**	**$52**
Jails			
Additional costs of routine screening on intake*	$58,200	—	—
Number of cases averted/detected by routine screening on intake	—	16	178
Net cost per case averted/detected	**—**	**$3,638**	**$327**

* As compared with presumptive treatment strategy option.

Gonorrhea—women

Routinely screening women for gonorrhea on intake into prisons and jails is not cost saving in terms of detecting cases of gonorrhea or preventing cases of PID (table 8). A routine screening program, however, detects many cases of gonorrhea and, in turn, averts sequelae. This program may be considered cost effective when considering that it costs the health care system approximately $585 to prevent a case of PID in prison and $3,638 to prevent a case of PID in jail.

Sensitivity analyses

One-way sensitivity analyses were conducted on all parameters in the prison and jail gonorrhea screening models to determine which parameters of the model most influenced the final results. Sensitivity analyses are conducted to determine whether the model results change if uncertain parameter values are changed. One-way sensitivity analyses include varying one parameter value in the decision trees at a time. In prisons and jails, it did not save money to screen routinely a hypothetical cohort of 10,000 male inmates for gonorrhea, in terms of the number of cases of epididymitis or the number of untreated infectious cases of gonorrhea detected, regardless of which parameters were varied.

For a hypothetical cohort of 10,000 women, the models were sensitive to the following variables (by setting): prevalence of gonorrhea (prisons and jails), probability of progression to PID whether a woman was or was not treated for gonorrhea (in prison), lifetime direct medical cost of a case of PID (prison), and the cost of the testing materials and labor processing time (prison). It would save money to screen female inmates routinely for gonorrhea on intake if prevalence rates were at least 22 percent in jails (figure 6) and at least 8 percent in prisons (figure 7). In addition, a two-way sensitivity analysis (an analysis that involves changing two parameter values in the decision trees simultaneously) of gonorrhea prevalence and treatment rates in the jail setting shows that it would save money to implement a routine screening program if the prevalence rate were at least 8 percent and the treatment rate is 100 percent (not shown). As the treatment rate declines, the prevalence rate must be higher in order for the routine screening program to save money. If the treatment rate is about 40 percent, then for a routine screening program to save money, the prevalence rate must be at least 30 percent.

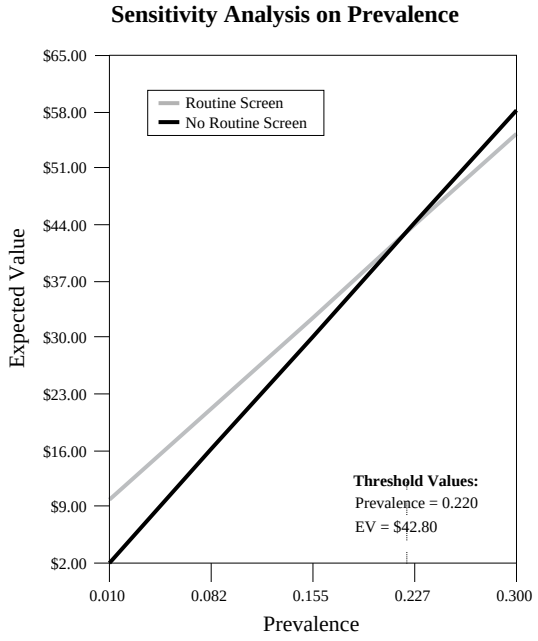
If the probability of progression to PID for women not treated for gonorrhea is at least 19 percent, instead of 15 percent as in the baseline model, then routine screening in prison will save money. If women are treated for gonorrhea, a routine screening program in prison will save money as long as the probability of progression to PID is less than 2.5 percent.

If the lifetime direct medical cost of a case of PID is at least $2,000, then a routine screening program for gonorrhea in prison will save money. If the cost of a case of PID exceeds $5,000, then a routine screening program in jail will also save money. If the cost of the test materials and labor time to conduct a single test does not exceed $6, then a routine screening program in prison will save money.

Chlamydia—men

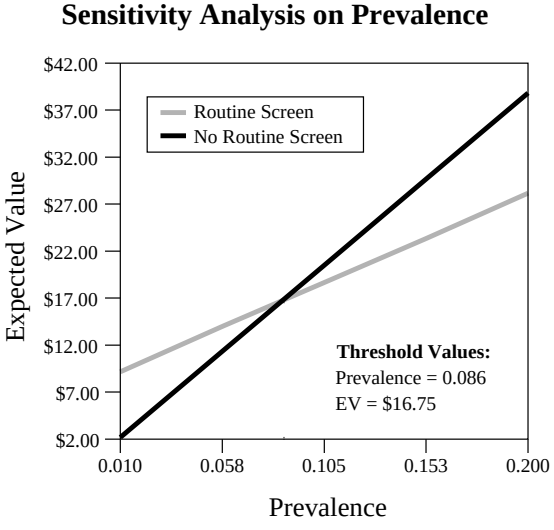
Table 9 shows that a program of routinely screening for chlamydia among men on intake to prisons and jails does not save money in terms of cases of untreated, infectious chlamydia or epididymitis. This program, however, would detect a substantial number of undiagnosed cases of chlamydia and perhaps decrease transmission from men to women. It would cost the health care system approximately $198 in the prison setting and almost $1,100 in the jail setting to detect a case of uncured chlamydia. It may be considered cost effective.

Figure 6. Sensitivity Analysis: Variations in Expected Value with Variations in Prevalence of Gonorrhea in Women—Jail Setting



* Expected Value = Program Cost per Person

Figure 7. Sensitivity Analysis: Variations in Expected Value with Variations in Prevalence of Gonorrhea in Women—Prison Setting



* Expected Value = Program Cost per Person

Table 9. Cost-Effectiveness of a Program To Screen Men Routinely for Chlamydia, by Setting			
	Total Costs	Number of Cases of Epididymitis Averted	Number of Cases of Untreated Infectious Chlamydia Detected
Prisons			
Additional costs of routine screening on intake*	$80,300	—	—
Number of cases averted/ detected by routine screening on intake	—	8	405
Net cost per case averted/ detected	—	**$10,038**	**$198**
Jails			
Additional costs of routine screening on intake*	$79,600	—	—
Number of cases averted/ detected by routine screening on intake	—	2	73
Net cost per case averted/ detected	—	**$39,800**	**$1,090**

* As compared with presumptive treatment strategy option.

Chlamydia—women

For a hypothetical cohort of 10,000 women with a prevalence rate of 9 percent, a routine-screening-on-intake program in prison would cost approximately $10,000 more than a presumptive treatment program (table 10). This program, however, would result in a substantially lower number of cases of PID and untreated or undiagnosed cases of chlamydia. It would cost the health care system only $198 in the prison setting to prevent a case of PID and $18 to detect a case of untreated infectious chlamydia.

Because the rate of treatment before release from jails is lower than in prisons, a routine screening program for women in jails does not save money. The cost per case of PID prevented is approximately $2,450, which may be considered cost effective.

Sensitivity analyses

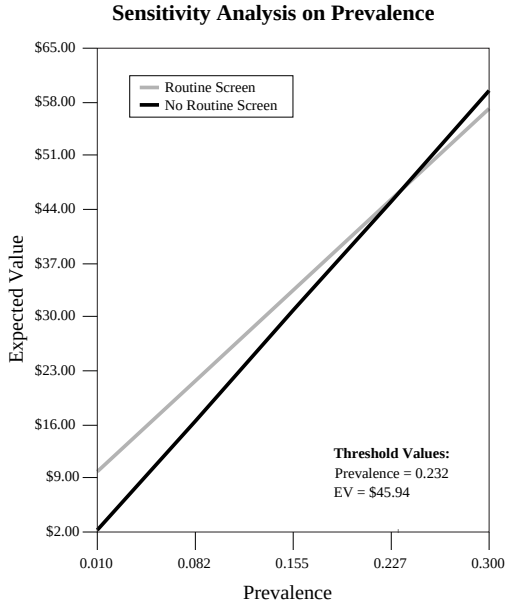
One-way sensitivity analyses were conducted on all parameters in the prison and jail chlamydia screening models. In prisons and jails, it does not save money to screen a hypothetical cohort of 10,000 male inmates routinely for chlamydia, in terms of the number of cases of epididymitis averted or the number of untreated, infectious cases of chlamydia detected, regardless of which parameters are varied.

For a hypothetical cohort of 10,000 women, the models were sensitive to the following variables (by setting): prevalence of chlamydia (prison and jail), probability of progression to PID if treated (prison) or untreated for chlamydia (prison and jail), lifetime direct medical cost of a case of PID (prison and jail), and the cost of the testing materials and labor time (prison). It saves money to screen routinely for chlamydia on intake if prevalence rates are at least 23 percent in jails (figure 8) and about 9 percent in prisons (figure 9). A two-way sensitivity analysis of chlamydia prevalence and treatment rates in jails shows that it would save costs to implement a routine screening program if the prevalence rate were at least 9 percent and the treatment rate were 100 percent (not shown). As the treatment rate declines, the prevalence rate must be higher in order for the routine screening program to save costs. If the treatment rate is about 40 percent, the prevalence rate must be at least 30 percent for a routine screening program to save costs.

Table 10. Cost-Effectiveness of a Program To Screen Women Routinely for Chlamydia, by Setting			
	Total Costs	**Number of Cases of Pelvic Inflammatory Disease (PID) Averted**	**Number of Cases of Untreated Infectious Chlamydia Detected**
Prisons			
Additional costs of routine screening on intake*	$10,300	—	—
Number of cases averted/ detected by routine screening on intake	—	52	576
Net cost per case averted/ detected	**—**	**$198**	**$18**
Jails			
Additional costs of routine screening on intake*	$51,400	—	—
Number of cases averted/ detected by routine screening on intake	—	21	230
Net cost per case averted/ detected	**—**	**$2,448**	**$223**

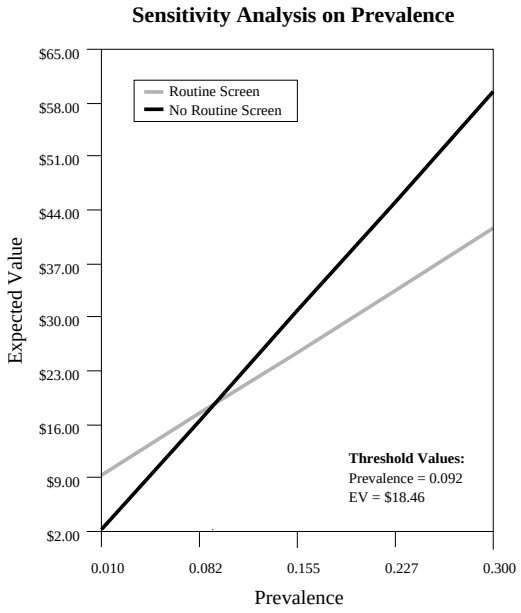
* As compared with presumptive treatment strategy option.

Figure 8. Sensitivity Analysis: Variations in Expected Value with Variations in Prevalence of Chlamydia in Women—Jail Setting



* Expected Value = Program Cost per Person

Figure 9. Sensitivity Analysis: Variations in Expected Value with Variations in Prevalence of Chlamydia in Women—Prison Setting



* Expected Value = Program Cost per Person

If the probability of progression to PID for those women not treated for chlamydia is at least 31 percent, instead of 15 percent as in the baseline model, then routine screening will save costs in jail. For the routine screening program to save costs in prison, the probability of progression to PID must be at least 16 percent, instead of 15 percent as in the baseline model. Conversely, a routine screening program will save money in prisons as long as the probability of progression to PID is less than 5 percent for women treated for chlamydia.

If the lifetime direct medical cost of a case of PID is at least $1,600, then a routine screening program for chlamydia will save money in prison. If the cost of a case of PID exceeds $3,900, then a routine screening program will save money in jail. If the cost of the test materials and labor time to process the test does not exceed $7.20, then a routine screening program will save money in prison.

Discussion—gonorrhea and chlamydia

The cost-effectiveness of routine screening for gonorrhea and chlamydia in jails and prisons, as examined using many and diverse data sources, had variable results. Screening is most cost effective in women with a high prevalence of disease and for whom high treatment rates before release can be achieved. Screening does not appear to be cost effective in preventing epididymitis in men, but the net costs of detecting infections in men are reasonable. Thus, screening in male populations may be considered a valid strategy for preventing transmission to women. In jail settings, screening programs should be designed to test as early as feasible after intake to enable treatment before release and to coordinate with local public health facilities to ensure treatment of inmates who require treatment after release.

The gonorrhea and chlamydia analyses have several limitations. The baseline estimates of averted costs or savings results are sizable underestimates. The benefits of routine screening on intake for each disease are understated because they exclude some specific direct medical costs that might be prevented as a result of a routine screening program. In particular, this model did not consider the potential role of gonorrhea and chlamydia infections in facilitating the transmission of HIV and the increased susceptibility to HIV. The model did not include morbidity and costs associated with the transmission of gonorrhea and chlamydia from index cases to secondary partners. This model also did not consider the issue of reinfection of an index patient by a partner who is infected and does not receive effective treatment. The costs of gonorrhea and chlamydia infections during pregnancy that lead to endometritis (infection of the uterine lining or endometrium), chorioamnionitis (infection of the fetal sac), or congenital infection of the infant that may cause serious eye and respiratory infections were not included. The benefits of preventing these costs, regardless of how minimal the costs may be, would favor implementing a routine screening program. If any of the averted costs mentioned above were included in the models, then the results would show the routine-screening-on-intake programs to be more cost effective and possibly cost saving, even at low to moderate prevalence rates.

Conversely, these models may have underestimated the program costs. In particular, none of the costs of counseling, partner elicitation, notification and referral, or recontacting inmates who are released before they get their test results were included. These costs were not considered because it may not be feasible in many jail settings to provide individual or group counseling or partner elicitation services during the short time many inmates are in jail. In addition, only the single-dose treatments for gonorrhea and chlamydia recommended by CDC were considered because these are readily administered in corrections settings (e.g., directly observed therapy). Use of slightly less expensive multiple-dose antibiotic regimens, if they could be administered in a way that would ensure reasonable adherence, may be an option in some facilities. Dual treatment for gonorrhea and chlamydia when only one such infection is detected on screening for a single disease also was not considered; this treatment approach may be cost effective in some settings.[31] Adverse reactions to cefixime and azithromycin were not considered because they have been found to be minimal.[32] Furthermore, the costs associated with urine-based screening may be lower than use of tests not based on urine testing, which require time of a health care provider and physical examination rooms to obtain a urethral specimen from a man or an endocervical specimen from a woman. Finally, program costs may be underestimated because treatment of asymptomatic persons who request treatment owing to sexual contact with an infected partner was not considered.

Second, the results presented here may not lend themselves to generalization. Key parameter values, such as prevalence data, may vary tremendously among facilities and geographic regions.

Third, separate models were estimated for each disease, ignoring the possibility that economies of scale could be achieved by screening for multiple diseases at once. For example, one urine sample may be collected to test for both gonorrhea and chlamydia. Therefore, the program test costs for each disease may be slightly lower than the estimates used in the models. This would change the results only slightly, however, since the only difference would be with the urine specimen collection materials (i.e., the time of the person who explains the purpose of the test and requests a urine sample and the container for the urine sample).

Finally, prisons and jails were treated as separate institutions. Realistically, many inmates in jail move to prisons later, but the hypothetical cohorts that were used did not consider double counting of inmates who move directly from jails to prisons.

Conclusion

Given the high prevalence of STDs among incarcerated populations and the cost-effectiveness of routine screening on intake for some STDs, corrections facilities provide an opportunity to test and treat people who are at high risk for STDs and who may have little access to care outside such institutions. All 3 diseases examined in this paper—syphilis, gonorrhea, and chlamydia—can be substantially reduced by jails and prisons employing STD screening on intake programs. Although the cost-saving nature of syphilis screening and the cost-effective nature of gonorrhea and chlamydia screening programs in some settings do not depend on the assumption that inmates transmit infection to sex partners, jail and prison screening programs have the potential to decrease STD transmission rates to inmates' sex partners and to the community at large through future generations of transmission. Routine screening for syphilis among men and women in both prisons and jails will ultimately result in financial savings by preventing expensive disease treatment. Routine screening for gonorrhea and chlamydia may not generate savings, but this approach is likely to be cost effective in both male and female populations in prisons and jails because of the serious nature of sequelae in women.

In jails, this study suggests that cost-effectiveness of STD screening can be improved and the disease burden lowered if infected inmates are identified and receive treatment before they are released. Because there is a quick turnaround in jails, efforts to test and treat as quickly as is practical, preferably within the first 24 hours of intake, may be both more effective and more cost effective. Collaborations among corrections facilities, community-based organizations, and health care providers in the public and private sectors are needed to facilitate the treatment of inmates who are released before the return of test results. If this can be accomplished, STD screening in jails and prisons can be a cost-effective strategy for reducing the overall burden of STDs in a community.

Notes

1. Hammett, T.M., P. Harmon, and W. Rhodes, "The Burden of Infectious Disease Among Inmates and Releasees From Correctional Facilities," paper prepared for the National Commission on Correctional Health Care, Chicago, Illinois, May 2001. (Copy in this volume.)

2. Oh, M.K., K.R. Smith, M. O'Cain, D. Kilmer, J. Johnson, and E.W. Hook, "Urine-Based Screening of Adolescents in Detention to Guide Treatment for Gonococcal and Chlamydial Infections," *Archives of Pediatric and Adolescent Medicine* 152(1)(1998): 52–56; Beltrami, J.F., D.A. Cohen, J.T. Hamrick, and T.A. Farley, "Rapid Screening and Treatment for Sexually Transmitted Diseases in Arrestees: A Feasible Control Measure," *American Journal of Public Health* 87(9)(1997): 1423–1426; Holmes, M.D., S.M. Safyer, N.A. Bickell, S.H. Vermund, P.A. Hanff, and R.S. Phillips, "Chlamydial Cervical Infection in Jailed Women," *American Journal of Public Health* 83(4)(1993): 551–55.

3. Cohen, D., R. Scribner, J. Clark, and D. Cory, "The Potential Role of Custody Facilities in Controlling Sexually Transmitted Diseases," *American Journal of Public Health* 82(4)(1992): 552–556.

4. Centers for Disease Control and Prevention, "High Prevalence of Chlamydial and Gonococcal Infection in Women Entering Jails and Juvenile Detention Centers—Chicago, Birmingham, and San Francisco, 1998," *Morbidity and Mortality Weekly Report* 48(36)(1999): 793–796.

5. Groseclose, S.L., W.E. Lafferty, M. Macaluso, P. Kissinger, M.J. Blythe, and G.A. Bolan, "Initial Findings From Chlamydia Monitoring Networks in Five Cities, 1995–1996," in Twelfth Meeting of the International Society for STD Research, Seville, Spain, 1997, Abstract Monograph (Abstract O158).

6. Kamb, M.L., D. Newman, T.A. Peterman, J.M. Douglas, J. Zenilman, G. Bolan, F. Rhodes, and M. Iatesta, "Most Bacterial STDs are Asymptomatic," (abstract) paper presented at the STIs at the Millenium Conference, May 3–7, 2000, Baltimore, MD.

7. Centers for Disease Control and Prevention, "Assessment of Sexually Transmitted Disease Services in City and County Jails—United States, 1997," *Morbidity and Mortality Weekly Report* 47(21): 429–431.

8. Parece, M.S., G.A. Herrera, R.F. Voigt, S.L. Middlekauff, and K.L. Irwin, "STD Testing Policies and Practices in U.S. City and County Jails," *Sexually Transmitted Diseases* 26(8): 431–437.

9. DATA; TreeAge Software, Inc., Williamstown, MA.

10. Glaser, J.B., and R.B. Greifinger, "Correctional Health Care: A Public Health Opportunity," *Annals of Internal Medicine* 118(2)(1993): 139–145; Beltrami, J.F., D.A. Cohen, J.T. Hamrick, and T.A. Farley, "Rapid Screening and Treatment for Sexually Transmitted Diseases in Arrestees: A Feasible Control Measure," *American Journal of Public Health* 87(9)(1997): 1423–1426.

11. U.S. Public Health Service, *Syphilis: A Synopsis,* Washington, DC: U.S. Department of Health, Education, and Welfare, 1968, publication no. 1660; Sparling, P.F., "Natural History of Syphilis," in *Sexually Transmitted Diseases*, 2d. ed., K.K. Holmes, P.A. Mardh, P.F. Sparling, P.J. Wiesner, W. Cates, S.M. Lemon, and W.E. Stamm, eds., New York: McGraw-Hill, 1990: 213–219.

12. Garnett, G.P., S.O. Aral, D.V. Hoyle, W. Cates, Jr., and R.M. Anderson, "The Natural History of Syphilis: Implications for the Transmission Dynamics and Control of Infection," *Sexually Transmitted Diseases* 24(1997): 185–200; Tramont, E.C., "*Treponema pallidum* (Syphilis)," in *Principles and Practice of Infectious Diseases,* 3d. ed., G.L. Mandell, R.G. Douglas, and J.E. Bennet, eds. New York: Churchill Livingstone, 1990: 1794–1808.

13. Clark, E.G., and N. Danbolt, "The Oslo Study of the Natural Course of Untreated Syphilis: An Epidemiologic Investigation Based on a Restudy of the Boeck-Brusgaard Material," *Medical Clinic North America* 48(1964): 613.

14. Finelli, L., S.M. Berman, E.H. Koumans, and W.C. Levine, "Congenital Syphilis," *Bulletin of the World Health Organization* 76(Supp.)(1998): 126–128.

15. Wasserheit, J.N., "Epidemiological Synergy: Interrelationships Between Human Immunodeficiency Virus Infection and Other Sexually Transmitted Disease," *Sexually Transmitted Diseases* 19(2)(1992): 61–77; Otten, M.W., Jr., A.A. Zaidi, T.A. Peterman, R.T. Rolfs, and J.J. Witte, "High Note of HIV Seroconversion Among Patients Attending Urban Sexually Transmitted Disease Clinics," *AIDS* 8(1994): 549–553; Quinn, T.C., R.O. Connor, D. Glasser, S.L. Groseclose, W.S. Brathwaite, A.S. Fauci, and E.W. Hook, "The Association of Syphilis With the Risk of Human Immunodeficiency Virus Infection in Patients Attending Sexually Transmitted Disease Clinics," *Archives of Internal Medicine* 150(1990): 1297–1302; Osewe, P.L., T.A. Peterman, R.L. Ransom, A.A. Zaidi, and J.E. Wroten, "Trends in the Acquisition of Sexually Trasmitted Diseases Among HIV-Positive Patients at STD Clinics: Miami, 1988–1992," *Sexually Transmitted Diseases* 23(1996): 230–233.

16. Larsen, S.A., B.M. Steiner, and A.H. Rudolph, "Laboratory Diagnosis and Interpretation of Tests for Syphilis," *Clinical Microbiology Review* 8(1995); 1–21.

17. Centers for Disease Control and Prevention, "1993 Sexually Transmitted Disease Treatment Guidelines," *Morbidity and Mortality Weekly Report* 42(RR–14) (1993): 1–102.

18. Centers for Disease Control and Prevention, "Syphilis Screening Among Women Arrestees at the Cook County Jail—Chicago, 1996," *Morbidity and Mortality Weekly Report* 47(21)(1998): 432–433.

19. Haddix, A.C., S.M. Teutsch, P.A. Shaffer, and D.O. Dunet, *Prevention Effectiveness: A Guide to Decision Analysis and Economic Evaluation*, New York: Oxford University Press, 1996.

20. Carande-Kulis, V.G., S.T. Cookson, V. Pope, G.P. Schmid, M. Messonnier, and A.C. Haddix, "Cost-Effectiveness of Syphilis Screening Among Refugees Prior to Arriving Into the United States," working paper for the Centers for Disease Control and Prevention, 2000.

21. HealthCare Consultants of America, *Physician's Fee and Coding Guide*, Augusta, GA: HealthCare Consultants of America, 1997.

22. Blank, S., D.D. McDonnell, S.R. Rubin, J.J. Neal, M.W. Brome, M.B. Masterson, and J.R. Greenspan, "New Approaches to Syphilis Control: Finding Opportunities for Syphilis Treatment and Congenital Syphilis Prevention in a Women's Correctional Setting," *Sexually Transmitted Diseases* 24(1997): 218–228.

23. Bateman, D.A., C.S. Phibbs, T. Joyce, and M.C. Hegarty, "The Hospital Cost of Congenital Syphilis," *The Journal of Pediatrics* 130(1997): 752–758; Finelli, L., E.M. Crayne, and K.C. Spitalny, "Treatment of Infants with Reactive Syphilis Serology—New Jersey: 1992 to 1996," *Pediatrics* 102(1998): 1–6.

24. Chesson, H.W., S.D. Pinkerton, K.L. Irwin, D. Rein, and W.J. Kassler, "New HIV Cases Attributable to Syphilis in the United States: Estimates From a Simplified Transmission Model," *AIDS* 13(1999): 1387–1396.

25. Holtgrave, D.R., and S.D. Pinkerton, "Updates of Cost of Illness and Quality-of-Life Estimates for Use in Economic Evaluations of HIV Prevention Programs," *Journal of Acquired Immune Deficiency Syndrome and Human Retrovirology* 16(1997): 54–62.

26. U.S. Census Bureau, *Statistical Abstract of the United States 1998*, Section 15: Prices (table no. 773). Available online at http://www.census.gov/pro/www/statistical-abstracts-us.htm.

27. The Ligase Chain Reaction was developed by Abbott Laboratories, Abbott Park, Illinois.

28. Walsh, C., "Model for Resource Allocation to Prevent Pelvic Inflammatory Disease Due to Infection with *Chlamydia trachomatis*," Ph.D. diss., University of North Carolina, Chapel Hill, 1998.

29. Washington, A.E., R.E. Johnson, and L.L. Sanders, "*Chlamydia trachomatis* Infections in the United States: What Are They Costing Us?" *Journal of the American Medical Association* 257(15)(1987): 2070–2072.

30. Rein, D., W. Kassler, K. Irwin, and L. Rabiee, "Direct Medical Cost of Pelvic Inflammatory Disease and its Sequelae: Decreasing, but Still Substantial," *Obstetrics and Gynecology* 95(2000): 397–402.

31. Gift, T.L., A.C. Haddix, and K.L. Irwin, "A Cost-Effectiveness Evaluation of the CDC Guidelines for Dual Treatment of Gonococcal and Chlamydial Infections," (abstract) paper presented to the International Society for Sexually Transmitted Diseases Research, July 11–14, 1999, Denver, CO: 185.

32. Friedland, L.R., R.M. Kulick, F.M. Biro, and A. Patterson, "Cost-Effectiveness Decision Analysis of Intramuscular Ceftriaxone Versus Oral Cefixime in Adolescents With Gonococcal Cervicitis," *Annals of Emergency Medicine* 27(1996): 299–304; Magid, D., J.M. Douglas, and J.S. Schwartz, "Doxycycline Compared With Azithromycin for Treating Women With Genital *Chlamydia trachomatis* Infections: An Incremental Cost-Effectiveness Analysis," *Annals of Internal Medicine* 124(4)(1996): 389–399.

Selected Bibliography

Alexander, L.J., and A.G. Schoch. 1949. "Prevention of Syphilis." *Archives of Dermatology and Syphilology* 59: 1–10.

Augenbraun, M., L. Bachmann, T. Wallace, L. Dubouchet, W. McCormack, and E.W. Hook. 1998. "Compliance with Doxycycline Therapy in Sexually Transmitted Diseases Clinics." *Sexually Transmitted Diseases* 25: 1–4.

Berger, R.E. 1999. "Acute Epididymitis." In *Sexually Transmitted Diseases.* K.K. Holmes, P. Mardh, P.F. Sparling, S.M. Lemon, W.E. Stamm, P. Piot, and J.N. Wasserheit eds. New York: McGraw-Hill: 847–858.

Buimer, M., G.J.J. van Doornum, S. Ching, P.G.H. Peerbooms, P.K. Plier, D. Ram, H.H. Lee. 1996. "Detection of *Chlamydia trachomatis* and *Niesseria gonorrhoeae* by Ligase Chain Reaction-Based Assays with Clinical Specimens from Various Sites: Implications for Diagnostic Testing and Screening." *Journal of Clinical Microbiology* 34: 2395–2400.

Centers for Disease Control and Prevention. 1998a. "1998 Guidelines for Treatment of Sexually Transmitted Diseases." *Morbidity and Mortality Weekly Report* 47 (RR–1): 1–111.

———. 1993b. "Recommendations for the Prevention and Management of *Chlamydia trachomatis* Infections." *Morbidity and Mortality Weekly Report* 42 (RR–12): 1–39.

Conklin, T.J., T. Lincoln, and T.P. Flanigan. 1998. "A Public Health Model to Connect Correctional Health Care with Communities." *American Journal of Public Health* 88(8): 1249–1250.

Eng., T.R., and W.T. Butler, eds. 1997. "The Neglected Health and Economic Impact of STD." In *The Hidden Epidemic: Confronting Sexually Transmitted Diseases*. Washington: National Academy Press: 28–68.

Genc, M., and P. Mardh. 1996. "A Cost-Effectiveness Analysis of Screening and Treatment for *Chlamydia trachomatis* Infection in Asymptomatic Women." *Annals of Internal Medicine* 124(1): 1–7.

Gibson, J.J., and T. Lindman. 1996. "Cost-Effectiveness of Contact Tracing Versus Screening to Find Syphilis Cases: Further Study Is Needed." *Sexually Transmitted Diseases* 23: 441–443.

Glaser, J.B. 1998. "Sexually Transmitted Diseases in the Incarcerated: An Underexploited Public Health Opportunity" (editorial). *Sexually Transmitted Diseases* 25(6): 308–309.

Gold, M.R, J.E. Siegel, L.B. Russell, M.C. Weinstein, eds. 1996. *Cost-Effectiveness in Health and Medicine*. New York: Oxford University Press.

Hammett, T.M. 1998. *Public Health/Corrections Collaborations: Prevention and Treatment of HIV/AIDS, STD, and TB.* Research in Brief. Washington, DC: National Institute of Justice and Centers for Disease Control and Prevention. NCJ 169590.

Handsfield, H.H., and W.E. Stamm. 1998. "Treating Chlamydial Infection: Compliance Versus Cost" (editorial). *Sexually Transmitted Diseases* 25: 12–13.

Hillis, S.D., F.B. Coles, B. Litchfield, C. Black, B. Mojica, K. Schmitt, and M.E. St. Louis. 1998. "Doxycycline and Azithromycin for Prevention of Chlamydial Persistence or Recurrence One Month After Treatment in Women: A Use-Effectiveness Study in Public Health Settings." *Sexually Transmitted Diseases* 25(1): 5–11.

Hillis, S.D., and J.N. Wasserheit. 1996. "Screening for Chlamydia—A Key to the Prevention of Pelvic Inflammatory Disease" (editorial). *New England Journal of Medicine* 334(21): 1399–1401.

Hook, E.W., and H.H. Handsfield. 1999. "Gonococcal Infections in the Adult." In *Sexually Transmitted Diseases*, 3d. ed. K.K. Holmes, P. Mardh, P.F. Sparling, S.M. Lemon, W.E. Stamm, P. Piot, and J.N. Wasserheit, eds. New York: McGraw-Hill: 451–466.

Howell, M.R., W.J. Kassler, and A.C. Haddix. 1997. "Partner Notification to Prevent Pelvic Inflammatory Disease in Women: Cost-Effectiveness of Two Strategies." *Sexually Transmitted Diseases* 24(5): 287–292.

Howell, M.R., T.C. Quinn, W. Brathwaite, and C.A. Gaydos. 1998. "Screening Women for *Chlamydia trachomatis* in Family Planning Clinics: The Cost-Effectiveness of DNA Amplification Assays." *Sexually Transmitted Diseases* 25(2): 108–115.

Karam, G.H., D.H. Martin, T.R. Flotte, F.O. Bonnarens, J.R. Joseph, T.F. Mroczkowski, and W.D. Johnson. 1986. "Asymptomatic *Chlamydia trachomatis* Infections Among Sexually Active Men." *Journal of Infectious Diseases* 154(5): 900–903.

Katz, B.P., B.W. Zwickl, V.A. Caine, and R.B. Jones. 1992. "Compliance with Antibiotic Therapy for *Chlamydia trachomatis* and *Neisseria gonorrhoeae*." *Sexually Transmitted Diseases* 19: 351–354.

Marrazzo, J.M., C.L. Celum, S.D. Hillis, D. Fine, S. DeLisle, and H.H. Handsfield. 1997. "Performance and Cost-Effectiveness of Selective Screening Criteria for *Chlamydia trachomatis* Infection in Women: Implications for a National Chlamydia Control Strategy." *Sexually Transmitted Diseases* 24(3): 131–141.

Marrazzo, J.M., D. Fine, C.L. Celum, S. DeLisle, and H.H. Handsfield. 1997. "Selective Screening for Chlamydial Infection in Women: A Comparison of Three Sets of Criteria." *Family Planning Perspectives* 29(4): 158–162.

Martin, D.H., and W.R. Bowie. 1999. "Urethritis in Men." In *Sexually Transmitted Diseases*, 3d. ed. K.K. Holmes, P. Mardh, P.F. Sparling, S.M. Lemon, W.E. Stamm, P. Piot, and J.N. Wasserheit, eds. New York: McGraw-Hill: 833–845.

Moore, M.B., E.V. Price, J.M. Knox, and L.W. Elgin. 1963. "Epidemiologic Treatment of Contacts to Infectious Syphilis." *Public Health Reports* 78: 966–970.

Peterman, T.A., K.E. Toomey, L.W. Dicker, A.A. Zaidi, J.E. Wroten, and J. Carolina. 1997. "Partner Notification for Syphilis: A Randomized, Controlled Trial of Three Approaches." *Sexually Transmitted Diseases* 24(9): 511–518.

Puisis, M., W.C. Levine, and K.J. Mertz. 1998. "Overview of Sexually Transmitted Diseases in Correctional Facilities." In *Clinical Practice in Correctional Medicine*. M. Puisis, B.J. Anno, R.L. Cohen, B. Heyman, L.N. King, J.P. May, J. Raba, R. Shansky, and A. Start eds. St. Louis: Mosby.

Randolph, A.G., and A.E. Washington. 1990. "Screening for *Chlamydia trachomatis* in Adolescent Men: A Cost-Based Decision Analysis." *American Journal of Public Health* 80(5): 545–550.

Scholes, D., A. Stergachis, F.E. Heidrich, H. Andrilla, K.K. Holmes, and W.E. Stamm. 1996. "Prevention of Pelvic Inflammatory Disease by Screening for Cervical Chlamydial Infection." *New England Journal of Medicine* 334(21): 1362–1399.

Schroeter, A.L., R.H. Turner, J.B. Lucas, W.J. Brown. 1971. "Therapy for Incubation Syphilis." *Journal of the American Medical Association* 218(5): 711–713.

Skolnick, A.A. 1998. "Look Behind Bars for Key to Control of STDs." *Journal of the American Medical Association* 279(2): 97–98.

Stamm, W.E. 1999. "*Chlamydia trachomatis* Infections of the Adult." In *Sexually Transmitted Diseases*, 3d. ed. K.K. Holmes, P. Mardh, P.F. Sparling, S.M. Lemon, W.E. Stamm, P. Piot, and J.N. Wasserheit, eds. New York: McGraw-Hill: 407–422.

———. 1998. "Expanding Efforts to Prevent Chlamydial Infection*." New England Journal of Medicine* 339(11): 768–770.

———. 1993. "Toward Control of Sexually Transmitted Chlamydial Infections." *Annals of Internal Medicine* 119(5): 432–434.

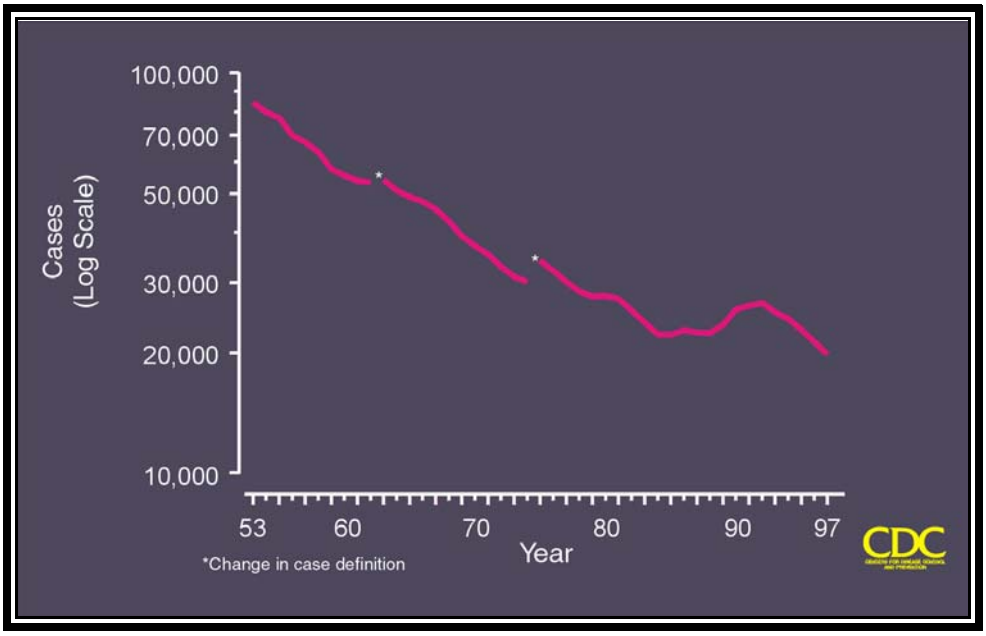
Stamm, W.E., and B. Cole. 1986. "Asymptomatic *Chlamydia trachomatis* Urethritis in Men." *Sexually Transmitted Diseases* 13(3): 163–165.

Zimmerman, H.L., J.J. Potterat, R.L. Dukes, J.B. Muth, H.P. Zimmerman, J.S. Fogle, and C.I. Pratts. 1990. "Epidemiologic Differences Between Chlamydia and Gonorrhea." *American Journal of Public Health* 80: 1338–1342.

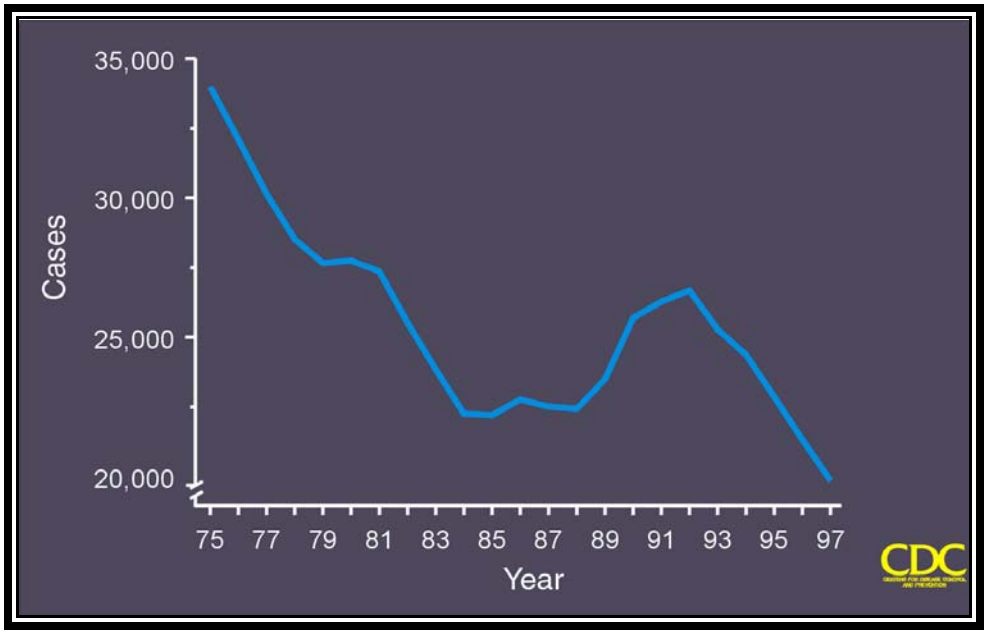
Cost-Effectiveness of Preventing Tuberculosis in Prison Populations

Zachary Taylor, M.D., M.S., and Cristy Nguyen, M.P.H.

Reported TB Cases,
United States, 1953–97



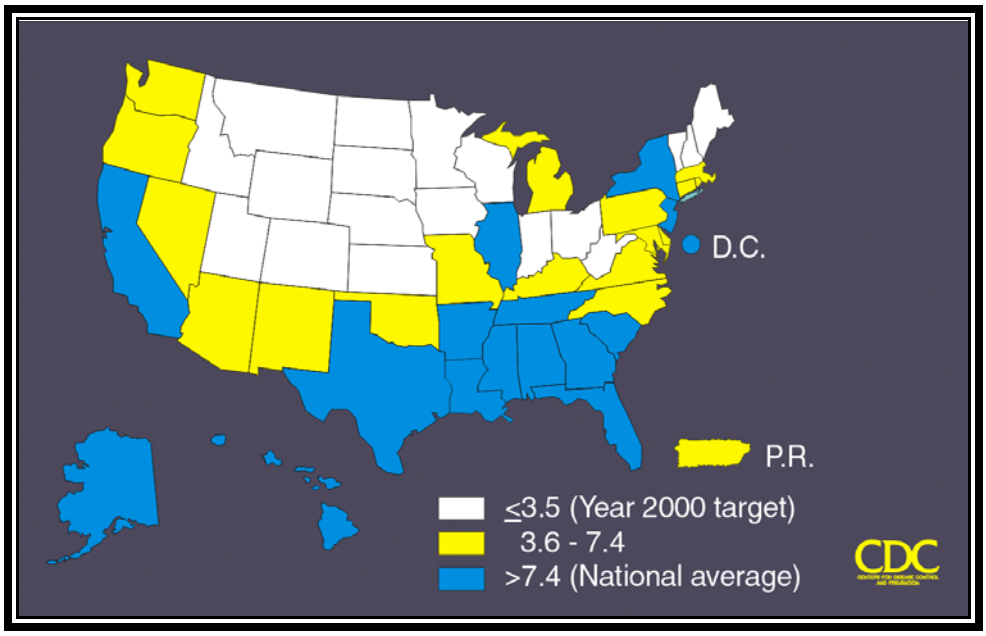
Reported TB Cases, United States, 1975–97



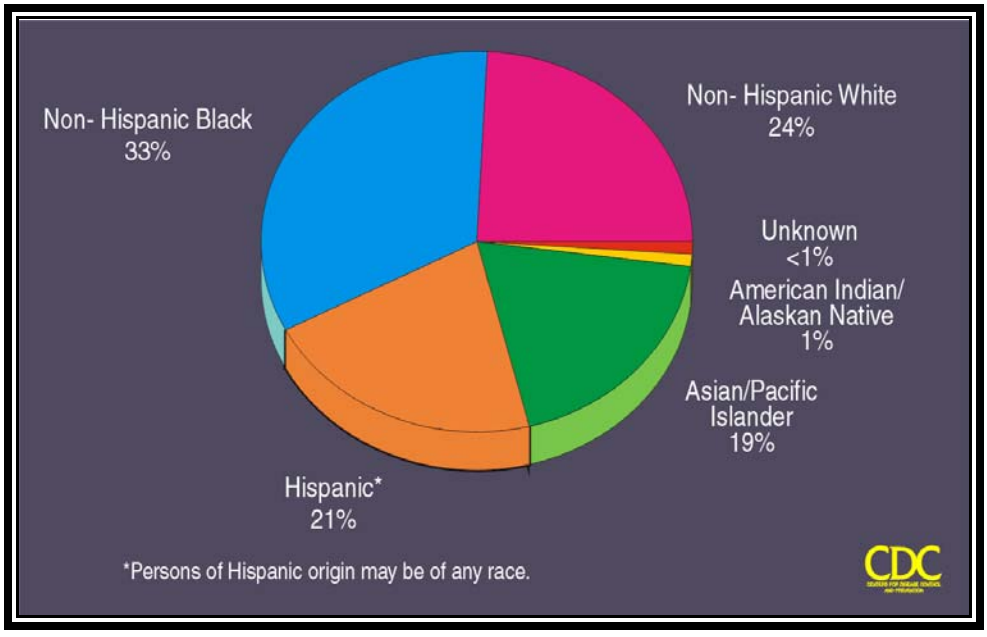
Factors That Contributed to the Increase in TB Cases

- Deterioration of the tuberculosis (TB) control infrastructure
- Coinfection with TB and human immunodeficiency virus (HIV)
- Transmission of TB in congregate settings, including prisons
- Immigration from countries where TB is endemic

TB Case Rates by State, United States, 1997



Reported TB Cases by Race and Ethnicity, United States, 1997



Reported TB Cases by Race and Ethnicity, United States, 1997

Race/Ethnicity	Cases	Percentage
Non-Hispanic white	4,872	24.5
Non-Hispanic black	6,610	33.3
Hispanic*	4,228	21.3
Asian/Pacific Islander	3,833	19.3
American Indian/ Alaskan Native	264	1.3
Unknown	44	0.2
Total	19,851	100.0

*Persons of Hispanic origin may be of any race.

CDC

Reported TB Cases by Race and Ethnicity, United States, 1996 and 1997

Race/Ethnicity	1996	1997	Change in Cases	% Change
Non-Hispanic white	5,506	4,872	-634	-11.5
Non-Hispanic black	7,106	6,610	-496	-7.0
Hispanic*	4,533	4,228	-305	-6.7
Asian/Pacific Islander	3,814	3,833	+19	+0.5
American Indian/ Alaskan Native	284	264	-20	-7.0
Unknown	94	44	--	--
Total	21,337	19,851	-1,486	-7.0

*Persons of Hispanic origin may be of any race.

CDC

Reported TB Cases by Race and Ethnicity, United States, 1985, 1992, and 1997

Race/Ethnicity	% Change 1985 vs. 1992	% Change 1992 vs. 1997
White, non-Hispanic	-9.9	-36.0
Black, non-Hispanic	+26.8	-31.3
Hispanic	+73.5	-22.2
Asian/Pacific Islander	+46.4	+5.0
American Indian/ Alaskan Native	-23.3	-11.7

CDC

Reported TB Cases by Age, United States, 1996 and 1997

Age	1996	1997	Change in Cases	% Change
0-14 years	1,372	1,265	-107	-7.8
15-24	1,656	1,681	+25	+1.5
25-44	7,604	6,912	-692	-9.1
45-64	5,588	5,297	-291	-5.2
65+	5,103	4,691	-412	-8.1
Unknown	14	5	--	--
Total	21,337	19,851	-1,486	-7.0

CDC

Change in TB Cases by Age, United States, 1985, 1992, and 1997

Age	% Change 1985 vs. 1992	% Change 1992 vs. 1997
0-14 years	+35.4	-25.9
15-24	+18.1	-14.8
25-44	+54.5	-33.8
45-64	+5.7	-18.3
65+	-5.2	-22.1

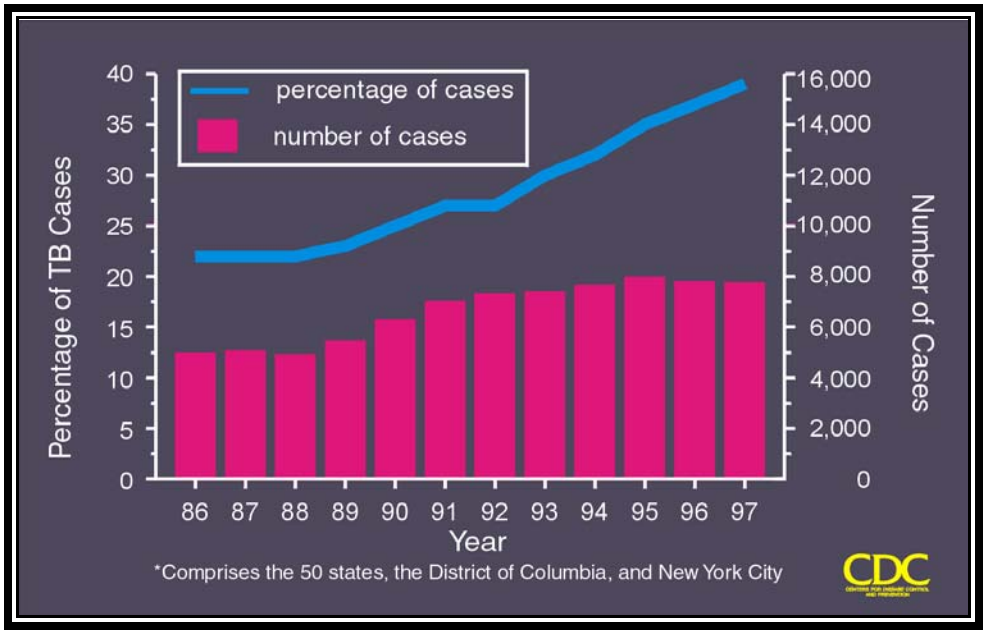
CDC

TB Cases in Foreign-Born Persons, United States, 1986–97

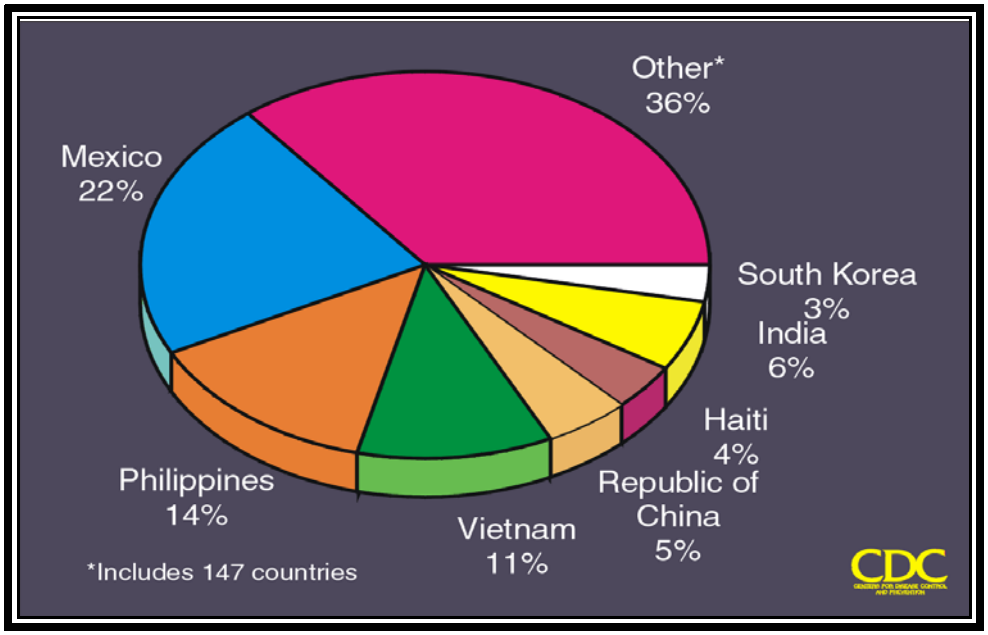
Year	Cases	Percentage
1986	4,925	22
1987	5,025	22
1988	4,868	22
1989	5,411	23
1990	6,262	25
1991	6,982	27
1992	7,270	27
1993	7,354	30
1994	7,627	32
1995	7,930	35
1996	7,704	37
1997	7,702	39

CDC

Trends in TB Cases in Foreign-Born Persons, United States, 1986–97



Country of Origin of Foreign-Born Persons with TB, United States, 1997



Change in TB Cases by Country of Origin, United States, 1986, 1992, and 1997

Country of Origin	% Change 1986 vs. 1992	% Change 1992 vs. 1997
Foreign-born	+47.6	+5.9
U.S.-born	+8.5	-38.1

CDC

TB in Correctional Facilities

- 1–22 percent of State/Federal prison inmates are infected with TB
- In 1997, 729 inmates were reported with active TB disease
- Reported TB outbreaks in correctional facilities

Transmission of TB in Correctional Facilities

- Confined, congregate living
- Population at risk of TB infection
- Population at risk of HIV infection

Recommendations for Screening

- Screening incarcerated populations for infection and disease
- Rapid diagnosis and treatment of active TB
- Surveillance of active TB disease and transmission of TB
- Preventive therapy for eligible inmates and correctional workers

Objectives

- Determine the cost-effectiveness of screening for TB in prisons
- Examine the effect of the prevalence of HIV on the cost-effectiveness of screening inmates
- Compare the relative cost-effectiveness of screening correctional inmates with screening other high-risk populations

Methods

- Markov-based decision model using DATA 3.0 by TreeAge
- Societal perspective
- 1-year time frame
- 20-year analytical horizon

Outcomes

- Costs
- Health effects
- Effectiveness of screening and preventive therapy

Results of Base-Case Analysis

Strategy	Total Cost ($)	Active TB Cases	Incremental Cost (Savings) ($)	Active TB Cases Prevented	QALYs Gained	Cost per TB Case Prevented ($)	Cost per QALY Gained ($)
No Screen	26,981,429	1,869	---	---	---	---	---
Screen	19,806,920	880	(7,174,509)	989	301	SAVINGS	SAVINGS

Results are per 100,000 inmates.

Effect of HIV Prevalence on Effectiveness of TB Screening

% HIV Infection	Cost (Savings)	TB Cases Prevented
0	($2,841,000)	692
2.3 (Base Case)	($7,174,509)	989
5	($12,261,650)	1,336
7.85	($17,631,420)	1,704

Secondary Health Outcomes

Strategy	TB Deaths	TB Deaths Averted*	INH Hepatitis Deaths
No Screen	12	---	0
Screen	6	6	1

*Incremental from No Screen

Sensitivity Analysis

Vary prevalence of latent *M. tuberculosis* infection

	Incremental Cost per Active TB Case Prevented ($)		
	Low (0.050)	Base Case (0.122)	High (0.200)
Screen	SAVINGS	SAVINGS	SAVINGS

Sensitivity Analysis, continued

Vary prophylaxis efficacy

	Incremental Cost per Active TB Case Prevented ($)		
	Low (60%)	Base Case (73%: HIV+) (93%: HIV-)	High (93%)
Screen	SAVINGS	SAVINGS	SAVINGS

Sensitivity Analysis, continued

Vary treatment cost per active TB case

	Incremental Cost per Active TB Case Prevented ($)		
	Low ($5,000)	Base Case ($14,435)	High ($20,000)
Screen	$2,176	SAVINGS	SAVINGS

Sensitivity Analysis, continued

Vary TB case rate without preventive therapy

	Incremental Cost per Active TB Case Prevented ($)		
	Very low HIV+: (0.01) HIV-: (0.00066)	Base Case HIV+: (0.045) HIV-: (0.0007)	High HIV+: (0.079) HIV-: (0.0012)
Screen	SAVINGS	SAVINGS	SAVINGS

Cost-Effectiveness of Screening in Various Target Populations

Target Group	Number of Active TB Cases Prevented	Cost (Savings) Per Active TB Case Prevented	Source
HIV-infected persons	68.6	($7,843)	Nguyen et al.
Prison inmates	98.9	($7,254)	Taylor et al.
Class B1/B2 immigrants	100.0	$12,929	Nguyen et al.
Physicians	20.6	$39,000	Nettleman et al.
20-year-old African-American men	30.7	$110,865	Schechter et al.

Cost-Effectiveness Ratio for Selected Interventions

Intervention	Comparator	Cost Per Qaly Saved
Lap/shoulder belts (50%)	No restraints	Cost saving
Screening inmates for latent TB infection	No screen	Cost saving
Annual colorectal screening (50–75 yr. old)	No screen	$18,000
Annual mammography (Women 55–65 yr. old)	Annual clinical breast exam	$150,000

Conclusions

- Even with current limitations, screening and preventive therapy for TB in prison inmates are cost effective and cost saving compared to no screening and no preventive therapy
- Results of this analysis were quite robust to changes in most variables
- Screening prison inmates is favored compared to screening in other high-risk groups and to other preventive interventions

Cost-Effectiveness of HIV Counseling and Testing in U.S. Prisons

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Introduction

U.S. correctional facilities are becoming increasingly important in the control of the human immunodeficiency virus (HIV) epidemic. Since the first cases of acquired immunodeficiency syndrome (AIDS) were reported in the early 1980s, the U.S. jail and prison population has tripled.[1] The HIV prevalence rate is markedly higher in this population than in other parts of the community. The correctional setting can provide easier access to this high-risk population.[2] Prisons, therefore, can provide important public health opportunities for identifying HIV-infected persons, getting them appropriate care, and providing counseling to prevent further HIV transmission. They also may enable high-risk, uninfected persons to be identified and counseled to reduce their risk of acquiring and then transmitting HIV infection.

Earlier studies have provided valuable information on the prevalence rates and risk factors of HIV in jails and prisons and have discussed the importance of HIV prevention among inmates.[3] Given that HIV-prevention resources are limited, it is important to evaluate the cost-effectiveness of HIV-prevention programs in prison settings. HIV counseling and testing have proven to be cost effective in clinic settings.[4] This study evaluates the cost-effectiveness of HIV counseling and testing among prison inmates at or near their time of release.

Methods

Standard methods of cost-effectiveness analysis were used, relying on a decision model from a societal perspective.[5] The societal perspective generally includes all costs and benefits of a program, irrespective of the source of resources, including patient costs, lifetime treatment costs, and morbidity costs. Given that the study populations are prison inmates, the patient time cost and productivity loss were not calculated in the model.

Cost estimates for counseling and testing services in prison were not available. Cost estimates collected from HIV/STD clinics at the Michigan Department of Community Health were used and time estimates and estimates of lifetime treatment costs were taken from the literature.[6] All cost figures are expressed in 1997 dollars. These are additional costs that are required to add a unit of counseling and testing services to an existing program that offers serologic tests and voluntary counseling in prisons. No fixed costs are included.

Estimates included the number of future HIV infections prevented, the total and additional costs or savings for society, and the total cost to the prison system. Sensitivity and threshold analyses were conducted to test the robustness of model parameters.

Model Probabilities

Figure 1 shows a simplified decision-tree model comparing counseling and testing with no counseling and testing in U.S. prisons. Hammett, Harmon, and Rhodes estimate the HIV seroprevalence for the Federal Bureau of Prisons in 1996 to be 1.5 percent.[7] The average State and regional prevalence rates ranged from 0.3 to 13.6 percent. Therefore, an HIV seroprevalence rate of 1.5 percent was used for the base-case model and a range of 0.2–15 percent was used in the sensitivity analysis (table 1).

Figure 1. Simplified Decision Tree Model Comparing HIV Prevention Programs in U.S. Prisons

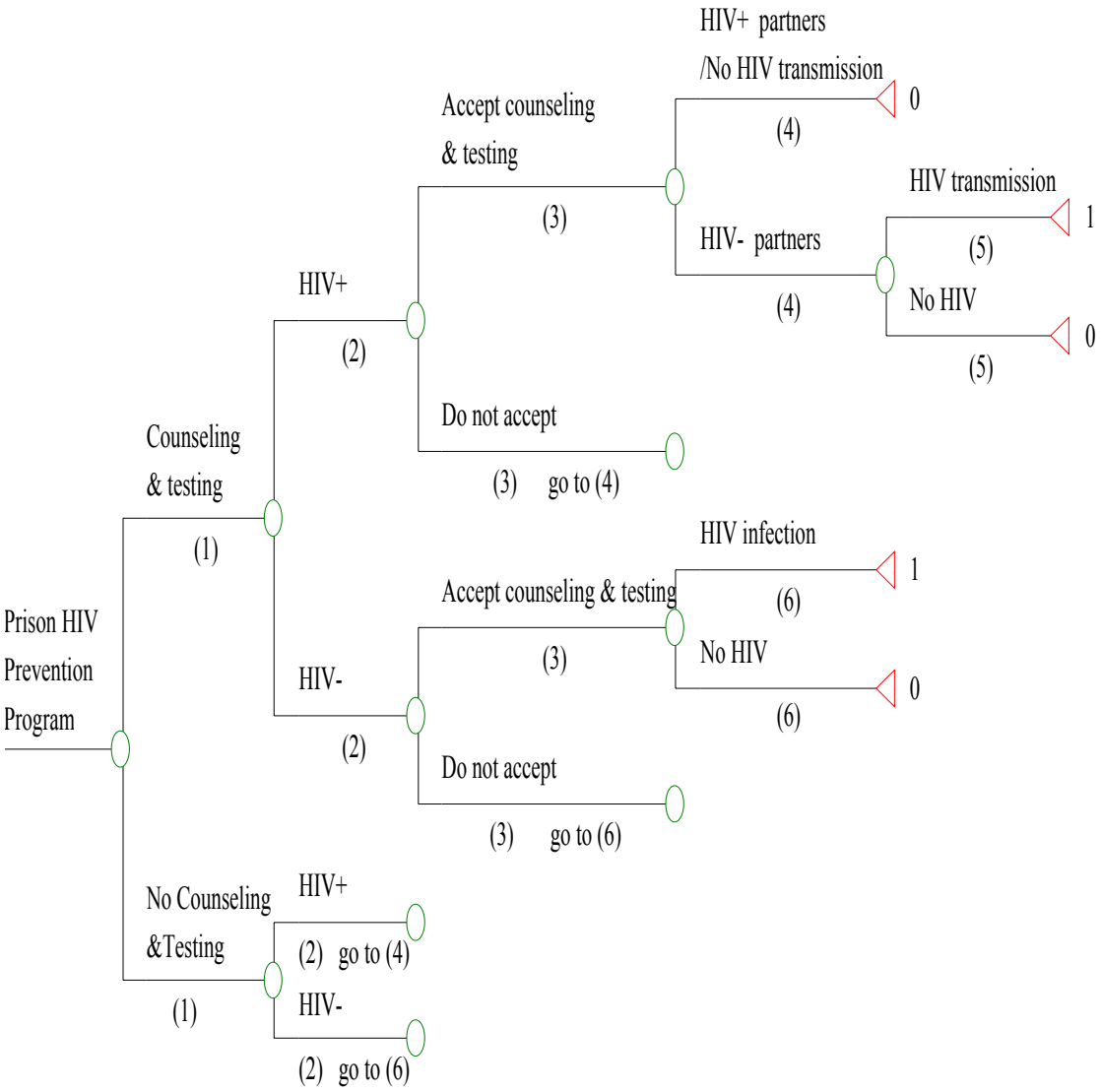


Table 1. Model Probabilities and Input Cost

Inputs	Probability, Percentage (range)	Source
HIV prevalence	1.5 (1–15)	Hammett, Harmon, and Rhodes 2000
Accept voluntary counseling and testing (CT) in prison		
HIV-infected	60 (30–90)	Baseline assumption
Uninfected	50 (30–90)	
Partners of infected individuals who are HIV infected	20 (15–40)	Rutherford et al. 1991 Hoffman, Spencer, and Miller 1995 Toomey et al. 1998
Risk of HIV transmission from infected to the uninfected partner		
No counseling	7 (5–30)	Mastro and DeVincenzi 1996
With counseling	5.2 (3.75-22.5)	DeVincenzi 1994 McKay and Phillips 1991 Holtgrave et al. 1993 Power, Hartnoll, and Daviaud 1988 Casadonte et al. 1990 Van den Hoek, van Haastrecht, and Couhtino 1990 Roggenburg et al. 1990 Farley, Carter, and Hadler 1990
Risk of acquiring HIV infection for uninfected person		
No counseling	0.35 (0.20–1.05)	Kamb et al. 1998
With counseling	0.315 (0.180–0.945)	Power, Hartnoll, and Daviaud 1991 Casadonte et al. 1990 van den Hoek, van Haastrecht, and Couhtino 1990 Roggenburg et al. 1990 Farley, Carter, and Hadler 1990
Inputs	**Cost**	**Source**
Lifetime treatment cost of HIV	$175,000 ($100,000–250,000)	Holtgrave and Pinkerton 1997 Hellinger 1993 Gable et al. 1996
Provider cost of counseling and testing		Farham et al. 1996
HIV-infected	$67.43	Varghese and Branson 2000
Uninfected	$22.74	

Correctional facilities in 16 States have mandatory HIV testing. The rest have some form of voluntary or on-request HIV testing. The acceptance level among inmates is not known but Hammett, Harmon, and Rhodes have suggested that some inmates will not accept voluntary HIV testing as they already know their HIV status.[8] Others might be unsure of the confidentiality of the test results. Therefore, it was assumed that 60 percent of HIV-infected inmates and 50 percent of uninfected inmates would accept the voluntary counseling and testing offered to them, with a range of 30–90 percent for sensitivity analysis.

Several partner notification studies found that 18–40 percent of the partners of HIV-infected individuals are infected.[9] Although a similar estimate for the prison population is not known, based on these studies it was assumed that 20 percent of the partners of HIV-infected inmates would be HIV positive. Therefore, HIV may be transmitted among the remaining 80 percent of their partners.

Racial and ethnic minorities and injection drug users (IDUs) are overrepresented in U.S. correctional systems. A recent survey found that 35 percent of male and 30 percent of female inmates have injected drugs.[10] Information is not available, however, on the risk of HIV transmission for this population.[11] The risk of HIV transmission from a released, infected inmate to an uninfected person in the community was therefore assumed to be similar to the risk of HIV transmission among discordant couples. Cross-sectional studies of heterosexual couples with an infected male index patient have reported that 10–30 percent of their female partners were infected with HIV at the time of the test.[12] A longitudinal study of sexually active, HIV-seropositive persons reported that transmission to the partner occurred in 7 percent of cases within 2 years.[13] For the analysis, a no-counseling transmission rate of 7 percent was used for the base model, with a range of 5–30 percent in the sensitivity analysis.

Studies have shown that 20–80 percent of people will reduce their risk behaviors when they learn they are HIV seropositive.[14] Another study used point estimates of 20 and 50 percent for its model to measure the benefits of counseling and knowledge of seropositivity on reducing risk behavior.[15] Studies have reported conflicting evidence on the effectiveness of counseling in risk reduction. Some have reported significant risk reduction following counseling,[16] although others have found no significant benefits.[17] Therefore, for the analysis, given the nature of the population, a lower estimate of 25 percent was used for the effectiveness of counseling in reducing risk behavior and a range of 10–50 percent was used for the sensitivity analysis. The risk of acquiring HIV infection in a sexually transmitted disease (STD) clinic patient was found to be 0.35 percent in the year following enrollment in a randomized controlled prevention trial.[18] In that study, client-centered counseling resulted in a 20 percent reduction in risk of acquiring a sexually transmitted infection by the 12-month followup. Based on that finding, it was estimated that counseling uninfected prison inmates in prison would reduce their risk of acquiring HIV infection by 10 percent in 1 year, with a range of 5–20 percent for sensitivity analysis.

Estimates of Future HIV Infections Averted

To estimate the number of HIV infections that can be prevented through counseling, information on the risk of HIV transmission among heterosexual couples was used,[19] combined and coupled with estimates of the effectiveness of counseling on risk reduction.[20] A value of one was assigned for the outcome of HIV transmission and zero was assigned for no HIV transmission. Therefore, the expected value obtained from the analysis gives the total number of HIV infections that would occur by following a particular path of the decision tree. The difference between the number of future HIV infections resulting with and without counseling and testing intervention yields the number of infections that can be prevented by the intervention (see figure 1).

Input Costs

Cost estimates for counseling and testing in a prison setting are not available in the literature. Therefore costs in 1997 dollars of adding counseling and testing services to an existing HIV/STD clinic were used (see table 1). For infected inmates, the costs of counseling and testing include wages for administrators, counselors, phlebotomists, and laboratory staff; and costs of serum collection kits, EIA and Western Blot tests, and controls.[21] To the provider, these add up to a total of $67.43 for each seropositive inmate. Seronegative inmates cost the provider only $22.74 each because they do not need a Western Blot test and post-test counseling requires less time.

The societal costs include these provider costs plus the lifetime treatment costs for HIV infection. Studies have estimated that the lifetime treatment costs for HIV range from $154,000 to $250,000, at a 3 percent discount rate.[22] An estimate of $175,000 was used for the base model, with a range of $100,000–250,000 for sensitivity analysis.

Results

The baseline model shows that offering counseling and testing to 10,000 prison inmates (an acceptance rate of 50–60 percent and HIV prevalence of 1.5 percent) would prevent three future cases of HIV at a net cost of $12 per inmate to the prison system. From a societal perspective, offering no counseling and testing services would result in 43 future cases of HIV at a cost of $7,500,000. Offering voluntary counseling and testing services would prevent three future cases of HIV and result in societal savings of more than $410,000 (table 2).

Table 2. Cost and Benefits of HIV Counseling and Testing (CT) in U.S. Prisons: Baseline Result and Sensitivity Analysis

Description of Variable (baseline value)	Range	Cases Averted	Societal Cost		Societal Savings	Provider Cost
			No CT	CT		
Prevalence of HIV (1.5%)	0.2	2	$6,310,000	$6,090,000	$220,000	$112,734
	15	14.5	$19,910,000	$17,540,000	$2,370,000	$156,014
Inmates who accept HIV counseling and testing (CT) (50-60%)	30	2.4	$7,500,000	$7,200,000	$300,000	$113,502
	90	3.7	$7,500,000	$6,980,000	$520,000	$119,570
Risk of HIV transmission from HIV-infected inmates to their partners, with no CT (7%)	5	2.6	$7,080,000	$6,740,000	$340,000	$116,536
	30	7.1	$12,830,000	$11,200,000	$1,630,000	$116,536
Effectiveness of counseling in reducing risk behavior for HIV-infected persons (25%)	10	2.3	$7,500,000	$7,230,000	$270,000	$116,536
	50	4.3	$7,500,000	$ 6,880,000	$620,000	$116,536
Effectiveness of counseling in reducing risk behaviors for HIV-uninfected persons (10%)	5	2.3	$7,500,000	$7,220,000	$280,000	$116,536
	20	4.8	$7,500,000	$6,790,000	$710,000	$116,536
Lifetime treatment cost of HIV (175,000)	100,000	3	$4,290,000	$4,100,000	$190,000	$116,536
	250,000	3	$10,720,000	$10,080,000	$640,000	$116,536
Baseline		**3**	**$7,500,000**	**$7,090,000**	**$410,000**	**$116,536**

The one-way sensitivity analysis (changing the value of one parameter at a time) for the model parameters shows that offering counseling and testing to prison inmates will remain beneficial to society under a wide range of parameter values, with savings ranging from $200,000 to more than $2 million (see table 2). On the other hand, total costs to the prison system are affected by HIV prevalence and acceptance rate of counseling among prisoners.

A threshold analysis was also conducted to estimate specific parameter values at which prison counseling and testing would not be a cost saving to society. This would occur if: (1) lifetime treatment cost of HIV infection decreased to less than $40,000; (2) risk of HIV transmission from infected to uninfected persons decreased to 1 percent (from 7 percent); or (3) risk of infection among the uninfected decreased to 0.1 percent (from 0.35 percent).

Discussion

The study shows that offering HIV counseling and testing services in prisons prevents future cases of HIV and saves society money. Given the high societal costs of HIV infection, the average provider cost of $39,000 to prevent a future case of HIV seems reasonable. The cost to the prison system decreases with an increase in HIV prevalence, increased risk of transmission, or increased effectiveness of counseling. Most State prisons in the Northeast and a few in the South report HIV prevalence of at least 3 percent. The State prison systems with HIV prevalence rates in excess of 3 percent house almost 31 percent of all State prisoners in the United States.[23] These State prison systems are ideal for HIV counseling and testing programs.

The model also shows that when HIV prevalence is less than 5 percent, most of the benefits in terms of future cases prevented come from prevention counseling of uninfected inmates who do not acquire infection rather than from preventing secondary transmission from infected inmates. Therefore, HIV counseling and testing programs are beneficial not only because they inform infected inmates of their status, prevent transmission to uninfected partners, and help infected inmates get care (this study does not address the benefits of providing care to HIV-infected inmates), but also because they inform uninfected inmates of their status and protect them from becoming infected.

It may be difficult for a prison system to accept the cost of a prevention intervention such as HIV counseling and testing where the benefits are averted future cases. Funding prevention programs that result in decreased future costs to society may seem too altruistic to some, but given the high recidivism rates among HIV-infected inmates, the benefits of prevention will more than likely accrue to prison systems.

Models that use epidemiological data to quantify benefits of prevention are highly dependent on accurate and representative data. The lack of relevant cost and epidemiological data among prison populations is a concern for this study. The decision model has used HIV transmission and infection rates between heterosexual couples and based its estimates on effectiveness of counseling on studies of heterosexual populations. Given that many prison inmates are IDUs and are suspected of having higher than normal HIV transmission rates due to dual modes of transmission (needles and sex), cost savings would increase with higher transmission rates.

Studies on the effectiveness of counseling on reducing risk behavior among IDUs are limited and contradictory, so counseling has been assumed to be half as effective in this group as in the heterosexual groups studied. As relevant information on transmission rates becomes available, required changes can be made to this model to increase the accuracy of the estimates. Because of the lack of estimates for prison populations, cost estimates for HIV treatment have been based on data from clinics. The lifetime treatment cost of $175,000 per case of HIV infection is almost certainly a conservative estimate, in part because of the increase in life expectancy provided by new therapies. A higher lifetime treatment cost would increase the societal savings per case prevented. Also, the morbidity and mortality costs associated with HIV infection

were not included, resulting in an underestimate of societal savings obtainable through prison HIV counseling and testing.

One limitation of this and all other models is that results should be considered within the context of the probabilities and information used in the analysis. A second important limitation is the lack of information on effectiveness of counseling and cost estimates for prison populations, which will probably lead to an underestimate of benefits. The third limitation is the underestimate of benefits from HIV prevention due to the use of a 1- to 2-year risk period of HIV infection instead of a lifetime risk, and the decision not to account for second- and third-generation transmission of HIV. This leads to underestimating the societal cost savings. Finally, the model is a prevention model that does not estimate the benefits and costs associated with treating HIV-infected persons who are identified by prison counseling and testing.

In summary, the analysis shows that quality HIV counseling and testing of prison inmates, under the given model assumptions, is a cost-saving prevention program that would prevent many future cases of HIV and save society money. Even from the prison perspective, the average cost of this prevention intervention seems reasonable.

Notes

1. Glaser, J.B., and R.B. Greifinger, "Correctional Health Care: A Public Health Opportunity," *Annals of Internal Medicine* 118(2)(1993): 139–145.

2. Vlahov, D., "HIV–1 Infection in the Correctional Setting," *National Institute on Drug Abuse Research Monographs* 118(1992): 51–61; Altice, F.L., F. Mostashari, P.A. Selwyn, P. Checko, R. Singh, S. Tanguay, and E.P. Blanchette, "Predictors of HIV Infection Among Newly Sentenced Males," *Journal of Acquired Immune Deficiency Syndrome and Human Retrovirology* 18(5)(1998): 444–453.

3. Glaser, J.B., and R.B. Greifinger, "Correctional Health Care: A Public Health Opportunity" (see note 1); Vlahov, D., "HIV–1 Infection in the Correctional Setting" (see note 2).

4. Kamb, M.L., M. Fishbein, J.M. Douglas, F. Rhodes, J. Rogers, G. Bolan, J. Zenilman, T. Hoxworth, C.K. Malotte, M. Iatesta, C. Kent, A. Lentz, S. Graziano, R.H. Byers, and T.A. Peterman, "Efficacy of Risk-Reduction Counseling to Prevent Human Immunodeficiency Virus and Sexually Transmitted Diseases: A Randomized Controlled Trial. Project RESPECT Study Group," *Journal of the American Medical Association* 280(13) (1998): 1161–1167; Varghese, B., T.A. Peterman, and D.R. Holtgrave, "Cost-Effectiveness of Counseling and Testing and Partner Notification: A Decision Analysis," *AIDS* 13(13)(1999): 1745–1751.

5. Varghese, B., T.A. Peterman, and D.R. Holtgrave, "Cost-Effectiveness of Counseling and Testing and Partner Notification: A Decision Analysis" (see note 4).

6. Farnham, P.G., R.D. Gorsky, D.R. Holtgrave, W.K. Jones, and M.E. Guinan, "Counseling and Testing for HIV Prevention: Costs, Effects, and Cost-Effectiveness of More Rapid Screening Tests," *Public Health Reports* 111(1): 44–53; Holtgrave, D.R., and S.D. Pinkerton, "Updates of Cost of Illness and Quality of Life Estimates for Use in Economic Evaluations of HIV Prevention Programs," *Journal of Acquired Immune Deficiency Syndrome and Human Retrovirology* 16(1)(1997): 54–62; Varghese, B., and B.M. Branson, "Cost and Cost-Effectiveness of Oral Fluid HIV Testing Compared to Serum Testing" (abstract), in *XIII International AIDS Conference Abstracts*, Durban, South Africa, July 9–14, 2000, Abstract ThpeC5433.

7. Hammett, T.M., P. Harmon, and W. Rhodes, "The Burden of Infectious Disease Among Inmates and Releasees From Correctional Facilities," paper prepared for the National Commission on Correctional Health Care, Chicago, Illinois, May 2000. (Copy in this volume.)

8. Ibid.

9. Rutherford, G.W., J.M. Woo, D.P. Neal, K.J. Rauch, C. Geoghegan, K.C. McKinney, J. McGee, and G.F. Lemp, "Partner Notification and the Control of Human Immunodeficiency Virus Infection: Two Years of Experience in San Francisco," *Sexually Transmitted Diseases* 18(2)(1991): 107–110; Hoffman, R.E., N.E. Spencer, and L.A. Miller, "Comparison of Partner Notification at Anonymous and Confidential HIV Test Sites in Colorado," *Journal of Acquired Immune Deficiency Syndrome and Human Retrovirology*

8(4)(1997): 54–62; Toomey, K.E., T.A. Peterman, L.W. Dicker, A.A. Zaidi, J.E. Wroten, and J. Carolina, "HIV Partner Notification: Cost and Effectiveness Data From an Attempted Randomized Controlled Trial," *Sexually Transmitted Diseases* 25(6)(1998): 310–316.

10. Hammett, T.M., M. Gross, and J. Epstein, *1992 Update: HIV/AIDS in Correctional Facilities*, Issues and Practices, Washington, DC: U.S. Department of Justice, National Institute of Justice, 1994, NCJ 144398.

11. Glaser, J.B., and R.B. Greifinger, "Correctional Health Care: A Public Health Opportunity" (see note 1); Vlahov, D., "HIV–1 Infection in the Correctional Setting" (see note 2).

12. Mastro, T., and I. De Vincenzi, "Probabilities of Sexual HIV-1 Transmission," *AIDS* 10(1996): S75–S82.

13. De Vincenzi, I., "A Longitudinal Study of Human Immunodeficiency Virus Transmission by Heterosexual Partners. European Study Group on Heterosexual Transmission of HIV," *New England Journal of Medicine* 331(6)(1994): 341–346.

14. McKay, N.L., and K.M. Phillips, "An Economic Evaluation of Mandatory Premarital Testing for HIV," *Inquiry* 28(3)(1991): 236–248.

15. Holtgrave, D.R., R.O. Valdiserri, A.R. Gerber, and A.R. Hinman, "Human Immunodeficiency Virus Counseling, Testing, Referral, and Partner Notification Services: A Cost-Benefit Analysis," *Archives of Internal Medicine* 153(10)(1993): 1225–1230.

16. Power, R., R. Hartnoll, and E. Daviaud, "Drug Injecting, AIDS, and At-Risk Behavior: Potential for Change and Intervention Strategies," *British Journal of Addiction* 83(6)(1988): 649–654; Van den Hoek, J.A.R., H.J.A. van Haastrecht, and R.A. Couhtino, "Heterosexual Behavior of Intravenous Drug Users in Amsterdam: Implications for the AIDS Epidemic," *AIDS* 4(5)(1990): 449–453; Casadonte, P.P., D.C. DesJarlais, S.R. Friedman, and J.P. Rotrosen, "Psychological and Behavioral Impact Among Intravenous Drug Users of Learning HIV Test Results," *International Journal of Addiction* 25(4)(1990): 409–426.

17. Roggenburg, L., B. Sibthorpe, H. Tesselaar, et al., "Characteristics of IVDUs Who Have Been HIV Tested," paper presented at the Sixth International Conference on AIDS, June 23, 1990, San Francisco, CA; Farley, T., M. Carter, and J. Hadler, "HIV Counseling and Testing in Methadone Programs: Effects on Treatment Compliance," paper presented at the Sixth International Conference on AIDS, June 23, 1990, San Francisco, CA.

18. Kamb, M.L., M. Fishbein, J.M. Douglas, F. Rhodes, J. Rogers, G. Bolan, J. Zenilman, T. Hoxworth, C.K. Malotte, M. Iatesta, C. Kent, A. Lentz, S. Graziano, R.H. Byers, and T.A. Peterman, "Efficacy of Risk-Reduction Counseling to Prevent Human Immunodeficiency Virus and Sexually Transmitted Diseases: A Randomized Controlled Trial. Project RESPECT Study Group" (see note 4).

19. De Vincenzi, I., "A Longitudinal Study of Human Immunodeficiency Virus Transmission by Heterosexual Partners. European Study Group on Heterosexual Transmission of HIV" (see note 13).

20. Kamb, M.L., M. Fishbein, J.M. Douglas, F. Rhodes, J. Rogers, G. Bolan, J. Zenilman, T. Hoxworth, C.K. Malotte, M. Iatesta, C. Kent, A. Lentz, S. Graziano, R.H. Byers, and T.A. Peterman, "Efficacy of Risk-Reduction Counseling to Prevent Human Immunodeficiency Virus and Sexually Transmitted Diseases: A Randomized Controlled Trial. Project RESPECT Study Group" (see note 4); McKay, N.L., and K.M. Phillips, "An Economic Evaluation of Mandatory Premarital Testing for HIV" (see note 14); Holtgrave, D.R., R.O. Valdiserri, A.R. Gerber, and A.R. Hinman, "Human Immunodeficiency Virus Counseling, Testing, Referral, and Partner Notification Services: A Cost-Benefit Analysis" (see note 15); Power, R., R. Hartnoll, and E. Daviaud, "Drug Injecting, AIDS, and At-Risk Behavior: Potential for Change and Intervention Strategies" (see note 16); Casadonte, P.P., D.C. DesJarlais, S.R. Friedman, and J.P. Rotrosen, "Psychological and Behavioral Impact Among Intravenous Drug Users of Learning HIV Test Results" (see note 16); Van den Hoek, J.A.R., H.J.A. van Haastrecht, and R.A. Couhtino, "Heterosexual Behavior of Intravenous Drug Users in Amsterdam: Implications for the AIDS Epidemic" (see note 16); Roggenburg, L., B. Sibthorpe, H. Tesselaar, et al., "Characteristics of IVDUs Who Have Been HIV Tested" (see note 17); Farley, T., M. Carter, and J. Hadler, "HIV Counseling and Testing in Methadone Programs: Effects on Treatment Compliance" (see note 17).

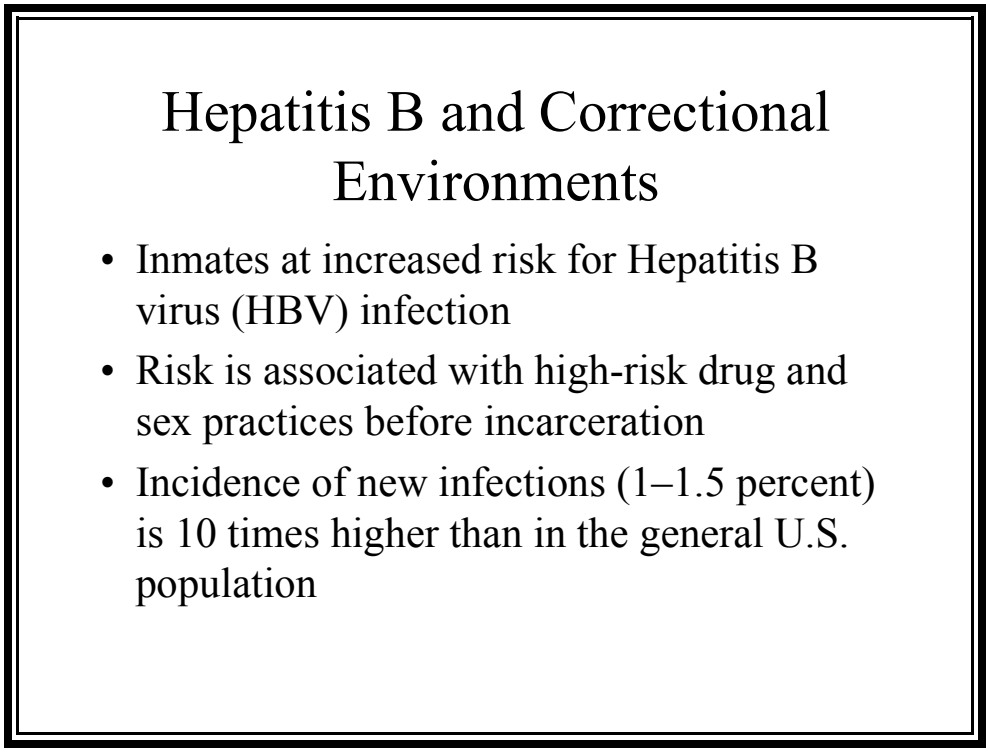
21. Varghese, B., T.A. Peterman, and D.R. Holtgrave, "Cost-Effectiveness of Counseling and Testing and Partner Notification: A Decision Analysis" (see note 4); Farnham, P.G., R.D. Gorsky, D.R. Holtgrave, W.K. Jones, and M.E. Guinan, "Counseling and Testing for HIV Prevention: Costs, Effects, and Cost-Effectiveness of More Rapid Screening Tests" (see note 6); Varghese, B., and B.M. Branson, "Cost and Cost-Effectiveness of Oral Fluid HIV Testing Compared to Serum Testing" (see note 6).

22. Holtgrave, D.R., and S.D. Pinkerton, "Updates of Cost of Illness and Quality of Life Estimates for Use in Economic Evaluations of HIV Prevention Programs" (see note 6); Hellinger, F.J., "The Lifetime Cost of Treating a Person With HIV" *Journal of the American Medical Association* 270(4)(1993): 474–478; Gable, C.B., J.C. Tierce, D. Simison, D. Ward, and K. Motte, "Costs of HIV/AIDS at CD4 Counts Disease Stages Based on Treatment Protocols" *Journal of Acquired Immune Deficiency Syndrome and Human Retrovirology* 12(4)(1996): 413–420.

23. Hammett, T.M., P. Harmon, and W. Rhodes, "The Burden of Infectious Disease Among Inmates and Releasees From Correctional Facilities" (see note 7).

What Is the Value of Immunizing Prison Inmates Against Hepatitis B?

Robert Lyerla, Ph.D.



Epidemiology of Hepatitis B in Correctional Settings

- Risk for HBV transmission during incarceration is low
  - Related to behaviors?
    - Injection drug use?
    - Men having sex with men?
    - Tattooing?
    - Fights?
- Risk is as high or higher than for groups recommended for vaccine for occupational reasons
  - Health care workers (1–6 percent/year)
  - Correctional officers (1–2 percent/year)
  - Incarcerated individuals (1–1.5 percent/year)

Strategy to Eliminate HBV Transmission in United States

- Comprehensive plan proposed in 1991 by the Advisory Committee on Immunization Practices (ACIP)
  - 4 components, including high-risk adolescents and adults
  - Surveys find low coverage in high-risk groups
- Identify settings where high-risk individuals can be vaccinated
  - Criminal justice system?

Missed Opportunities for Hepatitis B Vaccination

- Sentinel counties
  - Of acute cases, 20 percent had been incarcerated
  - 18 percent had household or sexual contact with case
- National Survey of Injection Drug Users (IDUs), 45 cities
  - Between 1987 and 1989
  - 17,000 IDUs identified
  - 81 percent report jail or prison

Issues Related to Hepatitis B Vaccine Programs

- Vaccination schedules
  - Altered schedules
  - Value of 1, 2, or 3 doses
- Prevaccination testing for susceptibility
  - Greater than 30 percent prevalence
  - Consequences of test results
- Postvaccination testing serologic response
  - Not recommended
- Prevention of perinatal HBV transmission from female inmates to their infants

Hepatitis B Vaccine Seroconversion Rates (≥10mIU/mL)

After 1 dose
20–50 percent

After 2 doses
85 percent

After 3 doses
Greater than 95 percent

Recommendations—I

- Implement hepatitis B vaccination programs in all correctional facilities
- Make efforts to achieve compliance with the 3-dose vaccine series
- Consider prevaccination screening in populations with an expected prevalence greater than 30 percent
- Integrate with other STD/HIV prevention programs

Recommendations—II

- Need programs to prevent perinatal transmission
- Need close cooperation between public health and criminal justice agencies to develop and implement hepatitis B vaccination programs
  - Staff training
  - Drug treatment centers
  - Followup of released prisoners
    - Treatment or vaccine series completion

Future Needs—Collaborations

- Algorithm for cost analysis
  - Cost associations
- *Healthy People 2010*—Section 2213.6B
  - Hepatitis B vaccine among inmates
    - No baseline data
    - Does a mechanism exist (periodic survey)?

Cost-Effectiveness Analysis of Annual Screening and Intensive Treatment for Hypertension and Diabetes Mellitus Among Prisoners in the United States

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Hypertension and diabetes mellitus are the most common chronic illnesses among adults. They occur in the prison population and are responsible for substantial morbidity, particularly after release. The prison setting offers an opportunity to initiate screening for and treatment of these conditions in an environment that is conducive to high levels of patient compliance. At present, in most correctional facilities, these diseases are diagnosed opportunistically and may not receive state-of-the-art treatment.

In this paper, a Monte Carlo simulation is constructed that projects the economic and health consequences over 20 years of initiating annual screening and intensive treatment for these illnesses. The model derives its underlying demographics from information supplied by the National Commission on Correctional Health Care. The prevalence of hypertension and diabetes are modeled by applying to this population the age-, sex-, and race-specific rates observed in the National Health and Nutrition Examination Survey III.[1] The occurrence of complications is then predicted using results of the Diabetes Control and Complications Trial, the Wisconsin Epidemiologic Study of Diabetic Retinopathy, and the Framingham Heart study.

Implementing the proposed program would, over the next 20 years, result in a gain of 386,108 life-years in the cohort of approximately 1.6 million persons currently incarcerated. The immediate and subsequent costs for screening and treating this population are $4,214,720,066, or $131.71 per prisoner per year. These costs are partially offset by concurrent reductions in expenditures for treating the complications of these diseases. When the conventional discount rate of 3 percent per annum is applied, the cost-effectiveness ratio for implementation is between $11,300 and $27,100 depending upon what levels of compliance and immediate costs of screening are assumed. Even under the worst-case scenario, this program is a more economical allocation of health care resources than many widely accepted preventive health practices.

The authors recommend that prison systems adopt annual screening for hypertension and diabetes and intensive treatment of both diseases to obtain tight control of both.

Introduction

Hypertension and diabetes mellitus are the two most common chronic illnesses among adults. Both are major risk factors for developing coronary heart disease and renal failure.

Hypertension is also the major risk factor for stroke, and one of the leading causes of peripheral vascular disease. Diabetes is the most common cause of blindness in adults and leads to painful neuropathy and amputation of limbs. It has been known for many years that treatment of hypertension reduces the incidence of complications. More recently, it has been demonstrated that tight

control of glucose in both Type I[2] and Type II[3] diabetes can also reduce the incidence of complications.

Prisoners are younger than the U.S. population as a whole and correspondingly have a lower prevalence of hypertension and diabetes. Screening for these diseases, even in this relatively low-prevalence population, might nevertheless be productive for several reasons:

- The prison population already has health care facilities and physicians at its disposal and makes frequent use of them; therefore, no costs to create capacity would be incurred.
- Prisoners do not lose income or free leisure activity while using the health care system; therefore, the usual indirect costs that encumber screening programs do not exist.
- Followup and adherence to dietary and medical regimens can be enforced in the prison environment to a greater extent than outside. (It might even be hoped that establishing a behavioral pattern of compliance with treatment in prison might lead to continued good compliance following release as well.)
- The direct screening costs for both diseases are modest, and the confirmatory evaluation of abnormal results is both inexpensive and safe.

The following analysis of the costs, consequences, and cost-effectiveness of screening and aggressive treatment for hypertension and diabetes mellitus in the imprisoned population of the United States has been carried out at the request of the National Commission on Correctional Health Care (NCCHC).

Methods

The major complications that are predicted to occur as a result of hypertension and diabetes mellitus among the current incarcerated population in the United States were identified through a Monte Carlo simulation model programmed using @Risk.[4] The costs and consequences of identifying and treating hypertension and diabetes among these prisoners were predicted and the cost-effectiveness ratio calculated. The cost-effectiveness ratio was defined as the increase in costs resulting from instituting screening and treatment divided by the increase in quality-adjusted life-years associated with that.

The simulation model projected the occurrence of the following outcomes:

- Coronary heart disease (CHD) including angina pectoris myocardial infarction.
- Congestive heart failure.
- Stroke.
- Hypertensive renal failure.
- Diabetic nephropathy progressing to renal failure.
- Diabetic neuropathy progressing to lower extremity amputation.
- Diabetic retinopathy progressing to blindness.
- Death.

The overall logic of the simulation was as follows:

- Assign sex, race, and initial age of the simulated subject according to the distributions known for the imprisoned population.
- Using age-, sex,- and race-specific distributions derived from the NHANES–III data, assign the simulated patient a smoking status, diabetic status, systolic blood pressure (SBP), total cholesterol, and high-density lipoprotein (HDL) cholesterol level. If the simulated subject is a diabetic, also assign a duration of diabetes and initial stage for diabetic retinopathy, neuropathy, and nephropathy.

Simulated followup begins at current age and continues for 20 years (or until the simulated patient "dies," whichever comes first). Each patient's current vital status; incarceration status; current SBP and lipid levels; and, if diabetic, current stage of diabetic retinopathy, neuropathy, and nephropathy are randomly determined on an annual basis. The probability of developing each of the study endpoints in this year is calculated, and then it is randomly determined which, if any, of such events occur.

Because CHD incidence rates are gender dependent and incidence rates of complications of diabetes differ by race, separate simulations were run for each combination of three racial or ethnic groups (white, Hispanic, and black) and both sexes. Twenty thousand subjects were simulated for each of these race-sex strata. The strata were then combined and the results adjusted to the racial/ethnic and sex distribution of the imprisoned population.

Population costs were calculated by applying average estimated unit costs to tallies of outcome events and person-years of morbid states and by assessing appropriate costs of screening, diagnostic followup, and treatment in the screen-and-treat strategy.

The Population

Demographics of the incarcerated population

Table 1 shows the numbers of prisoners of various ages, sexes, and races.[5]

Age-, sex-, and race-specific distributions of chronic disease

Appropriate sample weights were applied to the NHANES–III data (National Center for Health Statistics, 1997) to estimate smoking prevalence, SBP, total cholesterol, HDL, and prevalent cases of diabetes mellitus; analyses were carried out using Stata version 6.0.[6]

Smoking status. The case definition of smoking was defined as an affirmative response to the NHANES–III question about smoking within the past year because the risks of coronary heart disease associated with smoking are known to decline to near baseline rates after 1 year of abstinence. It was assumed that smoking status would not change over time. Table 2 shows the probabilities of being a smoker for a given age, sex, and race combination. These probabilities were used to predict smoking prevalence for each simulated individual.

Table 1. Demographics of the Incarcerated Population

Age	Black Male	Black Female	White Male	White Female	Hispanic Male	Hispanic Female
≤19	46,489	1,392	24,146	1,366	16,824	636
20–24	124,795	8,143	90,807	6,817	57,170	3,768
25–29	150,220	13,989	107,131	10,049	66,205	4,448
30–34	136,607	14,841	111,898	10,360	52,009	4,381
35–39	95,126	10,249	81,380	7,466	36,447	2,840
40–44	55,613	4,517	57,290	4,582	21,629	1,881
45–49	23,349	1,811	32,944	1,863	12,569	1,059
50–54	9,166	667	20,348	1,330	5,615	372
55–59	5,297	339	12,428	487	3,602	179
60–64	3,480	96	7,498	288	1,743	63
65+	3,564	155	5,297	235	548	10
Total	**653,706**	**56,199**	**550,167**	**44,843**	**274,361**	**19,637**

Table 2. Probability of Being a Smoker						
	Male			Female		
Age Group	White	Black	Other	White	Black	Other
≤19	0.230	0.154	0.103	0.270	0.043	0.006
20–24	0.410	0.268	0.306	0.333	0.212	0.095
25–29	0.378	0.324	0.288	0.390	0.298	0.004
30–34	0.363	0.403	0.431	0.334	0.370	0.005
35–39	0.369	0.517	0.374	0.274	0.313	0.258
40–44	0.319	0.487	0.395	0.236	0.318	0.116
45–49	0.354	0.525	0.386	0.280	0.352	0.088
50–54	0.325	0.444	0.191	0.222	0.266	0.050
55–59	0.273	0.464	0.548	0.237	0.356	0.193
60–64	0.207	0.375	0.090	0.246	0.235	0.351
≥65	0.147	0.247	0.359	0.112	0.112	0.118

Distribution of systolic blood pressure, initially and over time. Systolic blood pressure in homogeneous population groups follows an approximately log-normal distribution. SBP is known to be higher in African-Americans and in diabetics. The NHANES–III data were used to estimate the mean and standard deviation of the natural logarithm of SBP in each stratum of individuals defined by age group, sex, racial or ethnic group, and diabetes status. Each subject was assigned an initial SBP by sampling from a log-normal distribution with the corresponding parameters. The tails of the log-normal distribution are heavier than those of actual SBP distributions, so the corresponding values were truncated to limit the simulated SBPs to realistic values.

Blood pressure rises with age. This was modeled by adding an annual increment to the simulated blood pressure which equals the coefficient of age in the race-, sex-, and diabetes-specific regression of SBP with age in the NHANES–III data. Large random fluctuation caused by various factors occurs over time as well. The test-retest correlation of diastolic blood pressure measurements has been estimated to be 0.43[7] and that for systolic blood pressure is even lower.[8] More consistent blood pressure measurements require measurement procedures that have not been adopted in general clinical practice and are unlikely to be used in the correctional health care context. In each year of the simulation, a normally distributed, mean-zero, random increment to blood pressure was added to the previous year's blood pressure. The variance of the distribution was chosen to create a 1-year intercorrelation of 0.50 among SBP measurements. The principal reason for simulating SBP measurements (rather than hypertension) is to apply the American Heart Association (AHA) prediction formula[9] for CHD. Because the measurement procedures used in the Framingham study (from which the AHA formula is derived) are somewhat more rigorous than standard clinical practice, this enhanced intercorrelation seems reasonable.

To illustrate, for white males, the logarithm of initial SBP was sampled from a normal distribution with mean 0.00327 × age + 4.673 (+0.0268 if diabetic) and standard deviation 0.113. The resulting log SBP was trimmed to a minimum of 4.23 and a maximum of 5.5 (restricting SBP to the range 70–245). The exponential of this value was used as the initial SBP. For subsequent years, the logarithm of SBP was taken to be the previous year's log SBP + 0.00327 (to reflect aging) + a mean-zero normally distributed random fluctuation with standard deviation 0.08. The same trimming limits were applied and the result exponentiated to determine the next year's SBP. Similar procedures with

race- and sex-specific coefficients were used for women and blacks. SBPs for Hispanics were simulated using the equations for whites because analysis of the NHANES–III data found no substantial differences between these groups. Table 3 shows the regression equations used to predict the log of SBP for various racial and ethnic groups and both sexes.

Distribution of total cholesterol and HDL cholesterol, initially and over time. Total cholesterol and HDL also follow approximately log-normal distributions in homogeneous population groups. It is known that total cholesterol tends to be elevated and HDL cholesterol depressed among persons with high blood pressure compared with those with normal blood pressure, and among diabetics compared with nondiabetics. In addition, HDL cholesterol tends to be lower among those with higher total cholesterol. These intercorrelations could be captured by estimating the mean logarithm of total cholesterol from a race- and sex-specific regression equation involving age and systolic blood pressure and then estimating the mean logarithm of HDL cholesterol from age and total cholesterol. The process was similar to that outlined for SBP.

For white males, the logarithm of initial total cholesterol was sampled from a normal distribution with mean 4.03 + 0.2264 × SBP + 0.0038 × age, with standard deviation 0.1944, trimmed to limits of 4.3 and 6.55. For subsequent years, the logarithm of total cholesterol was incremented by 0.0038 + a zero-mean normally distributed error term with a standard deviation of 0.137, again trimmed to the same limits. The equations for females and nonwhites had different constant terms, but were otherwise the same. The same standard deviation was used for both sexes and racial groups. Table 4 shows the regression equations used to predict the logarithm of total cholesterol in race- and sex-specific groups.

For HDL cholesterol, the logarithm was sampled from a normal distribution with mean 3.769 −0.00064 × age + 0.00012 × total cholesterol and a standard deviation of 0.297 for white males. The trimming limits were 2.08 and 5.28. For females and nonwhites, separate equations and standard deviations were estimated, as shown in table 5.

Table 3. NHANES–III Regression Equations Used to Predict the Log of Systolic Blood Pressure

LogSBP Black Female = age × 0.0055882 + dm × 0.040263 + 4.557157	SD = 0.113
LogSBP Black Male = age × 0.0037727 + dm × 0.0289417 + 4.667224	SD = 0.112
LogSBP White Female = age × 0.0054558 + dm × 0.0552535 + 4.524341	SD = 0.113
LogSBP White Male = age × 0.0032679 + dm × 0.0267574 + 4.672714	SD = 0.113

Table 4. NHANES–III Regression Equations Used to Predict the Log of Total Cholesterol

Black Female = 0.2263468 × LogSBP + 0.0037968 × age + 4.0330064
Black Male = 0.2263468 × LogSBP + 0.0037968 × age + 4.0077188
White Female = 0.2263468 × LogSBP + 0.0037968 × age + 4.0524686
White Male = 0.2263468 × LogSBP + 0.0037968 × age + 4.027181

Table 5. NHANES–III Regression Equations Used to Predict the Log of HDL Cholesterol

Black Female = −0.0011172 × age + 0.0013044 × cholesterol + 3.790949	SD=0.2984
Black Male = −0.0003883 × age + 0.0004286 × cholesterol + 3.836287	SD=0.2963
White Female = −0.0000327 × age + 0.0003573 × cholesterol + 3.896419	SD=0.2963
White Male = −0.0005691 × age + 0.0001175 × cholesterol + 3.768782	SD=0.2967

As with SBP, for both total and HDL cholesterol values, Hispanics were treated as whites based on lack of significant differences. Separate parameter estimates for females and for blacks were used.

Diabetes: Prevalence, Duration, and Incidence

The case definition of diabetes mellitus used was: a history of using oral hypoglycemic agents or insulin preparations or a fasting blood glucose exceeding 125 mg/dL followed by a 2-hour specimen exceeding 140 mg/dL.

Diabetes prevalence

Table 6 shows the assumed prevalence of diabetes by age group, sex, and race. With the criterion for diabetes used, the number of cases of diabetes among Hispanics in the NHANES–III data was too small to provide stable estimates of prevalence in several age-sex subgroups. For this reason, in the model, the same prevalence rates were used for whites and Hispanics.

Diabetes duration

The rates of progression of complications of diabetes depend upon the duration of the disease. Time since diagnosis of diabetes was estimated using a model that was fitted to data from the NHANES–III survey. Within the NHANES–III survey, diabetes duration was defined as the difference between the date of examination and the date when the subject was first told of a diagnosis of diabetes. Graphical and descriptive exploratory analysis of this variable suggested that within narrow age groups, the distribution of duration followed an exponential distribution. The rate parameter for the distribution appeared to increase linearly with age. The duration of diabetes was treated as a survival time variable and fit an exponential regression model with age as a continuous predictor variable. Each simulated diabetic subject was assigned an initial duration of diabetes by sampling from an exponential distribution (truncated at current age) with the parameter calculated from the regression model.

$$Duration \sim Exponential\ (\alpha + \beta \times age)$$

Maximum likelihood estimates of $\alpha = 1.1$ and $\beta = 0.2$ were used. For each prevalent diabetic prisoner, a duration of diabetes was assigned by sampling from an exponential distribution with mean = $1.1 + 0.2 \times$ age.

Diabetes incidence

Age-, sex-, and race-specific incidence rates for diabetes mellitus are difficult to find. Because diabetes is not screened for routinely, is not reportable, and is initially asymptomatic, most

Table 6. Prevalence of Diabetes Mellitus

Age Group	Male White	Male Nonwhite	Female White	Female Nonwhite
≤19	0.001	0.009	0.011	0.009
20–24	0.004	0.006	0.004	0.006
25–29	0.004	0.008	0.001	0.017
30–34	0.003	0.012	0.009	0.017
35–39	0.027	0.014	0.018	0.017
40–44	0.038	0.036	0.047	0.062
45–49	0.051	0.107	0.032	0.084
50–54	0.086	0.120	0.062	0.116
55–59	0.118	0.244	0.081	0.157
60–64	0.136	0.226	0.128	0.133
≥65	0.127	0.195	0.103	0.164

newly diagnosed cases are not truly incident. The age-specific estimates of incidence shown in table 7 were derived from surveillance reports gathered by the Centers for Disease Control and Prevention (CDC).[10]

Diabetes: Prevalence, Incidence, and Progression of Complications

Stages of diabetic nephropathy—initial prevalence and progression

Following Eastman et al., an initial 10.5 percent prevalence of microalbuminuria among prevalent diabetics was assumed. Progression through frank proteinuria to end-stage renal disease was then simulated using duration-, sex-, and race-specific annual rates,[11] as shown in table 8.

Remarks about hypertension and renal disease

In addition to diabetic nephropathy, hypertensives are at risk of developing end-stage renal disease. Suitable data could not be identified on the incidence of renal failure by blood pressure, age, and race. Instead, total numbers of hypertensives that are being treated for end-stage renal disease under Medicare, broken down by age group, were obtained from the U.S. Renal Data System.[12] These numbers were divided by estimates from

Table 7. Incidence of Diabetes Mellitus

Age Group	Cases per 1,000 per Year
0–44	1.56
45–64	6.45
65+	4.18

Table 8. Rates of Progression of Complications of Diabetes

Race	Duration of Diabetes	From Normal to Microalbuminuria	Microalbuminuria Frank Proteinuria	Frank Proteinuria ESRD
White	0–4	0.0267	0.1572	0.0042
	5–9	0.0267	0.1572	0.0042
	9–11	0.0267	0.1572	0.0042
	12–13	0.0267	0.1572	0.0385
	14–20	0.0267	0.1572	0.0385
	21+	0.0267	0.1572	0.0740
Black	0–4	0.1215	0.1572	0.0042
	5–9	0.1215	0.1572	0.0042
	9–11	0.1215	0.1572	0.0042
	12–13	0.1215	0.1572	0.0385
	14–20	0.1215	0.1572	0.0385
	21+	0.1215	0.1572	0.0740
Hispanic	0–4	0.1719	0.1572	0.0042
	5–9	0.1719	0.1572	0.0042
	9–11	0.1719	0.1572	0.0042
	12–13	0.1719	0.1572	0.0385
	14–20	0.1719	0.1572	0.0385
	21+	0.1719	0.1572	0.0740

NHANES–III of the total numbers of hypertensives (defined as systolic blood pressure ≥140 mmHg) in these age groups. The resulting prevalence rates were taken to represent lifetime incidence. Annual incidence rates for hypertensives were then estimated by attributing the risk over the life expectancy of people in each age group. Although this method of estimating incidence is far from ideal, given the relatively small number of hypertensives and the low incidence of end-stage renal disease among them in the target population, even major errors in these estimates will exert little influence on the overall results of the analysis.

Stages of diabetic neuropathy—initial prevalence and progression

It was assumed that 3.5 percent of prevalent diabetics have symptomatic neuropathy. Incidence of symptomatic neuropathy and progression to amputation were simulated using duration-, sex-, and race-specific rates from Eastman et al.,[13] as shown in table 9.

Stages of diabetic retinopathy—initial prevalence and progression

The model of diabetic retinopathy was taken from the Wisconsin Epidemiologic Study of Diabetic Retinopathy.[14] For instance, it was assumed that 20 percent of prevalent diabetics already have nonproliferative diabetic retinopathy.

Diabetic retinopathy was modeled as having five stages: normal (R1), nonproliferative (R2), proliferative (R3), macular edema (R4), and visual acuity < 20/100 in better eye (R5). Progression through these stages can be direct, or stages R3 or R4 can be skipped with direct advancement from R2 to R4 or from R3 to R5. Table 10 summarizes the annual transition probabilities among these stages taken from Javitt et al.[15]

American Heart Association Model of CHD Risk

The Framingham study is the best known and longest running cohort study of the epidemiology of cardiovascular disease. Over the years, numerous formulas for predicting risk of coronary heart disease (or specific manifestations thereof) from the standard risk factors have been derived from the Framingham findings. To estimate the risk of CHD in the study model, a model developed by the American Heart Association that relies on age, gender, diabetes, smoking, systolic blood pressure, and total cholesterol/HDL cholesterol ratio as predictors was used.[16] That

Table 9. Simulation of Symptomatic Neuropathy and Progression to Amputation

Race	Duration of Diabetes (yrs.)	From Normal to Symptomatic	Symptomatic 1st Amputation	1st Amputation 2nd Amputation
White	0–8	0.0144	0.0280	0.1386
	9–13	0.0144	0.0350	0.1386
	14–19	0.0144	0.0467	0.1386
	20+	0.0144	0.1400	0.1386
Nonwhite	0–8	0.0432	0.0840	0.4158
	9–13	0.0432	0.1050	0.4158
	14–19	0.0432	0.1401	0.4158
	20+	0.0432	0.4200	0.4158

Table 10. Probabilities of Progression of Diabetic Retinpathy						
Race	Diabetes Duration	From R1 to R2	From R2 to R3	From R2 to R4	From R3 to R5	From R4 to R5
White	0–4	0.073	0.0025	0.047	0.088	0.05
	5–9	0.129	0.0090	0.095	0.088	0.05
	10–14	0.116	0.0095	0.092	0.088	0.05
	15+	0.113	0.0260	0.080	0.088	0.05
Black	0–4	0.154	0.0050	0.099	0.088	0.05
	5–9	0.272	0.0190	0.200	0.088	0.05
	10–14	0.245	0.0200	0.194	0.088	0.05
	15+	0.238	0.055	0.169	0.088	0.05
Hispanic	0–4	0.196	0.007	0.126	0.088	0.05
	5–9	0.346	0.024	0.255	0.088	0.05
	10–14	0.311	0.025	0.247	0.088	0.05
	15+	0.303	0.070	0.214	0.088	0.05

formula predicts the 4-year risk of incident CHD (defined as myocardial infarction, sudden death, and stable or unstable angina). A 1-year risk of incident CHD was calculated by assuming that the hazard is constant over the 4-year interval and applying the standard conversion formula.

Framingham-derived proportionate morbidity ratios

The American Heart Association formula predicts risk of CHD as a whole but does not distinguish among its various manifestations. Because different costs were to be assigned to different manifestations of CHD, the incidence of myocardial infarction and angina (both stable and unstable) were estimated as follows: Counts of incident cases of CHD, myocardial infarction, and angina were taken from the reports of the Framingham study.[17] Age-group- and sex-specific proportionate morbidity ratios were then calculated and applied. For example, among 55- to 64-year-old males in the Framingham study, 182 myocardial infarctions were observed among 305 incident cases of coronary heart disease. The ratio 0.597 was therefore used as the probability that a simulated subject with predicted incident CHD in a given year would have a myocardial infarction.

Other complications of hypertension

In addition to CHD, hypertension is the major risk factor for strokes and congestive heart failure and is a major contributor to renal failure as well. To model the development of strokes and congestive heart failure, the logistic regression models developed in the Framingham Heart study for these outcomes were used.[18] The modeling of hypertensive renal failure has been described earlier.

General Population Mortality Rates

Age-, sex-, and race-specific general population mortality rates were taken from *Vital Statistics of the United States, 1998.*[19]

Discharge From Incarceration

Duration of time in prison is difficult to estimate from available data. Prospective studies of cohorts of inmates from incarceration through discharge and subsequent reincarceration-discharge cycles have not been published. Sentence on admission cannot be used as a proxy for time to be served because actual time served may be substantially shorter or longer. Among prisoners discharged in a given year, information

on time served is available, but these prisoners may not be representative of all those currently incarcerated. Time served varies from State to State and facility to facility. Furthermore, differences exist between those sentenced for violent and nonviolent offenses. After review of several data sources, it was assumed that the average inmate serves 4.5 years and that the distribution of length of stay is exponential. This corresponds to an annual discharge probability of slightly greater than 0.20 and is consistent with Beck et al.[20]

Effects of Treatment

Hypertension is readily treated in the vast majority of compliant patients. The effect of blood-pressure-lowering interventions was modeled by truncating the systolic blood pressure distribution at 140 mmHg when simulating the effects of treatment. This reflects rigorous treatment. As a consequence of the lower blood pressures, the risks of coronary heart disease and renal failure are reduced, and these reductions are reflected in lower counts of those events. Treatment of hypertension was assumed to have no effect on the incidence or progression of complications of diabetes.

Treatment of diabetes has not yet been shown to clearly reduce the incidence of coronary heart disease. It does, however, substantially reduce the risk of microvascular complications and the rate at which they progress.[21] In an analysis of the Diabetes Control and Complications Trial (DCCT), Eastman and colleagues fit a proportional hazards model to the incidence of the various stages of complications. It was found that with tight control of diabetes (HbA1c maintained at 7.2 percent), the relative risk for microalbuminuria is 0.34 and with compared routine diabetic care (HbA1c maintained at 10.0 percent), the relative risk for frank proteinuria is 0.073. With good diabetic control, the relative risk of incidence of each stage of neuropathy is 0.175.[22]

With good diabetic treatment, the progression rates from retinopathy stages R3 and R4 to stage R5 are reduced. Treated annual progression probabilities were taken to be 0.0148 and 0.033, respectively, for all races and all durations of diabetes. (Compare with the rates of progression assumed for untreated diabetes shown in table 10.) For incident background retinopathy, the relative risk is estimated at 0.04; for macular edema, 0.67; and for proliferative retinopathy, 0.126.

Costs of Morbid Outcome Events

When preventive programs such as the one contemplated here are introduced, savings are realized as a result of avoided future morbidity. Although the savings so obtained seldom exceed the outlays necessary to achieve them, they represent a meaningful offset against the total cost of an intervention. Many of the complications of hypertension and diabetes are quite costly, so this offset is appreciable. Table 11 shows the assumed costs for each of the complications modeled.

The costs per person-year of congestive heart failure were estimated by dividing the annual Medicare expenditures for this diagnosis by the number of Medicare patients with the diagnosis.[23] The costs of diuretics and ACE inhibitors were

Table 11. Estimated Unit Costs of Complications of Hypertension and Diabetes

Morbid Event or State	Unit Cost
Person-year with congestive heart failure	$2,188.40
Person-year with a lower extremity amputation	4,808.46
Incident case of coronary heart disease	15,952.00
Person-year of blindness	16,207.00
Person-year with end-stage renal disease	46,207.00
Incident stroke	50,000.00

added to that sum because these are not covered by Medicare or reckoned in their reports. The costs of lower extremity amputation were calculated by amortizing the costs associated with an amputation and subsequent rehabilitation and followup care and over the expected lifespan of amputees.

The costs of incident coronary heart disease and those of a person-year with end-stage renal disease are taken from Eastman et al.;[24] those of a person-year of blindness are taken from Javitt et al.[25] Most published estimates of the costs of stroke exceed $90,000,[26] but costs of lost earnings and productivity figure heavily in those calculations. Because it is assumed that prisoners are not gainfully employed while incarcerated and primarily earn low wages after release, Matchar's lower estimate that excludes these costs was used.[27]

Not all stages of all complications incur costs. Microalbuminuria requires no treatment and is asymptomatic. Consequently no costs were assigned to its presence. The early stages of retinopathy necessitate both surveillance and treatment, but these costs are included in estimating treatment costs for diabetes (see below), so they are not counted again here.

Costs of Screening and Diagnosis

A major advantage of the prison setting for screening is the essential absence of indirect costs. Screening for hypertension and diabetes mellitus in a prison simply requires applying a sphygmomanometer and drawing a blood glucose level during one of the numerous visits made by prisoners each year to the prison physician. Because prisoners are not gainfully employed and are not free to pursue self-selected leisure activities, no opportunity costs attach to their undergoing these tests. Because prisoners average more than 10 physician visits per year (R. Greifinger, personal communication), no additional facilities or service capacity are required to carry out these tests. Some additional expenses will be incurred for repeat blood pressure and blood glucose measurements to confirm abnormal initial results. Overall, however, the average per capita annual cost of screening and confirmatory tests likely will not exceed $15.

Costs of Treatment

To achieve the benefits of treatment, resources must be expended to lower blood pressure and control hyperglycemia. For mild hypertensives, treatment with dietary modifications and exercise is often sufficient to bring about a normal blood pressure. In those requiring medication, adequate treatment can be achieved for almost all hypertensives by using a diuretic plus a beta-blocker. Assuming that the least expensive generic brands of drugs are used, and assuming five physician checkups per year, the annual per capita cost of treating hypertension will be approximately $388.40.[28] Eastman and colleagues have reported the average increased costs associated with aggressive diabetic treatment as $1,983 per person-year.[29] This amount includes the costs of pharmacotherapy with insulin or oral agents, materials for home glucose monitoring, periodic eye examinations, and routine diabetic eye and foot care.

Effects of Treatment on Quality of Life

Although treatment for hypertension often produces side effects, these are less pronounced with modern regimens than they were in the past. No direct effect on quality of life was assumed for treatment of either hypertension or diabetes mellitus. Instead, this effect was reckoned by counting the person-years of less than ideal quality of life avoided when aggressive treatment is used. Table 12 shows the quality-of-life adjustment factors assumed. Detailed studies of quality of life with congestive heart failure are currently being carried out by several investigators.

Table 12. Quality-of-Life Adjustments for Morbid Outcomes of the Analysis	
Complication	**Quality-of-Life Adjustment**
Congestive heart failure	0.9
Status—after lower extremity amputation	0.8
Blindness	0.7
End-stage renal disease	0.6
Status—after cerebrovascular accident	0.5

Congestive heart failure is a heterogeneous condition that can result in minimal impairment or in major disability. The average quality-of-life adjustment factor was estimated to be 0.9, reflecting the preponderance of mild congestive heart failure. The factors for lower extremity amputation, blindness, end-stage renal disease, and cerebrovascular accident were taken from Eastman et al.,[30] Javitt et al.,[31] and Matchar.[32] These figures were used as in the following example: Each person-year of congestive heart failure avoided by treatment results in a gain of 0.1 (=1−0.9) quality-adjusted life-years.

Results

As noted earlier, the effects of screening for and aggressively treating diabetes mellitus and hypertension are manifested in several dimensions: Survival is improved, morbidity is reduced, expenses for screening and treatment are incurred, and savings for treatment of avoided complications are realized. The diverse effects on various types of morbidity, as well as the improvement in survival, can be summarized by enumerating quality-adjusted life-years (QALY) and tallying the expenditures, net of any savings associated with reduced later morbidity. The overall impact may then be summarized as a single number, the cost-effectiveness ratio (CER), defined as:

$$CER = \frac{Costs(\text{with treatment}) - Costs(\text{without treatment})}{QALY(\text{with treatment}) - QALY(\text{without treatment})}$$

Future events and costs are considered less valuable than those in the present. Accordingly, it is conventional, when calculating cost-effectiveness ratios, to discount both the monetary stream in the numerator and the morbidity/mortality stream in the denominator at 3 percent per annum.[33]

Survival and reduction in morbidity

Over 20 years of followup, without screening and treatment, the 1,599,409 persons currently incarcerated are expected to accrue 7,616,668.5 person-years of survival in prison, and an additional 22,567,690 person-years of life outside prison. With aggressive screening and treatment and assuming 100-percent compliance, they will live 7,620,436.5 person-years in prison and 22,950,030.0 person-years outside prison. Thus, screening and treatment have the potential to salvage 386,108 person-years of life for this cohort over 20 years. Of these, more than 99 percent will be lived outside prison. In addition to increased survival, screening and treatment substantially reduce morbidity. Person-years of blindness are reduced by 31,697 with 94.1 percent of this realized outside prison and 61,021 episodes of coronary heart disease are avoided with 91.7 percent of them outside prison. Person-years of congestive heart failure are reduced by 31,555 with 89.25 percent of those outside prison and 44,400 strokes are avoided with more than 90 percent outside prison. Finally, 15,395 person-years of end-stage renal disease are avoided with 94.6 percent of them outside prison.

Expenditures

To achieve these benefits, outlays are made for screening and treatment. Using the cost estimates explained earlier, the total direct cost of screening in this population for 20 years will be $204,817,860. The total costs of hypertension treatment over this same period will be $11,873,569,188. The cost of treatment for

diabetes will be $2,822,545,288. These expenses will be partially offset by the savings from avoided complications. Sixty-three percent of the diabetes screening costs will be incurred outside prison, as will 75 percent of the hypertension treatment costs and 82 percent of the diabetes treatment cost. The proportion of the benefit realized outside prison is still greater.

Cost-effectiveness ratios

When discounting at 3 percent is applied to reflect the distribution of costs, deaths, and morbid events over time, the cost-effectiveness ratio for the screening and aggressive treatment strategy is $11,300 per QALY gained (rounded to the nearest $100). This figure makes this screening and treatment program one of the best investments of health care dollars available. This program would be more cost effective than widely accepted measures such as mammography screening in women age 50–59, or even cervical cancer screening in sexually active women. Except for the assumption of 100-percent compliance, all assumptions have been made conservatively, to bias the costs upward and the benefits downward. The figure of $11,300 per QALY gained is really a cost-efficacy ratio. In the real world, 100-percent compliance will not be achieved.

Modeling partial compliance is problematic. Most noncompliance consists of lapses in adherence or incomplete dosing of medications. Estimates of the extent of these behaviors are hard to acquire. Instead, compliance has been modeled as follows. Noncompliance is assumed not to reduce treatment costs. It is assumed, however, that noncompliance reduces the benefits of treatment by an amount equal to the noncompliance rate. In other words, 80-percent compliance in prison is modeled by recasting the calculations using the full costs of treatment, but recognizing only 80 percent of the in-prison benefit. This noncompliance model would be correct if, for example, the specified fraction of patients made regular physician visits and purchased their medicines, but then discarded them. In reality, noncompliance usually involves skipping some visits and consuming less medication. This starker model of noncompliance overestimates the cost-effectiveness ratio for a treatment plan.

A realistic assumption might be that 80-percent compliance can be obtained while in prison, with 50-percent compliance outside prison. Under this 80/50 compliance assumption, the cost-effectiveness ratio rises to $22,200 per QALY. This still compares favorably with the cost-effectiveness ratios of widely accepted practices.

The assumption that 80-percent compliance can be achieved in prison is reasonable. But because the cost-effectiveness ratio is sensitive to compliance rates, a less favorable scenario was also examined: 50-percent compliance both in and out of prison. The 50-percent compliance rate is widely believed to be obtained outside prison for treatment of hypertension and diabetes. This assumption makes a realistic assessment about compliance out of prison, combined with the assumption that adherence is not improved under conditions of incarceration. This might be regarded as a worst-case scenario. Even in these pessimistically constructed circumstances the cost-effectiveness ratio rises only slightly, to $22,600 per QALY.

Recommendations and Discussion

Limitations

The approach taken in this analysis has limitations. It is a leap of faith to assume that the prevalence of the conditions investigated and their sequelae are properly represented by the relied on sources (primarily NHANES–III and the Framingham study). This leap of faith is necessitated by the lack of studies of the incarcerated population specifically. Putting together estimates of risk-factor prevalence from NHANES–III with prognosis projections from Framingham is also problematic because of partially differing case definitions and the absence of ethnic stratification in the Framingham models.

The analysis also makes simplifying assumptions about the prison population. For example, it is assumed that there is no value to inmates' time while incarcerated and that they will earn low

wages after release. Because suitable statistics about recidivism were not available, it is also assumed that once released from prison they do not return. A better accounting of recidivism would modify the distribution of costs and benefits between the prison system and the community outside prison, but would affect the cost-effectiveness ratios negligibly, if at all. In a related matter, the analysis takes no account of possible additional criminal behavior during the additional years of survival and better health.

The cost estimates used in this analysis are a few years old. Adjustment to 1999 dollars would increase the estimated cost-effectiveness ratios only slightly because health care inflation has been moderate in the past 5 years and none of the estimates are from sources older than that. It has been assumed that annual screening for hypertension and diabetes can be carried out for only $15 per capita by using existing capacity and disregarding indirect costs. This assumption might be excessively optimistic. Some facilities might not currently perform routine blood tests, in which case the incremental costs of screening for diabetes would be higher. Even when the cost-effectiveness ratios are recalculated, assuming $45 per person per year, those ratios only rise by approximately 20 percent.

Finally, the model treats the prison population as essentially homogeneous across jurisdictions and facilities. The age-, sex-, and race-specific prevalence of hypertension and diabetes or the distributions of lipids and smoking may differ by geography or by prison. Although this does not invalidate the overall conclusion, examining such heterogeneity might make it possible to identify target areas that present unusually good opportunities for prevention or other places where a less intensive program might be sufficient.

Recommendations

Using conservative assumptions throughout, the conclusion seems inescapable that annual screening for hypertension and diabetes, followed by aggressive treatment of these conditions, is an excellent investment of health care resources. Hypertension screening and treatment should be carried out in accordance with the recommendations of the Joint National Committee for the Detection, Evaluation and Treatment of High Blood Pressure.[34] Screening for diabetes can be accomplished with a single fasting blood sugar. If the result exceeds 125 mg/dL, a subsequent postprandial blood sugar can be obtained, and a diagnosis made if the result exceeds 140 mg/dL. Subsequent treatment should include "home" glucose monitoring, dietary management, and appropriate use of insulin or oral hypoglycemic agents, with a target HbA1c level of 7.2 percent. Routine diabetic care should include periodic examinations of the optic fundi and the feet.

Most of the costs of the program and an even larger share of its benefits will be incurred outside prison. The results are sensitive to the degree of treatment compliance attained, but even under relatively pessimistic assumptions, the cost-effectiveness ratio still remains a bargain compared with many widely accepted preventive practices.

The United States Preventive Services Task Force's *Guide to Clinical Preventive Services* currently recommends screening for hypertension by taking blood pressure but does not specify a particular frequency. The task force does not currently recommend screening for diabetes. Its recommendation, however, predates the demonstration that aggressive treatment of diabetes substantially reduces complications.[35] It is expected that future editions of the Guide will endorse screening for diabetes mellitus.

Policymakers look beyond cost-effectiveness ratios to other considerations. Some might question the justice of providing state-of-the-art health care to those who have transgressed society's rules while others outside prison lack access to even rudimentary health care. It is also debatable whether providing first-rate health care to prisoners is politically viable in the current climate. To some extent, both of these concerns are mitigated by the observation that the bulk of the impact of the proposed interventions will be attained after prisoners are released, having paid their debt to society and begun contributing to the economy again.

In addition to the recommendations for screening and treatment, it is recommended that the authorities responsible for correctional facilities make health information specific to prisoners available. The simplest way to accomplish this might be to include a sample of prisoners in future iterations of the National Health and Nutrition Examination Survey. Reports on the health status of prisoners will prove invaluable in planning, setting, and evaluating health care policy for this large segment of the U.S. population.

Notes

1. National Center for Health Statistics, *National Health and Nutrition Examination Survey III*. Washington, DC: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 1997.

2. Diabetes Control and Complications Trial Research Group, "The Effect of Intensive Treatment of Diabetes on the Development and Progression of Long-Term Complications in Insulin-Dependent Diabetes Mellitus," *New England Journal of Medicine* 329(1993): 977–986.

3. U.K. Prospective Diabetes Study Group, "U.K. Prospective Diabetes Study (UKPDS)," *Diabetologia* 34(1991): 877–890.

4. Palisades Decision Tools, Newfield, NY.

5. Hornung, C.A., B.J. Anno, R.B. Greifinger, and S. Gadre, "Health Care for Soon-To-Be-Released Inmates: A Survey of State Prison Systems," paper prepared for the National Commission on Correctional Health Care, Chicago, Illinois, June 1999. (Copy in this volume.); R. Scott Chavez, personal communication.

6. Stata Corp., College Station, TX.

7. Schechter, C.B., and R.S. Adler, "Bayesian Analysis of Diastolic Blood Pressure Measurement," *Medical Decision Making* 8(1988): 182–190.

8. Schechter, unpublished observations.

9. Anderson, K.M., P.W.F. Wilson, P.M. Odell, and W.B. Kannel, "An Updated Coronary Risk Profile: A Statement for Health Professionals," *Circulation* 83(1)(1991): 356–362.

10. Geiss, L.S., W.H. Herman, M.G. Goldschmid, F. DeStefano, M.S. Eberhardt, E.S. Ford, R.R. German, J.M. Newman, D.R. Olson, S.J. Sepe et al., "Surveillance for Diabetes Mellitus—United States, 1980–1989," *Morbidity and Mortality Weekly Report* 42(SS–2)(1993): 1–20.

11. Eastman, R.C., J.C. Javitt, W.H. Herman, E.J. Dasbach, C. Copley-Merriman, W. Maier, F. Dong, D. Manninen, A.S. Zbrozek, J. Kotsanos, S.A. Garfield, and M. Harris, "Model of Complications of NIDDM. II: Analysis of the Health Benefits and Cost-Effectiveness of Treating NIDDM With the Goal of Normoglycemia," *Diabetes Care* 20(5)(1997): 725–734.

12. National Institute of Digestive and Kidney Diseases, Division of Kidney, Urologic, and Hematologic Diseases, *United States Renal Data System: 1999 Annual Data Report,* Bethesda, MD: National Institutes of Health, National Institute of Digestive and Kidney Diseases.

13. Eastman, R.C., J.C. Javitt, W.H. Herman, E.J. Dasbach, C. Copley-Merriman, W. Maier, F. Dong, D. Manninen, A.S. Zbrozek, J. Kotsanos, S.A. Garfield, and M. Harris, "Model of Complications of NIDDM. II: Analysis of the Health Benefits and Cost-Effectiveness of Treating NIDDM With the Goal of Normoglycemia" (see note 11).

14. Klein, R., "Hyperglycemia and Microvascular and Macrovascular Disease in Diabetes," *Diabetes Care* 18(1995): 258–268; Eastman, R.C., J.C. Javitt, W.H. Herman, E.J. Dasbach, C. Copley-Merriman, W. Maier, F. Dong, D. Manninen, A.S. Zbrozek, J. Kotsanos, S.A. Garfield, and M. Harris, "Model of Complications of NIDDM. II: Analysis of the Health Benefits and Cost-Effectiveness of Treating NIDDM With the Goal of Normoglycemia" (see note 11).

15. Javitt, J.C., L.P. Aiello, Y. Chiang, F.L. Ferris, J.K. Canner, and S. Greenfield, "Preventive Eye Care in People With Diabetes is Cost-Saving to the Federal Government: Implications for Health-Care Reform," *Diabetes Care* 17(8)(1994): 910–917.

16. Anderson, K.M., P.W.F. Wilson, P.M. Odell, and W.B. Kannel, "An Updated Coronary Risk Profile: A Statement for Health Professionals" (see note 9).

17. Kannel, W.B., and T. Gordon, eds., *The Framingham Study: An Epidemiological Investigation of Cardiovascular Disease,* Washington, DC: U.S. Government Printing Office: Section 26, 1987.

18. Ibid.

19. National Center for Health Statistics, *Vital Statistics of the United States, 1998*. Washington, DC: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 1999.

20. Beck, A., D. Gilliard, L. Greenfeld, C. Harlow, T. Hester, L. Jankowski, T. Snell, J. Stephan, and D. Morton, *Survey of State Prison Inmates, 1991,* Washington, DC: U.S. Department of Justice, Bureau of Justice Statistics, 1993, NCJ 136949: 7.

21. Diabetes Control and Complications Trial Research Group, "The Effect of Intensive Treatment of Diabetes on the Development and Progression of Long-Term Complications in Insulin-Dependent Diabetes Mellitus" (see note 2); U.K. Prospective Diabetes Study Group, "U.K. Prospective Diabetes Study (UKPDS)" (see note 3).

22. Eastman, R.C., J.C. Javitt, W.H. Herman, E.J. Dasbach, A.S. Zbrozek, F. Dong, D. Manninen, S.A. Garfield, C. Copley-Merriman, W. Maier, J.F. Eastman, J. Kotsanos, C.C. Cowie, and M. Harris, "Model of Complications of NIDDM. I: Model Construction and Assumptions," *Diabetes Care* 20(5)(1997): 725–734.

23. Funk, M., and H. Krumholz, "Epidemiologic and Economic Impact of Advanced Heart Failure," *Journal of Cardiovascular Nursing* 10(2)(1996): 1–10.

24. Eastman, R.C., J.C. Javitt, W.H. Herman, E.J. Dasbach, C. Copley-Merriman, W. Maier, F. Dong, D. Manninen, A.S. Zbrozek, J. Kotsanos, S.A. Garfield, and M. Harris, "Model of Complications of NIDDM. II: Analysis of the Health Benefits and Cost-Effectiveness of Treating NIDDM With the Goal of Normoglycemia" (see note 9).

25. Javitt, J.C., L.P. Aiello, Y. Chiang, F.L. Ferris, J.K. Canner, and S. Greenfield, "Preventive Eye Care in People With Diabetes is Cost-Saving to the Federal Government: Implications for Health-Care Reform" (see note 15).

26. Taylor, T.N., "The Medical Economics of Stroke," *Drugs* 54(Supp. 3)(1997): 51–54; Dobkin, B., "The Economic Impact of Stroke," *Neurology* 45(2 Supp. 1)(1995): S6–S9.

27. Matchar, D.B., "The Value of Stroke Prevention and Treatment," *Neurology* 51(3 Supp. 3): S31–S35.

28. Pearce, K.A., C. Furberg, B.M. Psaty, and J. Kirk, "Cost Minimization and the Number Needed to Treat in Uncomplicated Hypertension," *American Journal of Hypertension* 11(1998): 618–629.

29. Eastman, R.C., J.C. Javitt, W.H. Herman, E.J. Dasbach, C. Copley-Merriman, W. Maier, F. Dong, D. Manninen, A.S. Zbrozek, J. Kotsanos, S.A. Garfield, and M. Harris, "Model of Complications of NIDDM. II: Analysis of the Health Benefits and Cost-Effectiveness of Treating NIDDM With the Goal of Normoglycemia" (see note 11).

30. Ibid.

31. Javitt, J.C., L.P. Aiello, Y. Chiang, F.L. Ferris, J.K. Canner, and S. Greenfield, "Preventive Eye Care in People With Diabetes is Cost-Saving to the Federal Government: Implications for Health-Care Reform" (see note 15).

32. Matchar, D.B., "The Value of Stroke Prevention and Treatment" (see note 27).

33. Gold, M.R., J.E. Siegel, L.B. Russell, and M.C. Weinstein, eds., *Cost-Effectiveness in Health and Medicine,* New York: Oxford University Press, 1996: 230–235.

34. Joint National Committee for the Detection, Evaluation, and Treatment of High Blood Pressure, *The Sixth Report of the Joint National Committee on the Prevention, Detection, Evaluation, and Treatment of High Blood Pressure,* Bethesda, MD: National Institutes of Health, National Heart, Lung, and Blood Institute, 1997.

35. U.S. Preventive Services Task Force, *Guide to Clinical Preventive Services,* 2d. ed., Baltimore, MD: Williams and Wilkins, 1996: 39–52, 193–208.

Providing Psychiatric Services in Correctional Settings

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Introduction

Persons with mental illnesses present special problems to corrections administrators and staff. Left untreated, they are at increased risk of suicide, victimization, causing disturbances among inmate populations, and disciplinary infractions. In the community, these problems persist, as well as increased risks of homelessness, health problems, and, under certain circumstances, violence.

Providing mental health services to offenders who require them is necessary for the safety and well-being of offenders and staff, the smooth operation of corrections, and community safety and quality of life. To ensure continuity of care, police and corrections administrators must come together with mental health and substance abuse providers to identify and close the gaps in service. Law enforcement and community corrections staff, in particular, must work aggressively with community leaders to develop effective linkages to help persons with mental illnesses live successfully in the community, particularly at critical transition points between incarceration and the free community.

Each point in the criminal justice system brings with it unique service challenges. Institutional corrections differ significantly from community corrections. Jails and prisons, while similar in many aspects of psychiatric care, differ on several points. The following sections discuss the opportunities to provide mental health services in jails, prisons, and community corrections.

Jails

The United States has approximately 3,500 jails today. These locally operated facilities provide pretrial detention and short-term confinement after sentencing. They are best characterized as people-processing organizations with heavy flowthrough. Jails are increasingly important in identifying and treating acute and chronic medical and psychiatric conditions at a time when indigent care is dwindling. Unlike community-based treatment providers, jails, by their very nature, cannot refuse any individual presented to them by legitimate authority.

Jails have a substantial constitutional obligation to provide minimum care. Custodial facilities have both the duty to protect and the duty to treat serious medical and psychiatric conditions. In addition to case law such as *Estelle* v. *Gamble*[1] and *Bowring* v. *Godwin*[2] that establishes the standards of medical and mental health care, *Langley* v. *Coughlin*[3] provides a list of the several specific claims that, in conjunction with deliberate indifference, indicate constitutionally inadequate mental health care.[4] Clearly, providing mental health services to persons with mental illnesses who come into contact with the criminal justice system is not an option, but a constitutional necessity. Despite these requirements, a study of mental health services in U.S. jails with rated capacities of 50 or more detainees indicated that, while most jails offered at least one mental health service, few jails provided a comprehensive range of services.[5] Approximately 83 percent of all U.S. jails provided intake screening and 60 percent

provided mental health evaluations, but only 42 percent provided psychiatric medications. In response to emergencies, only 43 percent provided crisis intervention services, 73 percent provided suicide prevention services, and 72 percent provided access to inpatient hospitalization. Finally, only 21 percent of jails provided case management or discharge planning.[6]

Jail mental health services are typically focused on identification, crisis management (including suicide prevention), and short-term treatment. Two basic principles guide the minimum requirements: (1) persons in detention should not leave the facility in worse condition than when they arrived and (2) persons should not be punished for being identified as having a need (i.e., the identification of a mental illness should not affect access to other services or the length of time spent in jail).

Screening, assessment, and evaluation

Screening, assessment, and evaluation are the three stages at which jails identify persons in need of psychiatric care. The initial screen is typically conducted by a corrections officer at booking. The purpose of this screen is to identify persons in need of a more detailed mental health evaluation and those at risk for suicide. Officers are not trained clinicians and are not expected to make decisions regarding treatment. The booking officer's job is to refer all individuals who, because of their responses to specific questions or by their appearance or behavior, appear to be at risk.

A mental health assessment is often a second step toward providing treatment. This can be done by a mental health worker or by medical staff within the context of a medical history. Both the booking screen and the medical examination are done on all individuals who are booked into the jail and assigned housing. The mental health assessment is conducted only on persons identified by the booking screen or by the medical department. At the final stage, persons assessed as needing psychiatric services are referred for a full psychiatric evaluation. Psychiatric evaluations are usually conducted by a psychiatrist and often result in the prescription of medication.

Screening, assessment, and evaluation are critical points in the service delivery system for providing appropriate services because information uncovered at these points affect classification decisions and whether detainees will receive mental health and other treatment services. Screening instruments used by booking officers should include a minimum set of questions related to symptoms of affective and psychotic disorders, history of mental health treatment, current use of prescribed psychotropic medication, and risk of suicide.

Classification and housing

Structurally, jails are designed to control the potential for violence. Their primary mandate is to hold individuals in a secure environment and prevent physical injury to either staff or detainees. Single-cell tiers and pods, highly regimented schedules, lack of privacy, and an expectation of an unquestioning response to authority are characteristics of correctional facilities designed to maximize control and reduce opportunities for breaches in security (e.g., escapes, riots and violent incidents, use of contraband). Individuals with acute mental illnesses may have extreme difficulties conforming their behavior to what is required. This structure may, in fact, create an additional unintended burden on detainees with mental illness and increase disciplinary incidents and related punishment.

Classification refers to the process by which individuals booked into the jail are assigned housing. Appropriate classification takes into account the seriousness of the current offense and risk of violence; special needs, such as medical or mental health problems; gender and age; and adjudication status. Most jails assign different security levels within their facilities and have different kinds of housing, including general population, medical (where persons diagnosed with acute mental illnesses or suicide risk may be placed), and administrative segregation. Some jails also provide specialized housing, such as

mental health units for persons with stable conditions, substance abuse therapeutic communities, trustee housing, and juvenile units.

Because many jails do not provide inpatient care or specialized housing for individuals diagnosed with mental illnesses, many detainees are transferred to civil psychiatric facilities to receive treatment. While this is a humane and medically sound policy, it has serious, unintended consequences. First, a transfer out of the jail for evaluation or inpatient treatment interrupts and may significantly delay the adjudication process, extending the period of confinement. Second, the inpatient facility may not be within the locality. This means that the individual may not be able to see family and other support persons easily, if at all.

Medication and psychiatric followup services

Medication and medication monitoring are major issues for jail psychiatry. Some jails do not allow the prescription of certain antidepressants and tranquilizers because of their cost or potential for abuse. Despite indications or previous treatment, some individuals cannot receive the medication of choice due to standing policies. On the other hand, these policies exist for good reason. Detainees with significant addictive disorders may request psychiatric medications as a substitute for their drug of choice. Each case must be reviewed carefully before medication is prescribed and at regular intervals thereafter to assure that the medications are appropriate to the need.

Overprescription of medication is as problematic as underprescription. Because many facilities are overcrowded, housing is limited and management of detainee populations is more difficult. In stressed environments, there is a temptation to overprescribe medications for the sole purpose of tranquilizing the detainee. From the jail's perspective, this is a reasonable policy because it enhances the jail's security. From a human rights perspective, it is an unjustified use of chemical restraints and violates constitutional rights. In addition, the medication may interfere with the detainee's ability to participate in his or her adjudication process.

Crisis intervention and suicide precautions

Every jail should have established procedures to identify and respond to psychiatric crises, including suicide risk. Emergency responses may include emergency evaluations, close observation in a special housing area, removal of the individual to a medical/surgical or inpatient unit within the jail, or transfer to a psychiatric facility outside the jail. In addition, physical and chemical restraints may be used under the supervision of medical staff. The critical feature of emergency response is providing a safe environment for acutely distressed detainees. This sometimes requires the removal of objects that may be used to injure oneself or to harm others. This should not be interpreted to mean that clothing should be removed or that the individual be isolated. These two common procedures often exacerbate the problem.

The policies and procedures governing the use of seclusion and physical and chemical restraints should be carefully reviewed for their application. Some mental health systems are beginning to consider these issues in response to a growing awareness of how these procedures damage individuals' physical and emotional well-being.

Case management and discharge planning

Most jails do not provide case management or discharge planning services. Arguably, release planning can be the most important service a jail can provide to reduce the probability of return. For all persons with special needs, linkages to community services, particularly if the linkage is more than a telephone appointment, can make a significant difference in engagement in community-based services.

Although most jails acknowledge this important service, the manner in which inmates are processed limits a jail's ability to develop effective linkages. Most importantly, it is critical to understand that the court makes release decisions. Except when inmates serve specific sentences, jails do not typically know when someone will be released, whether it is pretrial or on sentencing. Therefore, beginning discharge planning early

in confinement is important. On release, individuals with mental illnesses typically require specific community-based services, including, at a minimum, housing, financial support and entitlements, health care, and mental health clinic services. Of all the potential problems that jails encounter in discharge planning, the most difficult to negotiate is continuity of mental health treat-ment, particularly providing uninterrupted med-ication. Lack of medication and basic necessities of life (i.e., housing, clothing, food, and health care) virtually guarantee the return of the individual to jail.

Prisons

Prisons are correctional facilities that hold sentenced inmates generally for more than 1 year. These facilities are operated by the Federal and State governments, and increasingly by private companies. Currently, the Federal government operates 112 facilities, including traditional prisons; work farms; boot camps; and Immigration and Naturalization Service, Bureau of Indian Affairs, and military facilities. State governments operate 928 facilities, including traditional prisons, youth detention facilities, work farms, boot camps, and specialty units for prisoners (e.g., forensic hospital units, substance-abuse treatment facilities, medical units). Private companies currently run 156 correctional facilities, including traditional prisons and specialty facilities (e.g., sex offender units, substance abuse facilities). The responsibility for mental health provision varies from State to State; in some States, psychiatric care is provided under the auspices of the State mental health authorities, and in others, under the auspices of the State corrections authority. As in jails, behavioral health services in State and Federal prisons are frequently contracted out.

Of the State-operated adult prison facilities, 83 percent provide mental health screening and assessment, 80 percent provide and monitor medications, and 77 percent provide access to inpatient care. In addition, 36 percent of prisons have specialized housing for individuals with stable mental health conditions and 87 percent of correctional facilities offer some form of counseling or verbal therapy.[7]

Jails and prisons differ somewhat in the scope of mental health services provided. This reflects the difference in average lengths of confinement. As stated earlier, jails process a large volume of detainees and have relatively short lengths of stay. Therefore, jail mental health services are primarily concerned with suicide prevention and stabilization of acute conditions. Prisons, on the other hand, are more aptly described as contained communities where individuals may spend many years. Therefore, prisons provide a greater range of services emphasizing long-term support, including residential units for individuals with stable conditions who cannot be placed in general population, case management, and counseling and verbal therapies.

Screening and assessment

Most States have a reception center where inmates are processed and assigned permanent housing. This central facility often holds new inmates for several months, during which time the inmates' needs and security levels are determined. This is the key point in identifying mental health treatment needs. Because inmates may arrive from local facilities in stable condition with or without accompanying medical and psychiatric records, prisons must have a capacity to assess individuals continuously for psychiatric problems.

Screening and evaluation are conducted in prisons in much the same way as in jail settings. An initial screen is conducted on all incoming inmates and evaluations are ordered for those who appear to require services.

Crisis intervention and suicide precautions

Mental health crises can occur at any time. Given the cyclic nature of many serious mental illnesses, crises should be expected. Therefore, crisis services must be available 24 hours a day in all facilities. Early response is critical to stabilize the individual and prevent further deterioration of the inmate's condition. Possible emergency responses are similar to those in jails, including emergency evaluations, close observation in a special housing area, physical or chemical restraints, and moving the individual to an inpatient unit inside or outside the facility.

Mental health treatment

Given the long periods of confinement of most prison inmates, greater opportunities exist to provide long-term mental health care. In addition to medication and periodic reviews, individual or group therapies and rehabilitation programs may be developed and implemented in prison settings. Some behavioral interventions appear promising.

Specialized housing and inpatient care

Meeting the needs of inmates with mental illnesses over long periods of time requires a full array of housing options, including inpatient care, short-term crisis beds, long-term residential treatment units, and general population housing. Inpatient care is a necessary component of treatment, but does not necessarily have to be provided within the facility. Prisons, however, must have the capacity to access such care.

Other residential alternatives can dramatically reduce the need for inpatient beds. These units do not necessarily require 24-hour medical supervision and are a cost-effective alternative to inpatient care. Acute crisis beds may be available to provide short-term relief short of inpatient hospitalization. Inmates with mental illnesses often have difficulty adjusting to and managing the stresses of prison life and are often vulnerable to abuses by other inmates and staff. Long-term residential treatment units can provide a safe and therapeutic environment in which to live. These units may be permanent or transitional.

Discharge planning

Discharge planning is more complicated in prisons than in jails. First, prisons are often located far from the inmate's home community. Further, formal or informal relationships are rarely developed between State prison staff and local providers. A prison-based case manager can do little to facilitate continuity of care on the inmate's release. In the case of a release to parole, communication between corrections departments may allow for prerelease planning and the possibility of requiring mental health treatment as a condition of release.

Community Corrections

Community corrections is a generic term used to describe the authorities responsible for supervising offenders serving a community sentence and individuals released from detention while awaiting trial. These include traditional probation and parole departments, pretrial services, and alternatives to incarceration programs. According to the Community Corrections Division of the National Institute of Corrections, the primary intent of community corrections supervision in most U.S. jurisdictions has changed from rehabilitation to risk reduction through a community-based sanction.[8] The main goal is the protection of the community. With growing correctional populations and ever increasing costs of incarceration, community corrections alternatives, with their emphasis on "control, treatment, and services outside an institutional placement," are gaining popularity.[9]

Risk reduction functions by motivating offenders to refrain from criminal activities or, for those who cannot or will not refrain, removing the offender from the community. It is becoming clear that an emphasis on surveillance alone increases the probability of early detection of violations, but does not reduce criminal behavior or assist offender rehabilitation. If the goal of probation is risk management, programs that are designed to reduce criminal activity or increase community integration may offer long-term solutions by intervening before recidivism occurs.

Like jails and prisons, probation and parole departments have experienced explosive growth over the past decade. In 1995, 2,620,560 adults were under active probation supervision and 648,921 were under active parole supervision. The growing community corrections population includes increasing numbers of persons with special treatment needs. Although probation caseloads continue to grow, departmental expenditures have not kept pace.[10] With ever-greater reliance on community corrections to manage persons at risk, departments are required to provide quality services with fewer resources.

The management of persons with mental illnesses is particularly problematic for community corrections agencies. Unlike jails and prisons, community corrections incur no constitutional mandate to provide health care, including psychiatric services, to individuals under community supervision. Because community corrections agencies do not have 24-hour physical custody of the offender, they are not required to maintain an individual's health status. Community corrections agencies are not required to provide universal medical or psychiatric care or even access to these services. For persons with mental health treatment conditions, community corrections must only assure access to appropriate treatment and supervision of participation. If mental health treatment is not a condition of release, individuals receiving mental health services do so voluntarily. These persons should be able to access mental health resources in the same manner as any other community member.

The double stigma of being identified as both an offender and a recipient of mental health services (and commonly with comorbid substance abuse or dependence) creates real barriers in accessing services in the community. In this time of fiscal constraints and competition for scarce resources, offender services and services for persons with serious mental illnesses have a low priority. In addition, decreasing community resources, particularly the lack of 24-hour emergency mental health services, have increased the likelihood that persons with mental illnesses will come into contact with the criminal justice system.[11] Without an affirmative decision to make this group a priority, these individuals will continue to cycle through the criminal justice and public mental health systems.

Roles for mental health practitioners in community corrections

Because providing mental health services is not required, the involvement of mental health practitioners in community corrections is not clear or obvious. There are, however, several opportunities for community corrections to engage community-based mental health practitioners to assist them in accomplishing their goals. These fall into the general categories of assessment/evaluation, training, and treatment, and exist at the points of adjudication and probation intake, investigation, or supervision.

Adjudication and the courts

An important change in the interface between community corrections and mental health occurs in the administration of specialty courts. Over the past decade, mental health diversion programs and, more recently, mental health courts have been gaining in popularity. Many jurisdictions are using these programs to engage offenders in community-based mental health services instead of serving jail time. Whether the programs are for pretrial release or fully adjudicated cases, community corrections agencies often supervise these offenders and their participation in required services in the community. Court-based or program-based mental health professionals (including psychiatrists, psychologists, and psychiatric social workers) play an important role in assessing the status and needs of persons appropriate for specialty courts or diversion. These programs cannot function as intended without professionally trained staff to assist in screening and recommending services.

Training and education

Community mental health practitioners can provide an invaluable resource to community corrections departments through preservice and inservice training and education. Field officers who may supervise persons with mental illnesses on generic caseloads and officers who supervise mental health caseloads both need training. The intensity and detail of the training may differ depending on the officer's role in relation to persons with mental illnesses. A basic understanding of mental health issues and appropriate crisis management, as well as substance abuse and emergency medical treatment, should be included in preservice training, supplemented as needed by inservice training. Community corrections officers who supervise specialized caseloads of individuals with mental illnesses should have a greater knowledge base, including the symptoms of mental illnesses; uses and effects of common psychotropic medications; the range

of mental health services, their purposes, and goals; and most important, the availability of emergency and community-based mental health services and how to access them.

Cross-training is an important component in all settings where criminal justice and mental health professionals work together. For effective community supervision of persons with mental illnesses, community corrections staff and mental health providers must understand each other's roles.

Mental health treatment, rehabilitation, and support programs

Community corrections is first and foremost a corrections agency. Community corrections should continue to perform its traditional duties without expanding its responsibilities to include treatment. Mental health treatment providers are experts in their fields and should be fully utilized by community corrections departments. Accomplishing the overall goal of community integration and long-term success of persons with mental illnesses requires community corrections department involvement in partnerships with community mental health, substance abuse, and other human services agencies. Creative collaboration can accomplish the goals of all systems.

Most community corrections departments provide access to mental health treatment on an as-needed basis. Community corrections departments or individual officers broker services as the need arises. In this case, the department will identify all necessary services and negotiate access for specific individuals. Given the small percentage of persons with mental health treatment conditions under community supervision, many departments believe that arranging for services for individuals as needed accomplishes the community corrections department's short-term goals of meeting the court's supervision requirements in the most flexible, cost-effective manner. This ad hoc brokering approach may be the best strategy in small communities, where familiarity with the offender and informal interagency relationships are the norm. In larger communities, however, this approach to access to services is time consuming, labor intensive, and may create service redundancies.

Some community corrections agencies have developed standing contracts with community providers. These working agreements support the activities of both systems and the clients they jointly serve. Community agencies that work with individuals serving community sentences are more likely to be familiar with corrections practices and more receptive to involuntary clients. Such arrangements may also allow community corrections officers to intervene at the mental health service provider site when emergencies involve persons under their supervision.

Some of the most comprehensive and promising programs for individuals with mental illnesses are jointly sponsored and developed by community mental health agencies and community corrections departments. Departments that have developed surveillance and revocation practices in conjunction with appropriate, integrated mental health services that individuals are willing to use have had good results. Joint ventures acknowledge that the community corrections department is not the best agency to determine the clinical and support needs of persons with mental illnesses. Typically, collaborative efforts between community corrections and community mental health agencies use one of two strategies: (1) single-point access to services; or (2) holistic programs with colocation of services.

Single-point access to community-based services. This approach involves the joint development of community corrections–mental health case management programs, particularly Intensive Case Management (ICM) or Assertive Community Treatment (ACT) programs. The core ideas within both of these service approaches are: (1) client centered, (2) continuity of care, (3) comprehensive services, (4) 24-hour, 7-day availability, (5) small caseloads, (6) and service delivered in natural environments. ICM models may use one case manager or a team of case managers. ICM programs typically provide support for many domains of living, including

mental health, substance abuse, housing, money management, and other support services. Intensive case managers may also provide counseling and training in daily living activities. ICM funding and the intensity of the services are flexible. Such programs appear to be effective in reducing the inappropriate use of psychiatric services and the number of days spent in hospitals and jails by some of the most difficult to serve individuals.

ACT models share many of the same core components as ICM models. The distinguishing feature of ACT models is the use of interdisciplinary teams of clinical and support staff. Teams typically include psychiatrists, registered nurses, psychiatric social workers, and other paraprofessional case workers. Each team is able to provide "generic mental health services, psychiatric evaluations, crisis intervention, individual therapy, group therapy, medication administration/monitoring, assistance with activities of daily living, budgeting, and full case management services."[12]

These models have had a great deal of success, reducing both hospital admissions and average number of inpatient days among persons with mental illnesses in the community.[13] Applied to criminal justice populations, several studies have found that ICM programs reduce the risk of violence in the community, including fewer average days in jail, fewer arrests, and reduced incidence of harmful behavior.[14]

Collaborative colocation of services. It is often difficult for persons with mental illnesses to negotiate one, much less multiple, service systems. In response, some innovative programs for persons with mental illnesses use day reporting/day treatment centers that combine community corrections monitoring with comprehensive mental health services. In addition to core clinic and case management services, these programs often provide money management, housing, assistance with gaining other needed supports, education and job training, and close monitoring through daily reporting.

Both single-point access and comprehensive colocation of services appear to be effective strategies in managing persons with mental illnesses who are serving community sentences. These programs reduce the duplication of services (particularly case management services), increase information flow, and have superior client outcomes, while reducing recidivism and attending to the individual's reintegration into his or her community.

Notes

1. *Estelle* v. *Gamble*, 429 U.S. 97 (1976).

2. *Bowring* v. *Godwin*, 551 F.2d 44 (4th Cir 1977).

3. *Langley* v. *Coughlin*, 888 F.2d 252 (2d Cir. 1989).

4. Cohen, F., and J. Dvoskin, "Inmates with Mental Disorders: A Guide to Law and Practice," *Mental and Physical Disability Law Reporter* 16(3–4)(1992): 39–46, 462–470.

5. Steadman, H.J., and B.M. Veysey, *Providing Services for Jail Inmates With Mental Disorders*, Research in Brief, Washington, DC: U.S. Department of Justice, National Institute of Justice, 1997, NCJ 162207.

6. Ibid.

7. Manderscheid, R.W., and M.A. Sonnenschein, eds., *Mental Health, United States, 1992,* Rockville, MD: U.S. Department of Health and Human Services, 1992, DHHS (SMA) 92–142.

8. Barajas, E., Jr., B.J. Nidorf, and R.P. Stroker, "Reinventing Community Corrections," in *Topics in Community Corrections,* Longmont, CO: U.S. Department of Justice, National Institute of Corrections, Summer 1993.

9. Ibid.

10. Byrne, J.M., A.J. Lurigio, and C. Baird, "The Effectiveness of the New Intensive Supervision Programs," *Research in Corrections* 2(2)(1989): 1–49; Jacobs, J.B., *Inside Prisons: Crime File Series Study Guide,* Washington, DC: U.S. Department of Justice, National Institute of Justice, 1986, NCJ 100743.

11. Veysey, B.M., and H.J. Steadman, *Double Jeopardy: Persons With Mental Illnesses in the Criminal Justice System,* report to Congress, Washington, DC: Center for Mental Health Services, 1995.

12. Plum, T.B., and S. Lawther, "How Michigan Established a Highly Effective Statewide Community-Based Program for Persons With Serious and Persistent Mental Illness," *Outlook* (July–August–September 1992): 2–5.

13. Ibid.

14. See Dvoskin, J.A., and H.J. Steadman, "Using Intensive Case Management to Reduce Violence by Mentally Ill Persons in the Community," *Hospital and Community Psychiatry* 45(7)(1994): 679–684 for a review of the New York, Texas, and British Columbia studies.

Communicable Diseases in Inmates: Public Health Opportunities

Jonathan Shuter, M.D.

Overview

At midyear 1997, more than 1.7 million people, or 1 of every 155 U.S. residents, were in either jail or prison. At yearend 1997, 1 of every 117 males and 1 of every 1,852 females in this country were sentenced prisoners under State or Federal criminal jurisdiction.[1] Fifteen million arrests are made annually,[2] and more than 10 million individuals are released from detention each year. Approximately two-thirds of incarcerated individuals are in State and Federal facilities, and the remaining one-third are in local, generally short-term-stay jails.[3] Any discussion of the public health implications of prisoners in this country must pay heed to these statistics. The incarcerated community cannot and must not be considered a small, separate population with minimal relevance to the outside community. People who are currently in the criminal justice system, those who have been in the past, and those who are destined to be in the future comprise a large segment of the overall population of this country, particularly in the urban centers. Furthermore, the view that physical separation limits the health threat of prisoners to the outside community is a dangerous misconception. The number of inmates released into the community annually[4] should dispel this myth, as should the average length of stay in local jails, which is often on the order of several days to several weeks. In a worst-case view these facilities can serve as places where arrestees go, acquire and/or transmit infection, and are quickly released to further spread their infection in the outside community.[5]

Although public sentiment in an era of more restricted health care may resist the idea of expanding the scope and intensity of medical services in correctional facilities, the public health community in this Nation resoundingly endorses the aggressive diagnosis and treatment of prisoners as a critical, cost-effective measure to improve health both inside and outside the facilities.[6] The period of incarceration is a crucial window of opportunity for health care interventions because prisoners often have little other interaction with the health care establishment. The correctional facility offers the additional benefit of access to this population at a time when the prisoners' thinking is not clouded by active drug use or pressing survival concerns such as the need for housing or food. The incarcerated men and women of this country suffer from staggering rates of communicable diseases. This review will concentrate on syphilis, gonorrhea, chlamydia, trichomoniasis, human immunodeficiency virus (HIV), tuberculosis, and hepatitis B and C. Some of these diseases are life threatening, some are short-lived, easily curable infections, and some are completely asymptomatic. One feature that all of these conditions have in common is their tremendous public health impact, whether it be the massive suffering and costs associated with HIV infection; the pelvic inflammatory disease (PID), infertility, and ectopic pregnancies caused by gonorrhea and chlamydia; or the cirrhosis and hepatocellular carcinoma caused by viral hepatitis. Another common feature of all of these infections is the ability of a small core group of individuals possessing specific sociodemographic and/or physiologic characteristics to exert a disproportionate force in the spread of illness through communities.

Theoretic Model

This review's goal is not to present a detailed mathematical model of disease transmission through a community. Sophisticated models exist that attempt to define the dynamics of

communicable diseases within given populations, and the development of such models have been the subjects of many articles and texts.[7] However, an understanding of certain parameters that govern the spread of infections through a population is vital to the selection of appropriate interventions to halt the spread. The starting point for most of the mathematical models is the formula, $R_0 = \beta D c$, where the terms of the equation are defined as follows:[8]

- R_0 is the reproductive rate of the infection, and is defined as the mean number of secondary cases of infection generated by a primary case in a susceptible population. It is a fundamental principle of these models that a disease can only survive over time in society when $R_0 > 1$. In other words, a disease for which an average of less than one secondary case is generated from each primary case will disappear over time within the population.

- β is the probability of transmission of disease from an index case to a new contact. There are many sociobiologic parameters that may influence this variable, such as immunity against the pathogen, cofactors of disease transmission, host susceptibility to infection, preventive measures designed to interrupt transmission, etc.

- D is the duration of infectiousness. Factors such as the natural history of the disease, the immune status of the infected individual, timeliness of diagnosis (which depends, in turn, on access to care and level of symptoms) and treatment (if the disease is treatable), and mortality rate of infected persons determine the value of this variable.

- *c* is the appropriately averaged number of new contacts per unit time. As discussed later, there are situations in which the relationship of *c* to R_0 are not linear but exponential.[9] Furthermore, for diseases that are vaccine preventable, *c* may be modulated downward by protective immunity, and may better be defined as the appropriately averaged number of *susceptible* new contacts per unit time.

A related concept that is crucial to understanding the epidemiology of the infections to be discussed is that the influence on disease transmission through a community is not evenly distributed among all infected individuals. An HIV-infected, former injection drug user (IDU) who is in a strictly monogamous relationship and uses an effective means of birth control is unlikely to infect more than one person with HIV and is of lesser public health import than an active IDU supporting his or her habit through prostitution. The concept of a "core group" of highly sexually active "supertransmitters" of disease is widely accepted. The dramatic impact and cost-effectiveness of programs aimed at removing individuals from the core group have been well validated in mathematical models and in real-world studies.[10]

This review will discuss the epidemiology and public health implications of specific disease states in the incarcerated population.

Nonviral Sexually Transmitted Diseases

Epidemiology

Syphilis. Of the nonviral sexually transmitted diseases (STDs), syphilis has received the most attention for a variety of reasons:

- Of the nonviral STDs, syphilis is most closely associated with HIV acquisition and transmission.[11]

- The long-term sequelae of inadequately treated or untreated syphilis are more feared than those of other STDs.

- Of the nonviral sexually transmitted pathogens, the vertical transmission of *Treponema pallidum* is associated with the most serious outcomes.

- The characteristics of diagnostic tests for syphilis lend themselves to rapid screening and treatment that are ideal for the correctional setting.

In a landmark study of STDs in correctional facilities published by Hammett et al.,[12] a review of syphilis serologies in 23 different correctional systems employing routine screening of all inmates (who did not refuse testing) throughout the Nation revealed a prevalence of seropositivity of 4.0 percent in a population of more than 200,000 inmates incarcerated in 1993 and 1994. Rates among females tested were more than triple the rates among males (9.9 versus 2.9 percent, $P<0.001$). Rates were highest in the Northeast, Middle Atlantic, and South. A recent unpublished report by the same author estimates that in 1997, there were almost 78,000 prison and jail inmates and almost 558,000 releasees with syphilis infection.[13] In Chicago, cases diagnosed in Cook County Jail accounted for 22 percent of all newly diagnosed cases in the city in 1996.[14] Similarly, the Rhode Island prison system housed 39 percent of the individuals newly diagnosed with syphilis in that State between 1989 and 1993.[15] Female inmates in the New York City jail system, who have particularly high rates of many STDs, had a prevalence of syphilis requiring treatment of 26 percent in a sample of 727 new admissions in 1993,[16] and the prevalence in a sample of newly incarcerated pregnant women was 19 percent in the same facility in 1996.[17]

The public health potential of interventions to reduce the burden of syphilitic infection in the incarcerated population of this country is great. In many large cities, control of syphilis in the correctional system is a crucial component of citywide control, since the jails and prisons may house a sizable fraction of all city cases. In this sense, delivery of prompt and responsible diagnostic testing and treatment to inmates is similar to providing these services in municipal STD clinics. The concentration of syphilis among inner-city crack-addicted minority women, who often trade sex for drugs or money, has received much attention in recent years.[18] Failure to treat these women properly has been associated with a rise in congenital syphilis cases in New York,[19] and newly instituted initiatives to improve treatment have resulted in a decline in numbers of infants requiring treatment for congenital syphilis.[20] Although crack-addicted prostitutes are a difficult patient population to deliver ongoing medical care to, interventions aimed at changing the risk behaviors of prostitutes have reduced rates of STDs and HIV transmission in other countries.[21]

In response to the reemergence of syphilis, including congenital syphilis, as an urban scourge with a predilection for drug-addicted, minority women, New York City and Chicago initiated innovative programs to better diagnose and treat syphilis in incarcerated females. Both cities instituted a computer link between the correctional system and the city department of health syphilis registry, and performed the Stat rapid plasma reagin (RPR) test on all female admissions to the system. The Stat RPR test yields results within 15 minutes, a characteristic that is crucial in correctional systems where mean lengths of stay are on the order of days. New arrestees were generally kept in the admission area until the test results were available and were offered treatment according to Centers for Disease Control and Prevention (CDC) recommendations before being housed. In the Chicago jail system, women who were seropositive for syphilis and required treatment were twice as likely to receive treatment before release than women who were diagnosed using conventional testing with its attendant 3- to 5-day delay in treatment.[22] A similar program in New York City also led to substantial increases in rates of women receiving therapy (as compared to historical controls), and was accomplished with a startup cost of $8,300 and a per test cost (including quality controls but excluding labor costs) of $0.25.[23]

Despite the availability of fairly inexpensive diagnostic and treatment modalities, and the broad support of the medical and public health community for aggressive screening and treatment of syphilis in the correctional setting, the existing state of affairs is extremely disappointing. In a CDC survey of city and county jails throughout the country, less than one-half (46–47 percent) offered routine screening for syphilis as a matter of policy.[24] Facilities boasting the most aggressive screening policies actually screened less than one-half of arrestees (48

percent). Thus, on average, less than one-quarter of arrestees were tested for syphilis during their incarceration. In those jails offering testing only to patients with suggestive symptoms or signs, a dismal 2–7 percent of inmates were actually tested.

Gonorrhea. Although generally less prevalent than syphilis in the incarcerated population, gonorrhea is a significant pathogen among prisoners in this country, particularly in younger inmates. Like the other nonviral STDs, *Neisseria gonorrhea* is an important organism both by virtue of its own pathogenicity and because of the company it keeps. Gonorrhea is a disease with significant morbidity including painful urethritis; cervicitis; proctitis; epididymitis; pharyngitis; and, in its disseminated form, tenosynovitis, arthritis, and occasionally, endocarditis. It is often involved in the development of PID and can be transmitted vertically to the newborn causing ophthalmia neonatorum. It is one of the most easily transmitted of the sexually transmitted pathogens with the likelihood of male-to-female transmission of approximately 50–90 percent and the corresponding figure for female-to-male transmission of 20–80 percent.[25] Coinfection with *N. gonorrhea* facilitates the transmission of HIV,[26] and infection with *N. gonorrhea* may render an individual more susceptible to HIV infection.[27]

Several highly reliable testing methods are available for the diagnosis of gonorrhea. The gold standard of culture on Thayer-Martin medium is available through most institutional, governmental, and commercial microbiology laboratories. Although technically simple to perform, the test requires pelvic examination for females, urethral swabbing for males, and at least 24–48 hours of incubation time in the laboratory. Another widely used technique involves direct probing of clinical specimens for gonococcal genetic material. While this method obviates the need for incubation, it is not a rapid test in the sense of yielding results within minutes in the clinic setting. The genetic probe assays suffer from some loss of sensitivity when compared to culture, and they also require pelvic examination or urethral swabbing. A new generation of tests based on amplification of microbial genetic material via the ligase chain reaction (LCR) holds great promise for the future. They are highly sensitive and specific tests that can be performed on urine specimens.[28] At this time, however, the tests are slow and costly.

There is less information available about rates of gonorrhea in jails and prisons than about syphilis. Few correctional facilities incorporate routine screening for gonorrhea into standard practice. The study by Hammett and colleagues that collected information from correctional facilities in 11 States found that 2.5 percent of 80,825 inmates undergoing routine screening were infected with *N. gonorrhea.*[29] Gender-specific data in their survey revealed an overall prevalence of 3.3 percent among women and 2.0 percent among men ($P < 0.001$). In their review of 1997 data, Hammett, Harmon, and Rhodes estimated that almost 18,000 prisoners and almost 77,000 releasees were infected with gonorrhea, and female prevalence rates were 75 percent higher than male prevalence rates.[30] The disease is more common among adolescents, with prevalences as high as 18 percent among females and 5 percent among males.[31] In an unpublished study of universal gonorrhea screening in the Chicago jail system from 1995 that involved more than 81,000 facility admissions, 1.5 percent of men and 4.3 percent of women were infected.[32] In the New York City jail system, the prevalence of gonorrhea was 8 percent in new female arrestees in 1988.[33]

The potential utility of aggressive interventions to control gonorrhea rates has not been as well studied as it has for syphilis. Screening and treatment programs involving prostitutes in the Philippines in the 1960s and selective mass screening and treatment in Greenland during the same decade were effective in decreasing the prevalence of infection in these populations.[34] In the Philippines, the decreased rates among prostitutes resulted in a decreased incidence of gonorrhea in locally stationed U.S. military personnel. Both of these studies demonstrated a failure to sustain benefit after the programs were terminated.[35] It is likely that gonorrhea control

efforts would be more successful today with the availability of more effective oral treatments, less cumbersome diagnostic techniques, and the greater social acceptability of condom usage. The tremendous potential of mass screening and treatment programs to reduce rates of gonorrhea, particularly those aimed at core group members, has been hailed by public health authorities in the United States for more than 20 years.[36] The overall impact of such programs would be compounded greatly today by the reduction in HIV transmission effected by gonorrhea eradication.

Chlamydia. The appreciation of the importance of *Chlamydia trachomatis* as a sexually transmitted pathogen is a recent development when compared to the former two organisms. This, combined with the relatively cumbersome nature of chlamydia culture is responsible for the scarcity of information regarding the prevalence of the disease in prisoners. Like gonorrhea, it is associated with a range of disease presentations in men, women, and infants infected by vertical transmission. It is more likely than gonorrhea to cause asymptomatic or paucisymptomatic infections,[37] and the duration of carriage in untreated patients is longer than that for *N. gonorrhea*. It also has been implicated as a cofactor in the transmission and acquisition of HIV.[38]

Clinicians may diagnose chlamydia through a variety of techniques. The gold standard is McCoy cell culture of a cervical or urethral swab, which is a costly and time-consuming tissue culture procedure. Tests that probe clinical specimens for chlamydial genetic material also are available, either alone or in combination kits with probes that react with *N. gonorrhea.* These tests are highly specific but their sensitivity is variable. While more convenient than tissue culture for the clinical laboratory, these are not rapid tests and they are fairly expensive. Finally, LCR tests can be performed on urine samples, but this promising technique suffers from the same shortcomings in diagnosing chlamydia as it does for the diagnosis of gonorrhea.[39] Because the organism is relatively difficult to isolate for definitive diagnosis and because untreated chlamydial infection may be quite destructive without causing symptoms, public health agencies have endorsed the use of empiric therapy in certain highly selected populations. Because patients with gonorrhea have a high rate of coinfection with chlamydia, gonorrhea patients are generally treated for both diseases.[40] Patients with nongonococcal urethritis are generally treated for chlamydia, and many correctional facilities treat men with leukocyte esterase activity on urinalysis for gonorrhea and chlamydia.[41] Finally, patients with PID and patients seeking assistance for infertility are generally treated for chlamydia because of the pathogen's frequent involvement in these conditions.

The review of Hammett and colleagues found a prevalence of 2.6 percent among women and 3.3 percent among men (2,379 women in four States were studied, and only 30 men) in facilities that screened routinely for chlamydia.[42] Hammett's unpublished report incorporating data from 1997 estimated that almost 43,000 inmates and almost 186,000 releasees had chlamydia infection during that year.[43] The diagnostic methodology was not described. One study in the New York City jail system found a 27 percent prevalence of active chlamydia infection among adult women admitted to the facility in 1988.[44] The authors of this study concluded that rates such as these may justify a program of empiric treatment for all women admitted to the facility. A troubling finding has been the high prevalence of chlamydia found in adolescent prisoners. Male adolescents arrested in Georgia had a 6.9 percent prevalence of chlamydia infection on admission,[45] and infection rates as high as 30 percent in female adolescents admitted to prison have been reported.[46]

The public health objectives of chlamydia control programs are twofold: reducing the incidence of PID and reducing HIV transmission/acquisition. Although neither of these two outcomes has been studied specifically in an incarcerated population or among prostitutes, a large-scale study of selective mass chlamydia screening and treatment was conducted in Washington State between 1990

and 1992. Women who admitted to a risk behavior associated with chlamydia infection were randomly assigned to a screening program or usual care. Those women who were assigned to the screening group were more likely to receive treatment and significantly less likely to develop PID during the specified followup period.[47] Such programs are justifiable not only in terms of reductions in personal suffering but also in terms of cost savings.[48] Although STD control programs have been effective in reducing rates of HIV transmission, the specific contribution of chlamydia control to these effects has not been studied.

Trichomoniasis. *Trichomonas vaginalis* is a pathogen that causes vaginitis, cervicitis, urethritis (in both sexes), and dyspareunia and is associated with poor pregnancy outcomes and vertical infection of newborns. It is also a cofactor in HIV transmission/acquisition,[49] and may be a cofactor in the development of PID.[50] Until recently, direct culture of the organism was not widely available in clinical laboratories. Therefore, the epidemiology of trichomoniasis in various populations has relied on relatively insensitive tests such as Pap smears and direct microscopy of cervical wet preps. The few data that exist on prevalence of trichomoniasis in incarcerated populations suggest that it may be the most common of all the nonviral STDs[51] and the availability of simple, reliable, inexpensive culture kits for the testing of cervical/vaginal swabs in females and centrifuged urine specimens in males will allow better definition of the epidemiology of this infection in correctional facilities in the future.

Three studies in the Northeast have demonstrated astoundingly high rates of trichomoniasis among female inmates. A sample of female detainees in the Rhode Island correctional system between 1987 and 1992 revealed a rate of trichomoniasis on Pap smear of 43 percent.[52] In an unpublished study of new female admissions to a large New York City jail in 1991, direct culture was positive for *T. vaginalis* in 47 percent.[53] In a more recent study conducted in the same facility, newly arrested pregnant women had an identical prevalence of 47 percent on direct culture using the newly available InPouch TV culture system.[54] In the latter two studies, all women were also screened for syphilis, gonorrhea, and chlamydia, and the prevalence of trichomoniasis exceeded the prevalences of all of these other STDs combined. The prevalence of trichomoniasis in male inmates has not been studied, but the medical community has recently begun to appreciate the importance of *T. vaginalis* as a cause of nongonococcal urethritis in men.[55]

No formal studies have been done of the public health benefit of screening and treatment interventions for trichomoniasis in incarcerated populations. A recently published editorial supports instituting routine screening for this extraordinarily common pathogen in correctional facilities.[56] In groups of individuals with prevalences of trichomoniasis approaching one-half of the overall population, it would also be reasonable to explore the role of presumptive therapy of the disease.

Potential interventions

The aforementioned statistics make a persuasive case that the Nation's jails and prisons are crucial targets for establishing better STD control in the community. Although the public health community applauds the concept of better directing STD control programs toward prisoners, the most recent report of the United States Public Health Service has shown existing programs to be woefully inadequate.[57] Although not all prisoners belong to the STD core group that must be a primary target of any sensible STD control policy, jails and prisons house a population among whom core group members are grossly overrepresented. Many of these individuals are relatively or completely asymptomatic and do not obtain routine medical care in the outside community. STD-reduction programs should focus on the elements of the mathematical model described above: reducing the likelihood of disease transmission per contact (β), reducing the duration of infectivity (D), and reducing the mean number of new contacts per unit of time (c).

Reducing the likelihood of transmission per contact. The ultimate method of reducing the likelihood of transmission of an STD per contact is by curing the STD, but treatment/cure is subsumed under variable D in the model. The variable β, in the present discussion, assumes that the individual is still actively infected (i.e., screening/treatment programs have failed to cure the patient) or the patient has become reinfected. The best method available to reduce the likelihood of transmission per sexual contact is the use of barrier protection with male and/or female condoms. There is no question that the consistent use of barrier protection reduces the rate of transmission of the nonviral STDs as well as HIV.[58] Even inconsistent use of condoms affords some level of protection. The great challenge is to make condoms socially acceptable, and to empower individuals, particularly women, to insist on their consistent use with all sexual partners. While such ideas are simple in theory, in reality the issue of insistence on condom usage is complicated by a multitude of behavioral and social factors including embarrassment, fear of loss of relationship, and fear of emotional or physical victimization.[59] Notwithstanding these issues, harm-reduction programs stressing education and behavior modification have been effective in increasing condom usage in inner-city populations.[60] These efforts are aided by greater societal acceptance of condoms as a consequence of public health statements, media awareness, and advertisements. Obviously, the cost of condoms must not be prohibitive, and ideally they should be available to these target populations free of charge.

Behavior-modification and harm-reduction research has consistently observed that multiple-session educational interventions are far more effective at curbing risk behaviors than single-session interventions.[61] The ideal approach to reducing β would include multiple culturally appropriate educational sessions led by peer counselors who teach the many dangers of unsafe sexual practices, the importance and proper use of barrier protection, and empowerment techniques to encourage safer sexual practices even under adverse social circumstances. Interventions begun in correctional facilities would be linked to harm-reduction programs in the outside community; would incorporate drug rehabilitation; and would address housing needs, job training, and ongoing medical concerns.[62] Such programs, while expensive, would offer the hope of controlling multiple factors that drive STD transmission in a community. Simultaneous reductions in risk of transmission, rate of partner exchange, and duration of infectivity would have a multiplicative effect in reducing the reproductive force of these infections in the population.

Reducing the duration of infectiousness. Significant reductions in duration of infectiousness are the most readily achievable of all the goals described. Any effort at reducing duration of infectivity in the inmate population must rest upon timely screening and prompt treatment. Screening and treatment programs in correctional facilities should be coordinated closely with local health departments for the purposes of oversight, contact tracing, reporting, and recordkeeping. The following screening and treatment methods are proposed for the specified nonviral STDs.

Syphilis. There is persuasive evidence that correctional facilities, at least in major cities, house a substantial fraction of all syphilis cases in their regions. There is also evidence that rapid screening and treatment can be accomplished inexpensively in the jail and prison settings, and that these programs dramatically increase rates of appropriate treatment delivery.[63] Finally, evidence suggests that a pilot program of this sort has reduced the overall syphilis burden in at least one major urban center.[64] For all these reasons, a Stat RPR test (or its functional equivalent) should be performed on all new admissions to jails and prisons in the Nation and inmates should remain in the clinical area until results are available so that immediate treatment according to CDC guidelines can be administered. These efforts should be closely coordinated with the local public health agencies. All inmates found to be seropositive for syphilis should be referred for immediate HIV testing (unless they are already known to be HIV infected) and for intensive harm-reduction training. Routine screening may

be discontinued in facilities or regions where the prevalence of syphilis is so low that it is not a significant public health concern. In areas where screening is discontinued, syphilis prevalence should be measured periodically in order to detect increases.

Gonorrhea. Every correctional facility in the country should establish the baseline rate of gonorrhea in new arrestees. Direct culture, genetic probe assays, or LCR may be used as diagnostic modalities. The latter test, while costly, has the advantage of higher acceptance rates, particularly among males, because urethral swabbing is not necessary. Males who refuse these tests should be screened for urine leukocyte esterase activity. All inmates diagnosed with gonorrhea (including males who are urine leukocyte esterase positive) should receive single-dose oral therapy for the infection according to CDC guidelines and should be referred for immediate HIV testing and intensive harm-reduction training. Correctional facilities with very low rates of gonorrhea may elect to restrict screening to high-risk groups such as adolescents and prostitutes, as well as inmates with symptoms or signs suggestive of gonorrhea. Communities with low prevalences of gonorrhea should institute routine screening in correctional facilities when significant increases in incidence are detected in the community or during periodic screening in the local jails or prisons. All other facilities should institute the practice of routine screening of new admissions. Testing and treatment should be offered in the most expeditious manner possible.

Chlamydia. The morbidity and societal costs associated with chlamydial disease in terms of acute symptomatic infection, PID, ectopic pregnancy, infertility, and amplified HIV transmission/acquisition are so great that broad screening of sexually active females is widely supported.[65] If such a measure is considered cost effective in the general community, it is certainly indicated in correctional facilities where rates are higher and core group members are over-represented. Every correctional facility in the Nation should screen new admissions for chlamydial infection. Until the LCR is adapted for economical, quick mass screening, women should be tested with one of the widely available genetic probe kits and males should be tested for leukocyte esterase activity in urine samples. Inmates testing positive for chlamydia infection should receive single-dose therapy with azithromycin and should be referred for intensive harm-reduction training and immediate HIV testing. These programs should be coordinated with the local public health authorities. Facilities in which the entire inmate population or identifiable subsegments thereof demonstrate chlamydia prevalence greater than 20 percent should consider empiric treatment without diagnostic screening of these groups immediately upon admission.

Trichomoniasis. The medical community is just beginning to understand the importance of *T. vaginalis* in prisoners. The few studies available suggest that it is the most prevalent of the non-viral STDs in females.[66] Its prevalence in male inmates remains undefined. Correctional facilities throughout the country should conduct studies to define the prevalence of trichomoniasis in their locales using inexpensive culture kits such as the InPouch TV for testing cervicovaginal specimens in female inmates and centrifuged urine specimens in males. Inmates who are culture positive for *T. vaginalis* should receive single-dose therapy with metronidazole, and should be referred for immediate HIV testing and intensive harm-reduction training. For populations with very high rates of trichomoniasis, the advisability of empiric therapy without screening should be considered in a cost-benefit model.

Reducing the mean number of new contacts per unit of time. The rate of partner exchange may be the most important of the variables in the mathematical model. It is not simply an arithmetic mean of new partners per unit of time across the community, but also incorporates a measure of variance that is related to *c* exponentially. Community members who have a substantially higher rate of partner exchange than the remainder of the community affect the reproductive force (R_0) of

STDs exponentially and produce an effect that is far out of proportion to their numbers.[67]

For the purpose of the present discussion, it would be best to divide nonmonogamous inmates into two groups, those who trade sex as a commodity for drugs or money (i.e., prostitutes) and those who do not. There is evidence that educational interventions that heighten awareness regarding the dangers of having sexual contact with numerous partners may be effective in inner-city populations.[68] Culturally appropriate messages delivered by respected personalities and peers are the most likely to be effective.[69] Even among nonprostitutes, efforts to encourage moderation in the use of alcohol and other drugs should go hand-in-hand with discussions of sexual practices. As with all attempts at behavior modification, ongoing reinforcement of the message through media campaigns, ongoing group sessions, and advertisements are the most likely to have a lasting impact. For inmates who rely on sex as
a means of income, the problem is more complicated. The complex and tragic interplay of drug use, prostitution, nonviral STDs, and HIV in inner-city minority women is well established.[70] Efforts to control these processes must hinge on drug rehabilitation programs, and correctional facilities are a reasonable target for resources committed to these pursuits.

Furthermore, society should not give up on those individuals who continue to engage in prostitution and drug use. Legal and educational interventions have been highly effective in reducing rates of STDs and HIV among prostitutes and their clients and have proven successful in active IDUs.[71] Harm-reduction programs in correctional facilities should teach inmates who are active drug users and prostitutes how to mitigate the health risks that are inherent in their practices. Limitations on the practice of prostitution through mass educational and legal interventions aimed at prostitutes and their clients also play an important role in reducing rates of partner exchange.

Human Immunodeficiency Virus

Epidemiology

HIV, the pathogen that causes acquired immunodeficiency syndrome (AIDS), is responsible for perhaps the most significant epidemic of our era. From the time that the virus first penetrated urban communities in the late 1970s it has caused an epidemic in continuous evolution. Beginning in the early 1980s, when AIDS was first described by the medical community, it involved primarily men who had sex with men.[72] Almost from the outset, the involvement of IDUs and their heterosexual partners in the epidemic was recognized.[73] The two decades of the epidemic have witnessed some of modern medicine's greatest victories and its most abysmal failures. In the United States as a whole, AIDS is becoming an endemic rather than an epidemic disease,[74] and antiretroviral therapy allows infected patients to live longer and better with a new-found hope of prolonged survival.[75] Mortality rates from AIDS have dropped dramatically.[76] At the same time, HIV infection is decimating the populations of many third world countries that lack the resources to treat the afflicted. There are also populations within this country that are being ravaged even as the overall effect levels off in the Nation as a whole. In the early days of the epidemic, females constituted a very small fraction of those infected. In the 1990s, as the epidemic slowed in the male homosexual and bisexual population, an alarming trend of steadily increasing incidence among women was noted. AIDS case rates are increasing in women, particularly urban women belonging to ethnic minority groups, more rapidly than any other major demographic category.[77] The HIV epidemic in the United States today is being driven by IDUs and their sexual partners.[78] In certain neighborhoods of cities in this country cumulative AIDS case rates exceed 5 percent of the entire population and a great many more are infected with HIV but have not developed AIDS.[79] Persuasive evidence that in some, if not most, of the major urban epicenters of HIV in this country, the jails and prisons represent epicenters within epicenters.[80]

Data are available from U.S. correctional facilities in the 1990s to define the extent of HIV infection and AIDS within the inmate population. Many, probably most, inmates with HIV infection are not aware of their diagnosis and are relatively asymptomatic. Therefore, the most legitimate method for defining the prevalence of HIV infection in prisoners is blinded serologic testing or mandatory universal testing. Both of these methods have been employed in jurisdictions throughout the United States.[81] Inmates with AIDS, the advanced stage of HIV infection characterized by severe immune system dysfunction, come to the attention of public health agencies because AIDS is a reportable disease throughout the country. Although individuals with AIDS consume a larger share of health cost resources per capita and they have been at the center of legal and ethical controversies surrounding such issues as adequate treatment, segregation, quarantine, and compassionate release, they are probably a less significant threat to the public health than asymptomatic, undiagnosed, HIV-infected prisoners. As with all STDs, asymptomatic infectious individuals who remain undiagnosed comprise the segment of the core group that is most likely to infect numerous partners.[82] Studies investigating HIV seroprevalence provide the best reflection of this group in correctional facilities.

Facilitywide HIV seroprevalence studies. The review by Hammett and colleagues.[83] summarizes the findings of mandatory and blinded HIV testing from jails and prisons in 32 States from 1985 to 1994. Prevalences of HIV infection ranged from 0 to 25.6 percent (the latter among women in New York City). States with prevalences of HIV among prisoners exceeding 5 percent were New York, New Jersey, Massachusetts, Florida, and Illinois. Although HIV infection in the United States is a disease predominantly of men, in jails and prisons, particularly in the Northeast, rates among female inmates are higher. This observation is related to the high rate of drug use among female arrestees and the intersecting epidemics of crack use, syphilis, and HIV in urban minority women.[84]

Voluntary HIV testing studies. Testing for HIV in response to the inmate's request is the prevalent system for HIV testing in the Nation's correctional facilities. This system has advantages and disadvantages. The advantages are that it respects prisoner autonomy, it most closely resembles what occurs in the outside community, and results are useful to the individual patient (in contrast to blinded serosurveys) and may be useful in estimating overall facility prevalences. The disadvantages are that voluntary testing programs generally fail to test inmates who do not actively seek out testing, thus missing a sizable and important population. Furthermore, aggregate results of such programs may underestimate actual prevalences because individuals who are less likely to be infected are more likely to volunteer for testing.[85] Voluntary testing programs, which are the most common testing strategy in correctional facilities throughout the Nation, have been useful for individual HIV diagnoses, but have been a public health failure of the first order because the numbers of inmates availing themselves of the testing services have fallen far short of the ideal.

AIDS prevalence studies. In 1994, a survey of 47 State and Federal prison systems revealed 4,827 cases of AIDS among prisoners with institutional prevalences ranging from 0 to 2.4 percent.[86] By the end of that year, 4,588 individuals in the United States had died of AIDS while behind bars representing 2 percent of all AIDS-related deaths in the Nation. Inmates in the New York and New Jersey correctional systems bore the greatest brunt of this fatal epidemic. Hammett, Harmon, and Rhodes estimate that 8,900 prison and jail inmates had AIDS in 1997 representing 4 percent of those living with AIDS in the United States. Moreover, they estimate that 17 percent of those living with AIDS in this country passed through a correctional facility at some point during the year. According to their mathematical model there were three to four HIV-infected inmates without AIDS for every one with AIDS.[87]

Theoretic model

Although the forces that govern the spread of the nonviral STDs through a community—likelihood of transmission per contact (β), duration of infectivity (D), and average rate of new partner acquisition (*c*)—also apply to HIV infection, a number of sociological and physiological distinctions complicate efforts at HIV control in the community. Important sociological differences include the following:

- In most cases, testing for HIV requires an informed consent and counseling process that is unique among STDs.
- Information pertaining to individual HIV status requires a higher level of confidentiality than that for other STDs.
- HIV-infected individuals are subject to stigmatization and discrimination to an extent unrivaled by other STDs.
- Medications used to treat HIV infection are extremely expensive.
- The Nation's populace and Government recognize HIV as a problem of major importance.

Important physiologic differences include the following:

- HIV causes an incurable illness.
- The natural history of untreated HIV infection in most patients eventuates in death.
- HIV infection is transmitted not only sexually, but also by contact with infected blood, most commonly in the context of injection drug use.
- All effective treatments for HIV require lengthy, perhaps lifelong, medication administration.
- When antiretroviral medications (the medications used to control HIV infection) are used improperly, the virus has the capacity to develop resistance quickly. This resistance is genetically stable and can be transmitted to new cases throughout the community.[88]
- Because HIV is incurable, patients cannot move in and out of the infected pool of individuals within a community. They are either once and always infected or not yet infected.

These differences complicate the mathematical modeling of the epidemic in the community. Whereas β is easily reduced to zero for the nonviral STDs through the use of curative antimicrobial agents, it is not clear that β can ever be zero for an HIV-infected patient. Reliance, therefore, on partially effective means such as condom use, bleach disinfection of needles, treatment of transmission cofactors (such as other STDs), and antiretroviral treatment is necessary to modulate the likelihood of transmission downward. In marked contrast to the curable STDs, effective treatment of HIV has the paradoxical effect of increasing D by prolonging the life and thus the period of contagion of each infected individual. Similarly, *c* may increase with effective treatment as a result of an increased sense of well-being and a societal view that HIV is now a treatable illness. These harmful trends are likely outweighed by a probable decrease in communicability of infection from effectively treated patients.

The final physiological difference of HIV infection listed above deserves emphasis. With the curable STDs, individuals can move in and out of the infected and uninfected populations many times, whereas individuals from the HIV-uninfected population can enter the HIV-infected population but cannot exit it while still alive. From a strictly mathematical standpoint, one can counterbalance the effect of a single new gonorrhea infection in a prostitute by diagnosing and curing a case of gonorrhea in another prostitute. With HIV, however, there is no easy or inexpensive way of neutralizing the community health impact of new cases of infection. It is

clearly less expensive in terms of both human suffering and actual dollars to prevent new cases of HIV than to manage them effectively. This reality has led to public health policies that concentrate not only on infected individuals but also on the segment of the population that is not yet infected, especially those who are at increased risk.

Because the mathematical model employed in the section on the nonviral STDs is rendered cumbersome by the distinctive properties of the HIV epidemic, the ensuing discussion will be structured according to the four main categories of HIV control interventions and will comment on the merits and limitations of each within the correctional setting: (1) HIV testing services, (2) harm-reduction training, (3) treatment of HIV disease, and (4) diagnosis and treatment of other STDs.

HIV testing. HIV counseling and testing services are a major component of HIV control efforts in the Nation.[89] In theory, the advantages of broad or universal testing for this illness in prisoners are great. The wide use of an inexpensive and highly reliable test would identify those inmates infected with HIV, allowing them the best possible opportunity for early treatment and offering past, present, and future partners a chance at early diagnosis or avoidance of disease acquisition. Testing pregnant inmates would allow for early treatment of mothers while dramatically improving the outlook for their children.[90] Inmates testing negative for HIV antibodies could receive reassurance about their infection status together with aggressive harm-reduction counseling. Reality diverges markedly from this ideal scenario. Although most facilities offer HIV counseling and testing services,[91] they are generally staffed only to process the small number of prisoners requesting their services or referred by physicians for specific reasons. Attendance at testing sites is generally limited by the movement constraints that govern all activities within jails and prisons and by discrimination from staff and other prisoners who are aware of testing appointments. Prisoners considering testing may defer it for a variety of reasons including misunderstanding, lack of interest, inconvenience, fear of positive test results, breaches in confidentiality, and possible discrimination if diagnosed as HIV infected.[92] Although the effects of discrimination are difficult to define in a quantitative sense, inmates with HIV infection often suffer from discrimination at the hands of correctional officers and other inmates. Screening programs in correctional facilities, particularly jails, function at maximum efficiency when they are a part of the intake process[93] because inmates who are already housed may be occupied with their daily routines, legal proceedings, anticipated release dates, and family visits and may not wish to disrupt these activities with multihour excursions to counseling and testing sites. At Rikers Island, a jail with an organized, full-time staff of HIV counselors/testers, but without HIV testing services incorporated into the intake process, approximately two-thirds of the most crucial, high-risk populations (e.g., pregnant women, men who have sex with men) complete their incarceration without having had their HIV status determined.[94] It is likely that facilities that are less attuned to the problem of HIV perform even more poorly. Unless existing practices undergo a dramatic change, pregnant prisoners in the United States will fail to meet the Government's goal of 95 percent prenatal HIV testing for the year 2000[95] in a most dismal way. This tragedy is compounded by the reality that incarcerated pregnant women are arguably the segment of the population in greatest need of these diagnostic initiatives. On a more positive note, correctional facilities in Maryland and Wisconsin have achieved 47–83 percent testing rates for new inmates after incorporating a convenient counseling and testing session into the intake procedure.[96] These programs are a highly cost-effective means of preventing new HIV infections in the community, with one new case of HIV infection averted for every five cases newly diagnosed, according to CDC estimates.[97] Reductions in new infections may be even greater in settings such as jails and prisons where the core group of supertransmitters is overrepresented. Voluntary programs for prisoners should attempt to assuage the main concerns that lead to test refusal—fear of positive test results and lack of confidentiality—and should strive to correct the

common misperception that prior negative HIV test results, even those obtained more than 1 year previously, render repeat testing unnecessary.[98] These programs should not write off inmates who refuse an initial attempt at testing because the intake period is often a time characterized by anger, frustration, and drug and alcohol withdrawal. A number of studies in urban populations have demonstrated that individuals who refuse testing have a higher prevalence of HIV infection than those who accept it.[99] Ideally, screening programs should maintain logs of inmates who have refused testing and recontact them periodically during their incarceration. Prisoners who test HIV seropositive should be referred for comprehensive care of their illness. They should be screened for curable STDs and treated (as indicated), and they should receive harm-reduction counseling tailored to their infection status. The success of such efforts in curbing activities likely to result in HIV transmission has been documented in inner-city populations.[100] Inmates who test negative for HIV should also receive aggressive counseling as well as STD screening, because a troubling trend of increased high-risk behavior in subjects receiving knowledge of seronegativity has been observed.[101] Inmates who refuse testing should, of course, receive the same range of STD screening and harm-reduction counseling as those accepting testing. Within the context of the theoretic mathematical model, $R_0 = \beta D c$, aggressive HIV testing programs may directly reduce the level of infectiousness (β) by encouraging condom usage and safer needle habits and by referring patients for effective antiretroviral treatment. The duration of infectiousness, D, may be reduced by removing certain individuals from the infectious pool by ending needle sharing or through sexual abstinence. The average rate of new partner acquisition, *c*, could also be reduced as a result of effective harm-reduction counseling. Although antiretroviral treatment is a strategy limited to HIV-infected inmates, the rest of these benefits of effective HIV testing programs apply to both HIV-infected and HIV-uninfected prisoners.

Harm-reduction training. The health care community faces a daunting task in attempting to provide harm reduction training to inmates of HIV-positive, HIV-negative, and unknown status. The majority of correctional facilities in the United States offer educational material pertaining to HIV, ranging from printed information to videotapes to individual and group counseling sessions.[102] The need for and efficacy of such programs are much more difficult to define than for HIV treatment programs. There are, however, some instructive data available. Two separate studies assessing knowledge levels of prisoners utilizing a standardized questionnaire in facilities in Maryland and Pennsylvania found that the vast majority of participants knew that HIV may be transmitted by sharing needles or through sexual contact.[103] The knowledge level of prisoners equaled that of the general population. There were, however, misperceptions concerning the risk of contracting HIV through casual contact and the risk of acquiring HIV during the period of incarceration. The prisoners tended to exaggerate the magnitude of these risks. Since levels of drug- and sex-related risk behaviors prior to incarceration are very high, it is clear that a rudimentary knowledge of routes of HIV transmission is necessary but not sufficient for effective control of HIV risk behaviors in this population. Harm-reduction programs must attempt to reinforce preexisting awareness of routes of transmission and correct any misperceptions. Moreover, these interventions must surpass awareness-level programs and include risk-reduction skill building (emphasizing self-empowerment for females). They should consider the affective dimensions of risk-reduction behavior change.[104] Messages imparted by peer counselors and respected members of ethnic minority groups are particularly effective.[105] All programs must recognize that many inmates on release confront basic survival needs such as housing and food requirements, as well as the very powerful influence of addiction. Because of these many factors, it is clear that progress in harm reduction can occur only incrementally and it becomes obvious why single-encounter educational interventions have negligible influence. Although

few, if any, correctional facilities offer multi-session harm-reduction programs to large portions of their inmate populations, there is reason to believe that they could be effective. Community-based harm-reduction programs have been highly successful in reducing sex- and drug-related risk behaviors in indigent inner-city populations in this country including prostitutes and active, out-of-treatment IDUs.[106] Programs such as these can simultaneously influence multiple variables from the theoretical model defining transmission of HIV through the community. These simultaneous effects would be expected to reduce HIV transmission exponentially.

Treatment of HIV infection. Newer antiretroviral medications and combinations have revolutionized the treatment of HIV infection. When used properly these medications can reduce levels of virus in the bloodstream to undetectable levels, improve the quality of life, and prolong survival, perhaps indefinitely.[107] When used improperly, these complex regimens can promote the development of drug-resistant viral strains that can render the patient virtually untreatable and can doom those individuals infected by the patient with the mutated virus to an inexorable progression to AIDS and death.[108] Jail and prison health services have an ethical obligation to administer antiretroviral medications as they would in the outside community. According to current recommendations, the vast majority of HIV-infected individuals should receive combination antiretroviral therapy.[109] The proper use of antiretroviral medications is most likely achieved under the supervision of providers with expertise and experience in infectious diseases and HIV management.[110] Testing of T-lymphocyte subsets and plasma viral load levels must be available in order to assess the need for and response to therapy. Provisions must be made for continuing therapy without interruptions despite court appearances, intrafacility and interfacility transfers, punitive detentions, and release from incarceration. These arrangements require close coordination with the correctional administration and the health care community in the surrounding area. Without aggressive efforts to ensure followup, high rates of interruption of care are inevitable.[111] Little is known about inmate interest in such programs or the success of antiretroviral therapy prescribed behind bars. In 1995, when enthusiasm originated for combination antiretroviral therapy concurrent with the release of lamivudine, the number of inmates on Rikers Island in New York City receiving antiretroviral therapy quickly tripled and has remained at the higher level. Patients receiving such therapy on Rikers Island demonstrated a rise in CD4 lymphocyte counts almost identical to that reported in controlled trials, suggesting that compliance in the jail was satisfactory.[112] A study of antiretroviral therapy in 217 prisoners in the Connecticut correctional system in 1996 found that among the 101 prisoners who were offered antiretroviral therapy, 93 percent accepted and 84 percent of these inmates were compliant with greater than 80 percent of their doses.[113] The belief was prevalent, however, that antiretroviral medications were harmful if there were illicit drugs in one's system. Better antiretroviral acceptance was associated with nonblack race and trust in physicians, and better compliance was associated with male gender and less complex regimens. Both the New York City and Connecticut State correctional systems have experience and expertise in delivering care to HIV-infected inmates and both employ full-time infectious disease specialists to supervise HIV care. These data suggest that effective antiretroviral therapy can be administered in correctional facilities, and that successes achieved in systems where HIV prevalences are extremely high could probably be matched at lesser expense throughout the country. They also suggest that the correctional facility may be an important site for initiating antiretroviral therapy in this population and that HIV management strategies should be culturally appropriate for black prisoners, especially women, and should strive to employ the least complex medication regimens possible. Several lines of evidence suggest that effective antiretroviral therapy may decrease β, the likelihood of HIV transmission per contact. Reduced levels of HIV in seminal fluid parallel those in plasma in treated patients, suggesting that the exposure inoculum of contacts of treated individuals is lower than that of the untreated.[114] Studies of vertical transmission of HIV from mothers to newborns have shown a direct

correlation between maternal viral load and likelihood of transmission to the infant.[115] Finally, the likelihood of HIV acquisition by health care workers experiencing needlestick injuries is related to a number of parameters governing exposure inocula, including end-stage AIDS in the source patient, a status generally associated with a high viral load.[116] Administering effective antiretroviral therapy may produce a number of indirect benefits to the patients and their communities by fostering ongoing relationships with health care providers. Continued contact with well-organized HIV clinics allows the regular reinforcement of harm-reduction messages and allows for social-service interventions that address substance abuse, economic, and housing issues in a legal and responsible way. Less tangible benefits such as the development of a sense of autonomy and self-determination among clinic patients, participation in support groups, and access to the most up-to-date information and therapy are also important byproducts of a good HIV treatment program. These effects may translate into communitywide benefits by further reducing β as a result of safer sexual and drug habits, as well as decreasing c, the appropriately averaged number of new contacts per unit time, through the behavioral changes produced by harm-reduction education.

Diagnosis and treatment of nonviral STDs. The magnitude of the hidden epidemic[117] of the curable STDs in prisoners has been discussed in prior sections. As mentioned earlier, these diseases, especially syphilis, gonorrhea, chlamydia, and trichomoniasis, are important not only vis-a-vis their own morbidities, but also as cofactors in the transmission and acquisition of HIV.[118] Underdeveloped countries without resources to commit to other aspects of HIV control have achieved dramatic reductions in HIV rates by instituting aggressive diagnostic and treatment measures for these easily curable diseases.[119] The CDC has recently highlighted this strategy as a key component of HIV control in this country.[120] State correctional facilities are currently failing to capitalize on this important public health opportunity. Recommendations for better utilization of screening and treatment programs for the curable STDs are outlined in a prior section.

Potential Interventions

HIV testing. Correctional facilities should incorporate easy, convenient HIV testing into the intake procedure for all inmates who are not known to be HIV infected. Testing programs of this magnitude are accomplished efficiently and affordably in the U.S. military (approximately $2.50 per test),[121] attesting to their feasibility. Because pretest counseling sessions and drawing blood are labor intensive, larger facilities should consider innovative approaches such as videotape counseling sessions and fingerstick blood, urine, or oral samples as testing substrate. Logs of inmates who refuse testing on intake should be maintained and these inmates should be recontacted periodically during their incarceration. Efforts such as these should be particularly strenuous when they involve critically important populations such as pregnant women, prostitutes, active IDUs, and men who have sex with other men. Results of HIV tests should be confidential and should be available in a timely fashion. Facilities should coordinate with local health departments to ensure delivery of test results to inmates who have been released from incarceration prior to test completion.

Harm-reduction training. All correctional facilities should offer programs with content aimed at fostering harm-reduction skills including condom usage and safer injection practices. At a minimum this can be accomplished with culturally appropriate printed materials and videotapes. Programs likely to have greater impact utilizing a multisession format, peer counselors, and communications from respected members of the community should be focused on groups of inmates at highest risk of acquiring HIV infection or of transmitting it to others (e.g., inmates with active STDs, prostitutes, active IDUs). Innovative approaches such as programs to promote inmates to the status of peer counselors after satisfactory completion of curricula should be encouraged. Funding bodies should authorize studies of the

short- and long-term effects of aggressive versus "standard" harm-reduction interventions in correctional facilities to evaluate the economic feasibility of more widespread programs.

Treatment of HIV disease. Prisoners with HIV infection should receive comprehensive therapy for the illness. This must include access to standard diagnostic testing (including T-cell subsets and plasma viral load measurement) and all antiretroviral medications. Many regimens must be taken on a strict schedule and require dosing on an empty stomach or after a full meal. Some require free access to fluids. Facilities must demonstrate flexibility in their generally rigid meal schedules to accommodate the requirements of HIV-infected inmates. Furthermore, antiretroviral medications must not be subject to confiscation during searches. Studies have shown that the outcomes of HIV-infected patients are better when they are cared for by providers with expertise in managing HIV infection.[122] All facilities housing HIV-infected individuals should have access to consultation with an infectious-diseases or HIV specialist. Facilities with large numbers of HIV-infected inmates should arrange for such consultation onsite.

Diagnosis and treatment of the nonviral STDs. Recommendations may be found in an earlier section of this paper.

Tuberculosis

Overview

In contrast to other diseases discussed in this document, the problem of tuberculosis (TB) in correctional facilities has long been recognized by the medical establishment, is the subject of comprehensive guidelines by the major governmental health agencies,[123] and has been at the center of numerous court cases involving prisoners' rights.[124] Tuberculosis is unique among the diseases discussed in this paper in that it is transmitted via an airborne route. The destructive potential of a single inmate spreading disease in a poorly ventilated facility by coughing, sneezing, laughing, and talking is large. Similarly, the potential of highly contagious prisoners to transmit disease to numerous individuals in the community after release from incarceration is large, particularly if the postrelease destination is a congregate housing facility such as a homeless shelter, hospice, hospital, or crack house. A recent report that 35 percent of new TB cases in a large urban center in 1992 were attributable to one individual who infected others in a neighborhood bar starkly illustrates the need to control every single contagious case.[125]

The pathophysiology of TB is distinct enough from the other diseases to warrant a separate, detailed discussion. *Mycobacterium tuberculosis* is the organism that causes TB. When a patient with TB coughs or otherwise emits the organism into the air, it attains a form called a *droplet nucleus* that can remain airborne for many hours and is the proper size to reach deep into the airways and establish a new infection in an individual who inspires it. When this occurs, the organism has the opportunity to multiply in the lung and disseminate through the body unchecked for several weeks until a meaningful immune response develops and contains (but does not eliminate) the infection. This process is asymptomatic and generally results in the conversion of the TB skin test, also called the tuberculin test, Mantoux test, or purified protein derivative (ppd), from negative to positive. The medical term referring to this scenario is tuberculosis infection. Patients with TB infection are not contagious to others, but are at some risk of developing symptomatic, progressive disease referred to as active tuberculosis. Certain factors are associated with a high risk of progression from TB infection to active TB. These include recent infection with the organism (especially within the first 1–2 years), HIV infection or other forms of immunosuppression, diabetes, and a history of gastrectomy. Many studies have shown that a 6- to 12-month course of single-drug therapy with isoniazid dramatically reduces the risk of progression to active TB.[126] Such treatment is called tuberculosis preventive therapy. Although active TB can develop almost anywhere in the body, the most common site is the lung. Patients with active TB generally have symptoms and signs such as cough, sputum production, weight

loss, night sweats, and fever. At this stage of disease, most patients have a positive tuberculin test and an abnormal chest roentgenogram. Definitive diagnosis rests upon obtaining sputum (or other anatomic material if the site of disease is not the lung) for Kinyoun, fluorochrome, or acid fast bacilli (AFB) staining, Genprobe, and mycobacterial culture and susceptibility testing. Kinyoun, fluorochrome, or AFB staining are simple, rapid, inexpensive techniques that take advantage of properties of the *Mycobacterium tuberculosis* cell wall to detect the organism on direct microscopic examination of the sputum or other biologic material. A positive stain is very suspicious for active TB and generally mandates separation or isolation from other individuals as well as antituberculous therapy. Patients with enough organisms to detect on direct microscopic examination of the sputum are considered highly contagious. The diagnosis of TB cannot rest entirely on sputum smears, however, because occasional patients with positive smears have diseases other than active TB and many patients with active TB have negative smears. The Genprobe assay is a rapid, fairly expensive test, licensed for use on smear-positive specimens, that employs genetic means to verify that organisms detected on the Kinyoun, fluorochrome, or AFB stains are *Mycobacterium tuberculosis*. A negative Genprobe test on a positive smear specimen casts doubt on the diagnosis of active TB. This technology represents a significant advance by speeding the positive diagnosis of active TB from a period of weeks or months to a single day. Ultimately, the definitive diagnosis of active TB rests upon the growth of the organism in culture. Testing of the organism for resistance to antimicrobial agents is also accomplished through the culture technique. Although recent advances have made culture identification and resistance testing of the organism faster, these processes generally take at least several weeks to complete.

Tuberculosis control in a community is a complex matter and depends mainly on two strategies. First, and most important, is the rapid isolation and effective treatment until cure of all patients with active TB. The second goal is preventing the progression to active TB in individuals who have TB infection.

The isolation and treatment of all patients with active TB requires an organized, proactive, and thoughtful approach containing the following elements:

Screening. All new entrants into a community (whether a nation, hospital workforce, or correctional facility) should be screened for active TB. The least expensive system of screening consists of a review of symptoms and a tuberculin test. Individuals with positive findings on either test would undergo further screening. A more expensive approach that would be less apt to miss cases of active TB would require universal chest roentgenography of all new entrants. A middle ground between these two approaches is also possible (i.e., roentgenographic screening of all individuals in high-risk groups such as HIV-infected patients, immigrants from countries with high rates of active TB, or IDUs). Screening programs should not be limited to new entrants into communities. Long-term members of communities where TB is endemic or epidemic require similar screening tests on a periodic basis, generally every 6–12 months. Finally, more aggressive screening and treatment must be directed at individuals who have had close contact with a patient with active TB. Such screening is often referred to as contact investigation.

Isolation. Individuals with a constellation of findings upon screening that are suggestive of active TB must be promptly isolated until they are deemed noninfectious. Adequate isolation involves placing the patient into a solitary room with negative pressure and frequent air exchanges. Negative pressure refers to air pressure within the patient's room. It must be negative to the outside corridor to prevent the escape of airborne bacteria into common areas. Air exchanges refer to the movement of air out of the patient's room to the outside of the building (or to elsewhere in the building after the air has passed through a high-efficiency particulate air [HEPA] filter). Ultraviolet light may also be a useful adjunct in inactivating airborne *Mycobacterium tuberculosis*

in a variety of settings. Depending on the rate of TB in a particular facility, it may be necessary to maintain isolation rooms onsite, or it may be appropriate to transfer all patients requiring isolation to local hospitals. The duration of isolation is based on the clinical judgment of the patient's care providers, and timely release from isolation depends heavily on the turnaround time of sputum specimens submitted for microscopic examination.

Treatment. The vast majority of patients with active TB are curable with a 6- to 12-month course of medications. The obvious benefit to the patient of such treatment is complemented by the societal benefit of quickly rendering the patient noninfectious to others. The most important lesson learned from the TB resurgence of the late 1980s is the critical role that directly observed therapy plays in achieving acceptable rates of medication completion. Directly observed therapy requires that a trained observer watch the patient ingest each and every dose of medication prescribed until the course of treatment is completed. Large studies have demonstrated the dramatic success of directly observed therapy programs in several urban centers.[127] All patients with active TB should be encouraged to enroll in a directly observed therapy program, and in some settings it should be mandatory.

The second arm of TB control in a community, TB prevention in patients at risk, is in certain respects a lesser challenge and in certain respects greater. It is easier in that patients do not require expensive isolation rooms, extensive diagnostic testing, and complex treatment regimens. It is more difficult, however, in that TB preventive therapy is indicated for far more individuals, and often patients who are free of symptoms are reluctant to commit themselves to 6–12 months of therapy to mitigate a theoretic risk. The challenge, therefore, has been to foster a communitywide understanding of the importance of TB preventive therapy, and to encourage patient commitment to long-term medication compliance using such innovative approaches as voucher systems and directly observed preventive therapy.

Epidemiology

Tuberculosis has been recognized throughout the centuries as one of the most feared and destructive scourges known to mankind. Rates of TB have declined throughout most of this century as a result of better living and housing conditions and with the later advent of effective medical therapy. The United States began compiling national TB reporting statistics in 1953. After 32 consecutive years of declines, the incidence of TB rose in 1985. Although the reasons for this observation were multiple, the HIV epidemic in the United States was a main contributor to the upsurge.[128] Since 1992, when Federal funding of State and local TB control programs increased dramatically, the national incidence of TB has again fallen to historically low levels.[129]

Even as the Nation enjoyed declines in TB incidence between the 1950s and the early 1980s as a consequence of antimycobacterial pharmacotherapy and decreased urban squalor, high rates of TB in correctional facilities were recognized.[130] The association between residence in correctional facilities and TB is an old one. A study of 512 New York City inmates in the early 1900s found 15 (2.9 percent) to have active TB and noted, "The finding of cases of this kind in congested barrack rooms accentuates the necessity for a careful examination of all inmates."[131] The authors suggested that, as a routine, sputum "should be submitted to microscopic examination if there is cough with expectoration and the physical examination of the chest leads to suspicion that tuberculosis may be present."[132] The public health law of New York State in 1902, in discussing the housing requirements of juvenile delinquents, ordered that, "The beds in every dormitory in such institution shall be separated by a passageway of not less than 2 feet in width, and so arranged that under each the air shall freely circulate and there shall be adequate ventilation. . . . The physician of the institution shall immediately notify in writing the local board of health and the board of managers or directors of the institution of any violation of any provision of this section."[133] It is clear that the fundamental elements of screening, environmental control, and

public health agency involvement in TB control in correctional facilities have existed, at least in New York City, for the past century.

With the resurgence of TB in the mid-1980s came a recognition that jails and prisons were serving as hotbeds of TB transmission, leading to studies that have better defined the epidemiology of TB in correctional institutions. A large-scale survey in 1984 and 1985 of TB cases in 29 States found that the incidence of active TB in correctional facilities was 3.9 times greater (95 percent confidence intervals, 3.35–4.49) than the rate in the surrounding communities.[134] This disparity was observed in high-, medium-, and low-incidence States. In the New York State correctional system, the incidence of TB increased sevenfold between 1976 and 1986.[135] In 1994, 4.6 percent of the incident cases of TB nationally were diagnosed in the correctional setting.[136] In New York City, the national epicenter of TB, 3.5 percent of individuals diagnosed with TB were incarcerated at the time of or within 1 year before diagnosis.[137] In 1997, 768 inmates were treated for active TB, and 7.8 percent of inmates nationally were diagnosed with TB infection (tuberculin test positive).[138] Over the past decade, numerous outbreaks of TB have been reported in correctional facilities across the country.[139] The role of the correctional facility as a breeding ground for TB has been a familiar topic in the mainstream medical, public health, and lay press.[140]

One other important epidemiologic trend that deserves mention is the emergence of multi-drug-resistant tuberculosis as a common phenomenon in the late 1980s. Multi-drug-resistant TB is caused by strains of *Mycobacterium tuberculosis* that are resistant to both isoniazid and rifampin (the two best agents for the treatment of active disease) and is characterized by the necessity for lengthy, expensive, toxic treatment regimens and high rates of mortality. This daunting problem originated from poor patient compliance with standard treatment regimens that were prescribed without supervision or observation.[141] Not surprisingly, correctional facilities played a major role in the growth of the multi-drug-resistant TB epidemic.[142] Directly observed therapy programs have recorded dramatic success in recent years in controlling this disease.[143] While case rates of TB (including multi-drug-resistant TB) nationally, in cities, and in jails and prisons have dropped in response to increased funding of public control programs, at least one noted authority has predicted future resurgences because of a lack of governmental foresight leading to diminished rather than redoubled efforts to stamp out the disease.[144]

Potential interventions

Efforts to control the spread of TB both inside and through the bars of correctional facilities should focus on those parameters mentioned in prior discussions—reducing the likelihood of disease transmission per contact (β), the duration of infectivity (D), and the mean number of new contacts per unit of time (c).

Reducing the likelihood of disease transmission per contact. The prisoner population can be divided conceptually into three groups: A small number of inmates with active TB who can spread their disease to others, a larger number of inmates with TB infection but without active TB who are at risk for progression of disease to an active state, and a majority of inmates who have neither and are susceptible contacts of contagious patients. Even with highly efficient screening programs, it is inevitable that congregate housing prior to screening, failure of screening procedures to detect all cases of active TB, or the progression of TB infection to active TB during the term of incarceration will lead to some exposures of susceptible individuals. Certain common sense measures can mitigate the risk of transmission from contagious patients to susceptible individuals (β). First, areas within jails and prisons that contain large numbers of prisoners for substantial time intervals (especially housing dormitories and mess halls) should be well ventilated. Areas that are likely to contain patients with undiagnosed active TB, such as initial intake areas and sick-call clinics, should have adequate ventilation and should consider such additional measures as HEPA filtration and microbicidal

ultraviolet radiation. Dormitories and infirmaries housing inmates with suppressed immune systems, such as AIDS patients, should be particularly stringent in screening current and prospective admissions for active TB because the pace of TB spread through immunosuppressed populations may be extremely rapid.[145] Finally, correctional staff throughout all facilities should be attuned to the problem of TB and should be on the alert for inmates with persistent coughs, sputum production, fever, and weight loss. Inmates who are coughing should be encouraged to wear a mask or at least to cover their coughs with their hands or with tissues until medical evaluation is complete.

Reducing the duration of infectiousness. Three methods are available to reduce the duration of infectiousness (D) of active TB cases. First is timely diagnosis of disease. Authoritative recommendations for screening of prisoners for TB infection and active TB are available to the interested reader.[146] All facilities should have a formal program of TB screening of new admissions and housed prisoners with new symptoms, as well as periodic evaluation of all housed prisoners. The elements of the program should be history and physical examination by a qualified health care provider, tuberculin skin testing, chest roentgenography, and cross-check with the local health department for evidence of a TB diagnosis. Each facility should, in cooperation with local public health agencies, modulate the intensity of these screening tools in accordance with the epidemiology of TB in the surrounding community. A large survey of TB screening practices in correctional facilities in 1994 found that 98 percent of State and Federal systems and 66 percent of city and county systems screened incoming inmates for TB infection. Ninety percent of State and Federal systems and 41 percent of city and county systems screened prisoners annually.[147] Although these statistics are improved over those of the past, higher rates of compliance with these screening procedures, particularly in city and county systems, are an important goal.

The second effective method for reducing the duration of infectivity is airborne isolation. Guidelines for appropriate isolation of patients with proven or suspected active TB are readily available to the interested reader.[148] All correctional facilities should have access to appropriate isolation rooms either onsite or at local hospitals. Patients should remain in isolation until they are deemed to be noninfectious by their medical provider. The duration of isolation may range from several days for inmates who turn out not to have active TB, to several weeks for patients with uncomplicated active TB, to several months or more for patients with multi-drug-resistant TB. Any legal proceedings that cannot await the completion of the isolation process should be conducted within the confines of the isolation facility; patients with suspected or proven active TB who may be infectious should not attend courtroom proceedings. In 1994, 61 percent of State and Federal systems reported that they housed patients with suspected or confirmed active TB in appropriate airborne isolation rooms onsite and 59 percent reported that they housed such patients in community hospital isolation rooms (some systems housed inmates both onsite and in local hospitals).[149] Forty-eight percent of city and county systems housed patients in appropriate isolation rooms onsite and 52 percent sent patients to community hospitals for isolation (some systems housed inmates both onsite and in local hospitals).[150] These statistics were dramatically better than in 1992, but more than 25 percent of the systems still reported inappropriate isolation practices for patients with suspected or proven active TB, most commonly involving placement in single rooms without air exchanges or negative pressure. Approximately 75 percent of the systems reported appropriate practices surrounding sputum smear examination and discontinuation of airborne isolation. It is both unethical and illegal to subject prisoners to exposure to confirmed or suspected active TB. Therefore, every facility must have a responsible plan to provide acceptable isolation for individuals who may have contagious disease.

The final method for reducing duration of infectivity is prompt and effective treatment. Studies suggest that patients without drug-resistant TB are rapidly rendered noninfectious by appropriate medical therapy.[151] All treatment for active TB in correctional facilities should be administered under direct observation.[152] Cases presenting diagnostic or therapeutic dilemmas, such as drug-resistant cases, should be managed under the supervision of a practitioner with expertise in this field. Case management should be closely coordinated with the local health department and provisions for followup in the community must be arranged for all inmates who may be released during their course of treatment. In 1994, 94 percent of State and Federal systems and 90 percent of city and county systems reported that they employed directly observed therapy for all inmates receiving treatment for active TB.[153]

Reducing the mean number of new contacts per unit of time. Many of the measures outlined in the section entitled "Reducing the likelihood of disease transmission per contact" also serve to reduce the mean number of new contacts per unit of time. The occasional inmate who penetrates into the general population despite existing screening practices will do the least public health damage in a facility that is not overcrowded and where progressive symptoms and signs of diseases lead an attuned correctional staff to evaluate and isolate the prisoner in a timely manner.

Miscellaneous. Several other ingredients are required for TB control in correctional facilities. First is TB preventive therapy for inmates with TB infection. The CDC recommends that all preventive therapy for TB within jails and prisons be directly observed.[154] Given a national mean prevalence of TB infection at time of intake of 4.3–8.9 percent, many hundreds of thousands of inmates per year would be candidates for directly observed preventive therapy. Since few, if any, facilities have the personnel to administer such programs, compliance with these recommendations has been inconsistent. One pilot program of directly observed preventive therapy in the Seattle jail system with aggressive community followup yielded disappointing results.[155] An earlier study in the New York City system demonstrated that the best predictors of compliance with preventive therapy were a higher level of understanding of the disease process and ease of access to medication.[156] TB preventive therapy is a key strategy in preventing new cases of active TB from emerging in a community and innovative approaches are needed in order to optimize the use of this powerful public health tool.

Additionally, every correctional facility must have the ability to conduct thorough contact investigations when cases of active TB occur in the general inmate population. Because newly infected patients are at high risk of progression to active TB, contacts of active TB cases must be evaluated and screened for signs of new infection according to established protocols.[157] Some groups, such as HIV-infected patients, are at such high risk that empiric TB preventive therapy should begin at the earliest possible opportunity after exposure.[158] The ability to conduct thorough contact investigations depends on the correctional facility's ability to identify other inmates who shared airspace with the infected individual at the time of contagion and on the organized efforts of personnel designated to complete this task. Employees of the facility may also require screening.

Finally, all TB control activities in jails and prisons should be performed in concert with local health departments. Access to health department registries are invaluable in identifying TB patients who may fail to report their diagnosis at the time of intake.[159] These agencies may also assist in completing the community components of contact investigations, ensuring followup of inmates after release, and tracking epidemiologic trends pertaining to TB, both inside and outside the facility.

Hepatitis B and C

Overview/epidemiology

The problems of hepatitis B and C in correctional facilities have received relatively little attention.

In the era antedating current recommendations for universal vaccination of children, approximately 300,000 new cases of hepatitis B occurred per year, mostly in young adults, resulting in 10,000 hospitalizations and 300 deaths from fulminant disease annually. Approximately 25,000 of each year's new cases develop chronic disease with the virus, accounting for a national chronic carrier population approaching 1 million individuals and for approximately 5,000 deaths annually attributable to consequences of chronic infection (approximately 4,000 from cirrhosis and 1,000 from hepatocellular carcinoma).[160] While the epidemiology of hepatitis B in the United States will undergo dramatic changes as a result of universal vaccination of children, the virus will remain an important pathogen for the foreseeable future.

Hepatitis C is receiving increasing attention from the medical and lay community. In the 10 years since the discovery and identification of the pathogen, it has become clear that hepatitis C is the most common chronic bloodborne viral infection in the United States.[161] Approximately 3.9 million individuals in the Nation have been infected with this virus. In contrast to hepatitis B, the majority of these people remain chronically infected. Complications of hepatitis C infection account for an estimated 25,000 deaths annually, or approximately 1 percent of all deaths.[162]

Although hepatitis B and C are two distinct diseases their routes of transmission are similar. Both viruses may be acquired through exposure to contaminated blood products especially during injection drug use and historically during transfusion. Rates of transfusion-associated hepatitis B and C have dropped dramatically since routine testing of all blood products was begun.[163] Infants are at high risk for hepatitis B acquisition if their mothers are actively infected and vertical transmission of hepatitis C also occurs. Sexual transmission is another important route for hepatitis B, less so for hepatitis C. In general, patients with active or chronic hepatitis B are more likely to transmit their infection to susceptible contacts than patients with hepatitis C. This transmission advantage is, however, counterbalanced by the longer average duration of infectivity of individuals who acquire hepatitis C infection and the lack of a means (i.e., vaccine) to promote protective immunity in those uninfected with hepatitis C.

Despite significant advances in the treatment of viral hepatitis, there is no consistently effective regimen available to cure either disease. Regimens offering some hope of cure are lengthy, expensive, and fairly toxic.

Although viral hepatitis in the correctional setting is becoming the focus of renewed attention, it is by no means a new problem. It has a colorful history dating back to the decades preceding the identification of the viral causes of serum hepatitis. Forty years ago, in the early days of transfusion medicine, units of blood were generally obtained from one of two sources, family and friends of the patient requiring transfusion or professional donors.[164] Professional donors were paid small fees to donate blood and were often drawn from the most indigent segments of society including alcoholics and drug addicts. Another common category of professional donor was the prisoner, and prison blood donation was an important part of the transfusion blood supply into the 1970s.[165] Because no serologic tests for viral hepatitis were available, screening was limited to donor-supplied reports of prior hepatitis or jaundice. In commenting on this donor pool, one authority stated, "The purchase of blood at low rates attracts many alcoholics or other unfortunates who return every 8 or 10 weeks and who know that they will not get the money if they answer 'Yes' to questions not only about jaundice but malaria and other infectious diseases."[166] A study of transfusion recipients in Chicago between 1946 and 1956 found a rate of serum hepatitis of 0.3 percent in patients who received 1 unit of blood from a family member compared to 3.2 percent in patients who received one unit of blood from a prisoner donor.[167] By the late 1950s it was clear not only that the incarcerated population had a high prevalence of contagious, bloodborne hepatitis, but also that the correctional facilities themselves were serving as amplifiers of disease through the

routes of intrafacility injection drug use; use of nondisposable, nonsterile needles for medicinal purposes; use of nonsterilized dental equipment; and tattooing.[168] Over the ensuing decades, the practice of obtaining blood donations from prisoners fell out of favor. During the era of modern diagnostic testing for viral hepatitis, there have been sporadic reports detailing prevalences of hepatitis B and C in jail and prison populations. High rates of hepatitis B and C in IDUs and in the socioeconomically disadvantaged have, not surprisingly, resulted in a disproportionate burden of disease in prisoners. Numerous series from around the country have consistently shown prevalences of these diseases in correctional facilities at least several times higher than in the general U.S. population.[169] These observations have led to recommendations for more aggressive screening of prisoners and a consideration of more intensive vaccination efforts.[170]

Few recent studies are available to define the current epidemiology of hepatitis B and C in correctional facilities and most of these data have been presented in abstract form, not in peer-reviewed medical journals. Two large surveys conducted during the 1990s found a seroprevalence of acute or chronic hepatitis B infection of 1.8 percent in the New York State correctional system[171] and 2.2 percent in the California correctional system.[172] An unpublished study in the early 1990s of 1,271 patients on Rikers Island in New York City who were initiating TB therapy or prophylaxis, initiating antiretroviral therapy, or had abnormal liver function tests demonstrated an 8 percent prevalence of chronic hepatitis B.[173] These rates are an order of magnitude greater than those of the general population.[174] Mathematical modeling of hepatitis C rates in prisoners and releasees based on serosurveys of prisoners and IDUs in a report by Hammett, Harmon, and Rhodes estimated that 17.0–18.6 percent of prisoners and releasees in 1996 and 1997 were infected with hepatitis C, translating into populations of 303,000–332,000 prisoners and 1.3–1.4 million releasees infected with hepatitis C. These investigators suggested that an astounding 29–32 percent of all persons with hepatitis C in the Nation passed through a correctional facility in 1996.[175]

Potential interventions

As pathogens that are transmitted by both the bloodborne and sexual routes, strategies to curb the transmission of hepatitis B and C are very similar to those employed for HIV. These strategies must rely on interventions that decrease the likelihood of transmission of infection from an infected person to an uninfected person, the duration of infectiousness, and the average number of contacts with uninfected individuals during a unit of time.

Reducing the likelihood of disease transmission per contact. Methods to reduce the likelihood of transmission (β) include harm-reduction messages identical to those employed for HIV. An additional educational component is needed, however, to inform prisoners that viral hepatitis is a serious threat separate from that of HIV and that safer needle sharing and sexual practices are necessary even when all involved have tested negative for HIV. Public health agencies support the institution of widespread testing for hepatitis B and C in inmates.[176] Such testing programs are justifiable on the premise that individuals who are identified as infected may receive intensified harm-reduction counseling and curb their high-risk behaviors. In turn, β could be reduced through safer injection and sexual practices. Furthermore, better and earlier diagnosis of hepatitis B and C may allow for successful treatment of certain prisoners with antiviral agents. Such treatment, while far from uniformly effective, may offer some hope of reducing viral burden and hence transmissibility and may lead to actual cure in a minority of patients.[177] Prisoners receiving antiviral treatment for hepatitis B or C must be managed by a physician with expertise in this area, generally a gastroenterologist or an infectious-diseases specialist. Finally, screening prisoners will identify a population of high-risk individuals who are not yet infected with hepatitis B or C. For these prisoners, educational messages may provide useful strategies for avoiding infection in the future, including safer injection and sexual behaviors, as well as the possibility of

hepatitis B vaccination for prisoners who are both hepatitis B surface antigen and antibody negative.

As with HIV, these interventions are able to affect multiple parameters determining disease transmission in a community simultaneously and the beneficial effects of behavior modification aimed at avoiding hepatitis transmission would, by extension, augment efforts to decrease HIV transmission and vice versa.

Reducing the duration of infectiousness. Cessation of injection drug use and sexual contact with uninfected partners as a result of harm-reduction training could effectively reduce the duration of infectiousness (D) in a subset of patients. Cure of disease by antiviral therapies could also serve to reduce the mean duration of infectiousness. The effect of such treatments on hepatitis transmission in the community may become more profound as new and better therapeutic options emerge.

Reducing the mean number of susceptible new contacts per unit of time. Harm-reduction counseling and behavior modification techniques together with social and legal remedies may lead to reductions in numbers of susceptible contacts per infected individual (*c*). These issues have already been discussed in greater detail in the section on HIV infection. In the case of hepatitis B, however, vaccination offers another route to decrease *c*. The number of susceptible contacts exposed per unit time can be reduced effectively by increasing the rate of hepatitis B immunity in the population. In the decades to come, there is hope that universal pediatric vaccination will increase herd immunity in the United States to a point that disease transmission and long-term sequelae become uncommon.[178] In the meantime, although the disease continues to thrive among those subsets of the adult population that tend to reside in correctional facilities,[179] much benefit can be derived from and much expense and illness averted by the use of aggressive, targeted hepatitis B vaccination in adults. A number of high-risk groups, including prisoners, have been suggested as potential target populations.[180] The idea of mass vaccination of prisoners is attractive. An extremely safe and effective vaccination could protect large numbers of prisoners from a serious health threat. Immunization of all inmates is probably not the proper approach, however. Up to 80 percent of prisoners in some facilities may show serologic evidence of prior hepatitis B infection[181] and therefore would not benefit from vaccination. A complete vaccination series requires 3 injections administered over 6 months. Prisoners who are incarcerated for less than 6 months, especially in jail systems, are unlikely to properly complete the series once released. These two realities, combined with the fairly high cost of the hepatitis B vaccine, necessitate a more selective approach to hepatitis B vaccination in prisoners. Screening for serologic markers of hepatitis B infection and vaccination in short-term stay facilities in which mean lengths of stay are often on the order of several days would be fairly senseless because few prisoners would remain to complete the vaccination or even to receive their serologic test results. If, however, a subset of the prisoner population could be identified with likely durations of incarceration exceeding 6 months, members of this group would be good candidates for hepatitis B surface antigen and antibody testing and for vaccination if these markers were absent. In prisons, where lengths of stay are longer and better defined, a program of universal hepatitis B screening and vaccination of uninfected, nonimmune individuals would doubtless save thousands of preventable new cases of hepatitis B each year. Methods of vaccine administration that could lessen the cost and perhaps the duration of the series are under investigation[182] and offer the hope of broader hepatitis B vaccination in correctional facilities in the future.

In summary, jails and prisons should be targets for intensified education about the dangers of hepatitis B and C and about methods available to decrease the rates of transmission and acquisition.

Broad-based screening for hepatitis B and C are recommended, as is vaccination of all uninfected, nonimmune prisoners against hepatitis B. These efforts should not be applied wastefully, however, and their applicability to a given facility depends primarily on the mean length of stay of inmates. Certainly, these programs should be universal or near universal in prison systems where lengths of stay are longer and better defined. Finally,

facilities must offer antiviral treatments supervised by appropriate subspecialty trained physicians to prisoners with hepatitis B and C who are deemed to be candidates. As therapies become more effective and better accepted, the need for these resources in correctional facilities will increase.

Conclusions

The burden of infectious diseases in correctional facilities in this country is staggering. The likelihood of active infection with a variety of serious pathogens among prisoners is many times higher than in the surrounding communities. In studies that have analyzed the proportion of cases of significant infectious diseases inside versus outside the bars of the facilities, the results have proven that prisoners and releasees can be major driving forces behind epidemics. Although correctional facilities have achieved some measure of success nationally in controlling TB and syphilis (in specific regions), overall efforts to control other infections, such as HIV, have been dismally ineffective. To implement appropriate screening, treatment, and prevention programs for the infections discussed in this document is expensive, but not nearly as expensive as a failure to do so. The problem of infectious diseases among prisoners represents not only a daunting challenge but also an extraordinary opportunity for the private and public health of this Nation.

Notes

1. Gilliard, D.K., and A.J. Beck, *Prisoners in 1997,* Bureau of Justice Statistics Bulletin, Washington, DC: U.S. Department of Justice, Bureau of Justice Statistics, August 1998, NCJ 170014.

2. Centers for Disease Control and Prevention, "Assessment of Sexually Transmitted Disease Services in City and County Jails—United States, 1997," *Morbidity and Mortality Weekly Report* 47(21)(1998): 429–431.

3. Gilliard, D.K., and A.J. Beck, *Prisoners in 1997* (see note 1).

4. Ibid.

5. Stead, W.W., "Undetected Tuberculosis in Prison: Sources of Infection for Community at Large," *Journal of the American Medical Association* 240(23)(1978): 2544–2547.

6. Centers for Disease Control and Prevention, "Assessment of Sexually Transmitted Disease Services in City and County Jails—United States, 1997" (see note 2); Stead, W.W., "Undetected Tuberculosis in Prison: Sources of Infection for Community at Large" (see note 5); Glaser, J.B., and R.B. Greifinger, "Correctional Health Care: A Public Health Opportunity," *Sexually Transmitted Diseases* 25(6): 308–309; Hammett, T.M., R. Widom, J. Epstein, M. Gross, S. Sifre, and T. Enos, *1994 Update: HIV/AIDS and Sexually Transmitted Diseases in Correctional Facilities*, Issues and Practices, Washington, DC: U.S. Department of Justice, National Institute of Justice and Centers for Disease Control and Prevention, National Center for HIV, STD, and TB Prevention, December 1995, NCJ 156832; Cohen, D., R. Scribner, J. Clark, and D. Cory, "The Potential Role of Custody Facilities in Controlling Sexually Transmitted Diseases," *American Journal of Public Health* 82(4)(1997): 552–556; Skolnick, A.A., "Look Behind Bars for Key to Control of STDs," *Journal of the American Medical Association* 279(2)(1998): 97–98; Glaser, J.B., "Sexually Transmitted Diseases in the Incarcerated: An Underexploited Public Health Opportunity," *Sexually Transmitted Diseases* 25(6)(1998): 308–309.

7. Anderson, R.M., and R.M. May, eds., *Infectious Diseases of Humans: Dynamics and Control*, Oxford: Oxford University Press, 1995; Garnett, G.P., and R.M. Anderson, "Sexually Transmitted Diseases and Sexual Behavior: Insights From Mathematical Models," *Journal of Infectious Diseases* 174(1996): S150–S161; Shiboski, S., and N.S. Padian, "Population- and Individual-Based Approaches to the Design and Analysis of Epidemiologic Studies of Sexual Disease Transmission," *Journal of Infectious Diseases* 174(1996): S188–S200.

8. Garnett, G.P., and R.M. Anderson, "Sexually Transmitted Diseases and Sexual Behavior: Insights From Mathematical Models" (see note 7).

9. Anderson, R.M., and R.M. May, "Social Heterogeneity and Sexually Transmitted Diseases," in *Infectious Diseases of Humans: Dynamics and Control*, R.M. Anderson and R.M. May, eds., Oxford: Oxford University Press, 1992: 228–303.

10. Garnett, G.P., and R.M. Anderson, "Sexually Transmitted Diseases and Sexual Behavior: Insights From Mathematical Models" (see note 7); Thomas, J.C., and M.J. Tucker, "The Development and Use of the Concept of a Sexually Transmitted Disease Core," *Journal of Infectious Diseases* 174(1996): S134–S143; Yorke, J.A., H.W. Hethcote, and A. Nold, "Dynamics and Control of the Transmission of Gonorrhea," *Sexually Transmitted Diseases* 5(2)(1978): 51–56.

11. Clottey, C., and G. Dallabetta, "Sexually Transmitted Diseases and Human Immunodeficiency Virus: Epidemiologic Synergy?" *Infectious Disease Clinics North America* 7(4)(1993): 753–770.

12. Hammett, T.M., R. Widom, J. Epstein, M. Gross, S. Sifre, and T. Enos, *1994 Update: HIV/AIDS and Sexually Transmitted Diseases in Correctional Facilities* (see note 6).

13. Hammett, T.M., P. Harmon, and W. Rhodes, "The Burden of Infectious Disease Among Inmates and Releasees From Correctional Facilities," paper prepared for the National Commission on Correctional Health Care, Chicago, IL, May 2000. (Copy in this volume.)

14. Centers for Disease Control and Prevention, "Syphilis Screening Among Women Arrestees at the Cook County Jail—Chicago, 1996," *Morbidity and Mortality Weekly Report* 47(21)(1998): 432–433.

15. Skolnick, A.A., "Look Behind Bars for Key to Control of STDs" (see note 6).

16. Blank, S., D.D. McDonnell, S.R. Rubin, J.J. Neal, M.W. Brome, M.B. Masterson, and J.R. Greenspan, "New Approaches to Syphilis Control: Finding Opportunities for Syphilis Treatment and Congenital Syphilis Prevention in a Women's Correctional Setting," *Sexually Transmitted Diseases* 24(9)(1997): 218–228.

17. Shuter, J., D. Bell, D. Graham, K.A. Holbrook, and E.Y. Bellin, "Rates of and Risk Factors for Trichnomoniasis Among Pregnant Inmates in New York City," *Sexually Transmitted Diseases* 25(6)(1998): 303–307.

18. Edlin, B.R., K.L. Irwin, S. Faruque, C.B. McCoy, C. Word, Y. Serrano, J.A. Inciardi, B.P. Bowser, R.F. Schilling, and S.D. Holmberg, "Intersecting Epidemics—Crack Cocaine Use and HIV Infection Among Inner-City Young Adults: Multicenter Crack Cocaine and HIV Infection Study Team," *New England Journal of Medicine* 331(21)(1994): 1422–1427.

19. Coles, F.B., S.S. Hipp, G.S. Silberstein, and J.H. Chen, "Congenital Syphilis Surveillance in Upstate New York, 1989–1992: Implications for Prevention and Clinical Management," *Journal of Infectious Diseases* 171(3)(1995): 732–735.

20. Blank, S., D.D. McDonnell, S.R. Rubin, J.J. Neal, M.W. Brome, M.B. Masterson, and J.R. Greenspan, "New Approaches to Syphilis Control: Finding Opportunities for Syphilis Treatment and Congenital Syphilis Prevention in a Women's Correctional Setting" (see note 16).

21. Ngugi, E.N., D. Wilson, J. Sebstad, F.A. Plummer, and S. Moses, "Focused Peer-Meditated Educational Programs Among Female Sex Workers to Reduce Sexually Transmitted Disease and Human Immunodeficiency Virus Transmission in Kenya and Zimbabwe," *Journal of Infectious Diseases* 174(1996): S240–S247.

22. Centers for Disease Control and Prevention, "Syphilis Screening Among Women Arrestees at the Cook County Jail—Chicago, 1996" (see note 14).

23. Blank, S., D.D. McDonnell, S.R. Rubin, J.J. Neal, M.W. Brome, M.B. Masterson, and J.R. Greenspan, "New Approaches to Syphilis Control: Finding Opportunities for Syphilis Treatment and Congenital Syphilis Prevention in a Women's Correctional Setting" (see note 16).

24. Centers for Disease Control and Prevention, "Assessment of Sexually Transmitted Disease Services in City and County Jails—United States, 1997" (see note 2).

25. Handsfield, H.H., and P.F. Sparling, "Neisseria Gonorrhoeae," in *Principles and Practice of Infectious Diseases,* G.L. Mandell, J.E. Bennett, and R. Dolin, eds., New York: Churchill Livingstone: 1909–1926.

26. Cohen, D., R. Scribner, J. Clark, and D. Cory, "The Potential Role of Custody Facilities in Controlling Sexually Transmitted Diseases" (see note 6).

27. Kiviat, N.B., J.A. Paavonen, P. Wolner-Hanssen, C. Critchlow, W.E. Stamm, J. Douglas, D.A. Eschenbach, L.A. Corey, and K.K. Holmes, "Histopathology of Endocervical Infection Caused by *Chlamydia trachomatis*, Herpes Simplex Virus, *Trichimonas vaginalis*, and *Neisseria Gonorrhoeae*," *Human Pathology* 21(8)(1990): 831–837.

28. Stary, A., S.F. Ching, L. Teodorowicz, and H. Lee, "Comparison of Ligase Chain Reaction and Culture for Detection of *Neisseria Gonorrhoeae* in Genital and Extragenital Specimens," *Journal of Clinical Microbiology* 35(1)(1997): 239–242.

29. Hammett, T.M., R. Widom, J. Epstein, M. Gross, S. Sifre, and T. Enos, *1994 Update: HIV/AIDS and Sexually Transmitted Diseases in Correctional Facilities* (see note 6).

30. Hammett, T.M., P. Harmon, and W. Rhodes, "The Burden of Infectious Disease Among Inmates and Releasees From Correctional Facilities" (see note 13).

31. Puisis, M., W.C. Levine, and K.J. Mertz, "Overview of Sexually Transmitted Diseases," in *Clinical Practice in Correctional Medicine*, M. Puisis, ed., St. Louis: Mosby, 1998: 127–133.

32. Ibid.

33. Holmes, M.D., S.M. Safyer, N.A. Bickell, S.H. Vermund, P.A. Hanff, and R.S. Philips, "Chlamydial Cervical Infection in Jailed Women," *American Journal of Public Health* 83(4)(1993): 551–555.

34. Homes, K.K., D.W. Johnson, P.A. Kvale, C.W. Halverson, T.F. Keys, and D.H. Martin, "Impact of a Gonorrhea Control Program, Including Selective Mass Treatment, in Female Sex Workers," *Journal of Infectious Diseases* 174(1996): S230–S239.

35. Ibid.

36. Yorke, J.A., H.W. Hethcote, and A. Nold, "Dynamics and Control of the Transmission of Gonorrhea" (see note 10).

37. Centers for Disease Control and Prevention, "*Chlamydia trachomatis* Genital Infections—United States, 1995," *Morbidity and Mortality Weekly Report* 46(9)(1997): 193–198; McCormack, W.M., and M.F. Rein, "Urethritis," in *Principles and Practice of Infectious Diseases*, G.L. Mandell, J.E. Bennett, and R. Dolin, eds., New York: Churchill Livingstone, 1995: 1063–1074.

38. Cohen, D., R. Scribner, J. Clark, and D. Cory, "The Potential Role of Custody Facilities in Controlling Sexually Transmitted Diseases" (see note 6); Kiviat, N.B., J.A. Paavonen, P. Wolner-Hanssen, C. Critchlow, W.E. Stamm, J. Douglas, D.A. Eschenbach, L.A. Corey, and K.K. Holmes, "Histopathology of Endocervical Infection Caused by *Chlamydia trachomatis*, Herpes Simplex Virus, *Trichimonas vaginalis*, and *Neisseria Gonorrhoeae*" (see note 27).

39. Stary, A., S.F. Ching, L. Teodorowicz, and H. Lee, "Comparison of Ligase Chain Reaction and Culture for Detection of *Neisseria Gonorrhoeae* in Genital and Extragenital Specimens" (see note 28).

40. Centers for Disease Control and Prevention, "1998 Guidelines for Treatment of Sexually Transmitted Diseases," *Morbidity and Mortality Weekly Report* 47(RR–1)(1998): 1–111.

41. Puisis, M., W.C. Levine, and K.J. Mertz, "Overview of Sexually Transmitted Diseases" (see note 31).

42. Hammett, T.M., R. Widom, J. Epstein, M. Gross, S. Sifre, and T. Enos, *1994 Update: HIV/AIDS and Sexually Transmitted Diseases in Correctional Facilities* (see note 6).

43. Hammett, T.M., P. Harmon, and W. Rhodes, "The Burden of Infectious Disease Among Inmates and Releasees From Correctional Facilities" (see note 13).

44. Holmes, M.D., S.M. Safyer, N.A. Bickell, S.H. Vermund, P.A. Hanff, and R.S. Philips, "Chlamydial Cervical Infection in Jailed Women" (see note 33).

45. Oh, M.K., G.A. Cloud, L.S. Wallace, J. Reynolds, M. Sturdevant, and R.A. Feinstein, "Sexual Behavior and Sexually Transmitted Diseases Among Male Adolescents in Detention," *Sexually Transmitted Diseases* 21(3)(1994): 127–132.

46. Canterbury, R.J., E.L. McGarvey, A.E. Sheldon-Keller, D. Waite, P. Reams, and C. Koopman, "Prevalence of HIV-Related Risk Behaviors and STDs Among Incarcerated Adolescents," *Journal of Adolescent Health* 17(3)(1995): 173–177.

47. Scholes, D., A. Stergachis, F.E. Heidrich, H. Andrilla, K.K. Holmes, and W.E. Stamm, "Prevention of Pelvic Inflammatory Disease by Screening for Cervical Chlamydial Infection," *New England Journal of Medicine* 334(21)(1996): 1362–1366.

48. Hillis, S.D., and J.N. Wasserheit, "Screening for Chlamydia—A Key to the Prevention of Pelvic Inflammatory Disease," *New England Journal of Medicine* 334(21)(1996): 1399–1401.

49. Kiviat, N.B., J.A. Paavonen, P. Wolner-Hanssen, C. Critchlow, W.E. Stamm, J. Douglas, D.A. Eschenbach, L.A. Corey, and K.K. Holmes, "Histopathology of Endocervical Infection Caused by *Chlamydia trachomatis*, Herpes Simplex Virus, *Trichimonas vaginalis*, and *Neisseria Gonorrhoeae*" (see note 27); Laga, M., A. Manoka, M. Kivuvu, B. Malele, M. Tuliza, N. Nzila, J. Goeman, F. Behets, V. Batter, M. Alary, et al., "Non-Ulcerative Sexually Transmitted Diseases as Risk Factors for HIV–1 Transmission in Women: Results From a Cohort Study," *AIDS* 7(1)(1993): 95–102.

50. Paisarntantiwong, R., S. Brockmann, L. Clarke, S. Landesman, J. Feldman, and H. Minkoff, "The Relationship of Vaginal Trichinomoniasis and Pelvic Inflammatory Disease Among Women Colonized With *Chlamydia trachomatis*," *Sexually Transmitted Diseases* 22(6)(1995): 344–347.

51. Shuter, J., D. Bell, D. Graham, K.A. Holbrook, and E.Y. Bellin, "Rates of and Risk Factors for Trichnomoniasis Among Pregnant Inmates in New York City" (see note 17); Cu-Uvin, S., K. Flanagan, K. Culff, et al., "Cervical Dysplasia Among Incarcerated Women: A Comparison of HIV-Seropositive and HIV-Seronegative Inmates," *Journal of Women's Health and Gender-Based Medicine* 5(1996): 603–608.

52. Cu-Uvin, S., K. Flanagan, K. Culff, et al., "Cervical Dysplasia Among Incarcerated Women: A Comparison of HIV-Seropositive and HIV-Seronegative Inmates" (see note 51).

53. E.Y. Bellin, personal communication.

54. Shuter, J., D. Bell, D. Graham, K.A. Holbrook, and E.Y. Bellin, "Rates of and Risk Factors for Trichnomoniasis Among Pregnant Inmates in New York City" (see note 17).

55. Krieger, J.N., C. Jenny, M. Verdon, N. Siegel, R. Springwater, C.W. Critchlow, and K.K. Holmes, "Clinical Manifestations of Trichomoniasis in Men," *Annals of Internal Medicine* 118(11)(1993): 844–849.

56. Glaser, J.B., "Sexually Transmitted Diseases in the Incarcerated: An Underexploited Public Health Opportunity" (see note 6).

57. Centers for Disease Control and Prevention, "Assessment of Sexually Transmitted Disease Services in City and County Jails—United States, 1997" (see note 2).

58. Eng, T.R., and W.T. Butler, eds., *The Hidden Epidemic: Confronting Sexually Transmitted Diseases,* Washington, DC: National Academy Press, 1997: 18; Centers for Disease Control and Prevention, "Update: Barrier Protection Against HIV Infection and Other Sexually Transmitted Diseases," *Morbidity and Mortality Weekly Report* 42(3)(1993): 589–591, 597.

59. Maxwell, C., and M. Boyle, "Risky Heterosexual Practices Amongst Women Over 30: Gender, Power, and Long-Term Relationships," *AIDS Care* 7(3)(1995): 277–293.

60. Centers for Disease Control and Prevention, "Community-Level Prevention of Human Immunodeficiency Virus Infection Among High Risk Populations: The AIDS Community Demonstration Projects," *Morbidity and Mortality Weekly Report* 45(RR–6)(1996): 1–24; DiClemente, R.J., and G.M. Wingood, "A Randomized Controlled Trial of an HIV Sexual Risk-Reduction Intervention for Young African-American Women," *Journal of the American Medical Association* 274(16)(1995): 1271–1276.

61. Ngugi, E.N., D. Wilson, J. Sebstad, F.A. Plummer, and S. Moses, "Focused Peer-Meditated Educational Programs Among Female Sex Workers to Reduce Sexually Transmitted Disease and Human Immunodeficiency Virus Transmission in Kenya and Zimbabwe" (see note 21); DiClemente, R.J., and G.M. Wingood, "A Randomized Controlled Trial of an HIV Sexual Risk-Reduction Intervention for Young African-American Women" (see note 60).

62. Magura, S.A., S.Y. Kang, J.L. Shapiro, and J. O'Day, "Evaluation of an AIDS Education Model for Women Drug Users in Jail," *Internal Journal of Addictions* 30(3)(1995): 259–273; Bond, L., and S.

Seeman, "At Risk for HIV Infection: Incarcerated Women in a County Jail in Philadelphia," *Women and Health* 24(4)(1996): 27–45.

63. Centers for Disease Control and Prevention, "Syphilis Screening Among Women Arrestees at the Cook County Jail—Chicago, 1996" (see note 14); Blank, S., D.D. McDonnell, S.R. Rubin, J.J. Neal, M.W. Brome, M.B. Masterson, and J.R. Greenspan, "New Approaches to Syphilis Control: Finding Opportunities for Syphilis Treatment and Congenital Syphilis Prevention in a Women's Correctional Setting" (see note 16).

64. Centers for Disease Control and Prevention, "Syphilis Screening Among Women Arrestees at the Cook County Jail—Chicago, 1996" (see note 14).

65. Hillis, S.D., and J.N. Wasserheit, "Screening for Chlamydia—A Key to the Prevention of Pelvic Inflammatory Disease" (see note 48).

66. Shuter, J., D. Bell, D. Graham, K.A. Holbrook, and E.Y. Bellin, "Rates of and Risk Factors for Trichnomoniasis Among Pregnant Inmates in New York City" (see note 17); Cu-Uvin, S., K. Flanagan, K. Culff, et al., "Cervical Dysplasia Among Incarcerated Women: A Comparison of HIV-Seropositive and HIV-Seronegative Inmates" (see note 51).

67. Anderson, R.M., and R.M. May, "Social Heterogeneity and Sexually Transmitted Diseases" (see note 9); Boily, M.C., and R.C. Brunham, "The Impact of HIV and Other STDs on Human Populations: Are Predictions Possible?" *Infectious Disease Clinics of North America* 7(4)(1993): 771–792.

68. Centers for Disease Control and Prevention, "Community-Level Prevention of Human Immunodeficiency Virus Infection Among High Risk Populations: The AIDS Community Demonstration Projects" (note 60); Wiebel, W.W., A. Jimenez, W. Johnson, L. Ouellet, B. Jovanovic, T. Lampinen, J. Murray, and M.U. O'Brien, "Risk Behavior and HIV Seroincidence Among Out-of-Treatment Injection Drug Users: A Four-Year Prospective Study," *Journal of AIDS* 12(3)(1996): 282–289.

69. DiClemente, R.J., and G.M. Wingood, "A Randomized Controlled Trial of an HIV Sexual Risk-Reduction Intervention for Young African-American Women" (see note 60); Wiebel, W.W., A. Jimenez, W. Johnson, L. Ouellet, B. Jovanovic, T. Lampinen, J. Murray, and M.U. O'Brien, "Risk Behavior and HIV Seroincidence Among Out-of-Treatment Injection Drug Users: A Four-Year Prospective Study" (see note 68); Centers for Disease Control and Prevention, "Sexual Risk Behaviors of STD Clinic Patients Before and After Earvin 'Magic' Johnson's HIV-Infection Announcement—Maryland, 1991–1992," *Morbidity and Mortality Weekly Report* (42)(3)(1993): 45–48.

70. Edlin, B.R., K.L. Irwin, S. Faruque, C.B. McCoy, C. Word, Y. Serrano, J.A. Inciardi, B.P. Bowser, R.F. Schilling, and S.D. Holmberg, "Intersecting Epidemics—Crack Cocaine Use and HIV Infection Among Inner-City Young Adults: Multicenter Crack Cocaine and HIV Infection Study Team" (see note 18).

71. Centers for Disease Control and Prevention, "Update: AIDS Among Women—United States, 1994," *Morbidity and Mortality Weekly Report* 44(5)(1995): 81–83; Wiebel, W.W., A. Jimenez, W. Johnson, L. Ouellet, B. Jovanovic, T. Lampinen, J. Murray, and M.U. O'Brien, "Risk Behavior and HIV Seroincidence Among Out-of-Treatment Injection Drug Users: A Four-Year Prospective Study" (see note 68).

72. Centers for Disease Control, "Kaposi's Sarcoma and *Pneumocystis* Pneumonia Among Homosexual Men—New York City and California," *Morbidity and Mortality Weekly Report* 30(25)(1981): 305–308.

73. Pitchenick, A.E., M.A. Fischl, and T.J. Spira, "Acquired Immune Deficiency Syndrome in Low-Risk Patients: Evidence for Possible Transmission by an Asymptomatic Carrier," *Journal of the American Medical Association* 250(10)(1983).

74. Graham, N.H.M., "Epidemiology of Acquired Immunodeficiency Syndrome: Advancing to an Endemic Era," *American Journal of Medicine* 102(4A)(1997): 2–8.

75. Palella, F.J., K.M. Delaney, A.C. Moorman, M.O. Loveless, J. Fuhrer, G.A. Satten, D.J. Aschman, and S.D. Holmberg, "Declining Morbidity and Mortality Among Patients With Advanced Human Immunodeficiency Virus Infection," *New England Journal of Medicine* 338(13)(1998): 853–860.

76. Palella, F.J., K.M. Delaney, A.C. Moorman, M.O. Loveless, J. Fuhrer, G.A. Satten, D.J. Aschman, and S.D. Holmberg, "Declining Morbidity and Mortality

Among Patients With Advanced Human Immunodeficiency Virus Infection" (see note 75).

77. Centers for Disease Control and Prevention, "Update: AIDS Among Women—United States, 1994" (see note 71).

78. Holmberg, S.D., "The Estimated Prevalence and Incidence of HIV in 96 Large US Metropolitan Areas," *American Journal of Public Health* 86(5)(1996): 642–654.

79. New York City Department of Health, *AIDS New York City*, June 1998.

80. Hammett, T.M., R. Widom, J. Epstein, M. Gross, S. Sifre, and T. Enos, *1994 Update: HIV/AIDS and Sexually Transmitted Diseases in Correctional Facilities* (see note 6).

81. Ibid.

82. Anderson, R.M., and R.M. May, eds., *Infectious Diseases of Humans: Dynamics and Control* (see note 7).

83. Hammett, T.M., R. Widom, J. Epstein, M. Gross, S. Sifre, and T. Enos, *1994 Update: HIV/AIDS and Sexually Transmitted Diseases in Correctional Facilities* (see note 6).

84. Edlin, B.R., K.L. Irwin, S. Faruque, C.B. McCoy, C. Word, Y. Serrano, J.A. Inciardi, B.P. Bowser, R.F. Schilling, and S.D. Holmberg, "Intersecting Epidemics—Crack Cocaine Use and HIV Infection Among Inner-City Young Adults: Multicenter Crack Cocaine and HIV Infection Study Team" (see note 18).

85. Hammett, T.M., R. Widom, J. Epstein, M. Gross, S. Sifre, and T. Enos, *1994 Update: HIV/AIDS and Sexually Transmitted Diseases in Correctional Facilities* (see note 6); Schwarcz, S.K., G.A. Bolan, T.A. Kellogg, R. Kohn, and G.F. Lemp, "Comparison of Voluntary and Blinded Human Immunodeficiency Virus Type 1 (HIV–1) Seroprevalence Surveys in a High Prevalence Sexually Transmitted Disease Clinic Population," *American Journal of Epidemiology* 37(1993): 600–608; Hull, H.F., C.J. Bettinger, M.M. Gallaher, N.M. Keller, J. Wilson, and G.J. Mertz, "Comparison of HIV-Antibody Prevalence in Patients Consenting to and Declining HIV-Antibody Testing in an STD Clinic," *Journal of the American Medical Association* 260(7)(1988): 935–938.

86. Hammett, T.M., R. Widom, J. Epstein, M. Gross, S. Sifre, and T. Enos, *1994 Update: HIV/AIDS and Sexually Transmitted Diseases in Correctional Facilities* (see note 6).

87. Hammett, T.M., P. Harmon, and W. Rhodes, "The Burden of Infectious Disease Among Inmates and Releasees From Correctional Facilities" (see note 13).

88. Hecht, F.M., R.M. Grant, C.J. Petropoulos, B. Dillon, M.A. Chesney, H. Tian, N.S. Hellman, N.I. Bandrapalli, L. Digilio, B. Branson, and J.O. Kahn, "Sexual Transmission of an HIV–1 Variant Resistant to Multiple Reverse-Transcriptase and Protease Inhibitors," *New England Journal* 339(5)(1998): 307–311.

89. Centers for Disease Control and Prevention, "Publicly Funded HIV Counseling and Testing—United States, 1991," *Morbidity and Mortality Weekly Report* 41(34)(1992): 613–617.

90. Sperling, R.S., D.E. Shapiro, R.W. Coombs, J.A. Todd, S.A. Herman, G.D. McSherry, M.J. O'Sullivan, R.B. Van Dyke, E. Jimenez, C. Rouzioux, P.M. Flynn, and J.L. Sullivan, "Maternal Viral Load, Zidovudine Treatment, and the Risk of Transmission of Human Immunodeficiency Virus Type I From Mother to Infant," *New England Journal of Medicine* 335(22)(1996): 1621–1629.

91. Hammett, T.M., R. Widom, J. Epstein, M. Gross, S. Sifre, and T. Enos, *1994 Update: HIV/AIDS and Sexually Transmitted Diseases in Correctional Facilities* (see note 6).

92. Hammett, T.M., R. Widom, J. Epstein, M. Gross, S. Sifre, and T. Enos, *1994 Update: HIV/AIDS and Sexually Transmitted Diseases in Correctional Facilities* (see note 6); Behrendt, C., N. Kendig, C. Dambita, J. Horman, J. Lawlor, and D. Vlahov, "Voluntary Testing for Human Immunodeficiency Virus (HIV) in a Prison Population With a High Prevalence of HIV," *American Journal of Epidemiology* 139(9)(1994): 918–926.

93. Behrendt, C., N. Kendig, C. Dambita, J. Horman, J. Lawlor, and D. Vlahov, "Voluntary Testing for Human Immunodeficiency Virus (HIV) in a Prison Population With a High Prevalence of HIV" (see note 92); Hoxie, N.J., J.M. Vergeront, H.R. Frisby, J.R. Pfister, R. Golubjatnikov, and J.P. Davis, "HIV Seroprevalence and the Acceptance of Voluntary HIV Testing Among

Newly Incarcerated Male Prison Inmates in Wisconsin," *American Journal of Public Health* 80(9)(1990): 1129–1131.

94. J. Shuter, M.D., unpublished observation.

95. Wilfert, C.M., "Beginning to Make Progress Against HIV," *New England Journal of Medicine* 335(22): 1678–1680.

96. Behrendt, C., N. Kendig, C. Dambita, J. Horman, J. Lawlor, and D. Vlahov, "Voluntary Testing for Human Immunodeficiency Virus (HIV) in a Prison Population With a High Prevalence of HIV" (see note 92); Hoxie, N.J., J.M. Vergeront, H.R. Frisby, J.R. Pfister, R. Golubjatnikov, and J.P. Davis, "HIV Seroprevalence and the Acceptance of Voluntary HIV Testing Among Newly Incarcerated Male Prison Inmates in Wisconsin" (see note 93).

97. Holtgrave, D.R., R.O. Valdiserri, A.R. Gerber, and A.R. Hinman, "Human Immunodeficiency Virus Counseling Testing, Referral, and Partner Notification Services: A Cost-Benefit Analysis," *Archives of Internal Medicine* 153(10)(1993): 1225–1230.

98. Behrendt, C., N. Kendig, C. Dambita, J. Horman, J. Lawlor, and D. Vlahov, "Voluntary Testing for Human Immunodeficiency Virus (HIV) in a Prison Population With a High Prevalence of HIV" (see note 92).

99. Schwarcz, S.K., G.A. Bolan, T.A. Kellogg, R. Kohn, and G.F. Lemp, "Comparison of Voluntary and Blinded Human Immunodeficiency Virus Type 1 (HIV–1) Seroprevalence Surveys in a High Prevalence Sexually Transmitted Disease Clinic Population" (see note 84); Hull, H.F., C.J. Bettinger, M.M. Gallaher, N.M. Keller, J. Wilson, and G.J. Mertz, "Comparison of HIV-Antibody Prevalence in Patients Consenting to and Declining HIV-Antibody Testing in an STD Clinic" (see note 84).

100. Higgins, D.L., C. Galavotti, K.R. O'Reilly, D.J. Schnell, M. Moore, D.L. Rugg, and R. Johnson, "Evidence for the Effects of HIV Antibody Counseling and Testing on Risk Behaviors," *Journal of the American Medical Association* 266(17)(1991): 2419–2429; Otten, M.W., A.A. Zaidi, J.E. Wroten, J.J. Witte, and T.A. Peterman, "Changes in Sexually Transmitted Disease Rates After HIV Testing and Posttest Counseling, Miami, 1988 to 1989," *American Journal of Public Health* 83(4)(1993): 529–533.

101. Otten, M.W., A.A. Zaidi, J.E. Wroten, J.J. Witte, and T.A. Peterman, "Changes in Sexually Transmitted Disease Rates After HIV Testing and Posttest Counseling, Miami, 1988 to 1989" (see note 100).

102. Hammett, T.M., R. Widom, J. Epstein, M. Gross, S. Sifre, and T. Enos, *1994 Update: HIV/AIDS and Sexually Transmitted Diseases in Correctional Facilities* (see note 6).

103. Celentano, D.D., D. Vlahov, A.S. Menon, et al., "Maryland Inmates' Knowledge of HIV–1 Transmission and Prevention," *Journal of Prison and Jail Health* 9(1990): 45–50; Zimmerman, S.E., R. Martin, and D. Vlahov, "AIDS Knowledge and Risk Perceptions Among Pennsylvania Prisoners," *Journal of Criminal Justice* 19(3)(1991): 239–256.

104. Inciardi, J.A., "HIV Risk Reduction and Service Delivery Strategies in Criminal Justice Settings," *Journal of Substance Abuse and Treatment* 13(5)(1996): 421–428; St. Lawrence, J.S., G.D. Eldridge, M.C. Shelby, C.E. Little, T.L. Brasfield, and K.E. O'Bannon, III, "HIV Risk Reduction for Incarcerated Women: A Comparison of Brief Interventions Based on Two Theoretic Models," *Journal of Consulting and Clinical Psychology* 65(3)(1997): 504–509.

105. Centers for Disease Control and Prevention, "Community-Level Prevention of Human Immunodeficiency Virus Infection Among High Risk Populations: The AIDS Community Demonstration Projects" (note 60); Centers for Disease Control and Prevention, "Sexual Risk Behaviors of STD Clinic Patients Before and After Earvin 'Magic' Johnson's HIV-Infection Announcement—Maryland, 1991–1992" (note 69).

106. Centers for Disease Control and Prevention, "Community-Level Prevention of Human Immunodeficiency Virus Infection Among High Risk Populations: The AIDS Community Demonstration Projects" (note 60); Wiebel, W.W., A. Jimenez, W. Johnson, L. Ouellet, B. Jovanovic, T. Lampinen, J. Murray, and M.U. O'Brien, "Risk Behavior and HIV Seroincidence Among Out-of-Treatment Injection Drug Users: A Four-Year Prospective Study" (see note 68).

107. Palella, F.J., K.M. Delaney, A.C. Moorman, M.O. Loveless, J. Fuhrer, G.A. Satten, D.J. Aschman, and S.D. Holmberg, "Declining Morbidity and Mortality

Among Patients With Advanced Human Immunodeficiency Virus Infection" (see note 75).

108. Hecht, F.M., R.M. Grant, C.J. Petropoulos, B. Dillon, M.A. Chesney, H. Tian, N.S. Hellman, N.I. Bandrapalli, L. Digilio, B. Branson, and J.O. Kahn, "Sexual Transmission of an HIV–1 Variant Resistant to Multiple Reverse-Transcriptase and Protease Inhibitors" (see note 88).

109. Centers for Disease Control and Prevention, "Guidelines for the Use of Antiretroviral Agents in HIV-Infected Adults and Adolescents," *Morbidity and Mortality Weekly Report* 47(RR–5)(1998): 43–82.

110. Laine, C., L.E. Markson, L.J. McKee, W.W. Hauck, T.R. Fanning, and B.J. Turner, "The Relationship of Clinic Experience With Advanced HIV and Survival of Women With AIDS," *AIDS* 12(4)(1998): 417–424.

111. Warren, N., E.Y. Bellin, S. Zoloth, and S. Safyer, "Human Immunodeficiency Virus Care is Unavailable to Inmates on Release from Jail," *Archives of Family Medicine* 3(10)(1994): 894–898.

112. J. Shuter, M.D., unpublished observation.

113. Altice, F.L., F. Mostashari, A.S. Thompson, et al., "Perceptions, Acceptance, and Adherence to Antiretrovirals Among Prisoners," abstracts of the 4th Conference on Retroviruses and Opportunistic Infections, January 1997, Washington, D.C., Abstract 253.

114. Vernazza, P.L., B.L. Gilliam, M. Flepp, J.R. Dyer, A.C. Frank, S.A. Fiscus, M.S. Cohen, and J.J. Eron, "Effect of Antiviral Treatment on the Shedding of HIV–1 in Semen," *AIDS* 11(10)(1997): 1249–1254.

115. Contopoulos-Ioannidis, D.G., and J.P. Ioannidis, "Maternal Cell-Free Viremia in the Natural History of Perinatal HIV–1 Transmission: A Meta-Analysis," *Journal of AIDS* 18(2)(1998): 126–135.

116. Centers for Disease Control and Prevention, "Public Health Service Guidelines for the Management of Health-Care Worker Exposures to HIV and Recommendations for Postexposure Prophylaxis," *Morbidity and Mortality Weekly Report* 47(RR–7)(1998): 1–33.

117. Eng, T.R., and W.T. Butler, eds., *The Hidden Epidemic: Confronting Sexually Transmitted Diseases* (see note 58).

118. Edlin, B.R., K.L. Irwin, S. Faruque, C.B. McCoy, C. Word, Y. Serrano, J.A. Inciardi, B.P. Bowser, R.F. Schilling, and S.D. Holmberg, "Intersecting Epidemics—Crack Cocaine Use and HIV Infection Among Inner-City Young Adults: Multicenter Crack Cocaine and HIV Infection Study Team" (see note 18); Cohen, D., R. Scribner, J. Clark, and D. Cory, "The Potential Role of Custody Facilities in Controlling Sexually Transmitted Diseases" (see note 6); Kiviat, N.B., J.A. Paavonen, P. Wolner-Hanssen, C. Critchlow, W.E. Stamm, J. Douglas, D.A. Eschenbach, L.A. Corey, and K.K. Holmes, "Histopathology of Endocervical Infection Caused by *Chlamydia trachomatis*, Herpes Simplex Virus, *Trichimonas vaginalis*, and *Neisseria Gonorrhoeae*" (see note 27); Laga, M., A. Manoka, M. Kivuvu, B. Malele, M. Tuliza, N. Nzila, J. Goeman, F. Behets, V. Batter, M. Alary, et al., "Non-Ulcerative Sexually Transmitted Diseases as Risk Factors for HIV–1 Transmission in Women: Results From a Cohort Study" (see note 49).

119. Grosskurth, H., F. Mosha, J. Todd, E. Mwijarubi, A. Klokke, K. Kenkoro, P. Mayaud, J. Changalucha, A. Nicoll, G. ka-Gina, et al., "Impact of Improved Treatment of Sexually Transmitted Diseases on HIV Infection in Rural Tanzania: Randomised Controlled Trial," *Lancet* 346(1995): 530–536; Gilson, L., R. Mkanje, H. Grosskurth, F. Mosha, J. Picard, A. Gavyole, J. Todd, P. Mayaud, R. Swai, L. Fransen, D. Mabey, A. Mills, and R. Hayes, "Cost-Effectiveness of Improved Treatment Services for Sexually Transmitted Diseases in Preventing HIV–1 Infection in Mwanza Region, Tanzania," *Lancet* 350(9094)(1997): 1805–1809.

120. Centers for Disease Control and Prevention, "HIV Prevention Through Early Detection and Treatment of Other Sexually Transmitted Diseases—United States: Recommendations of the Advisory Committee for HIV and STD Prevention," *Morbidity and Mortality Weekly Report* 47(RR–12)(1998): 1–24.

121. Brown, A.E., and D.S. Burke, "Cost of HIV Testing in the U.S. Army," *New England Journal of Medicine* 332(14)(1995): 963.

122. Laine, C., L.E. Markson, L.J. McKee, W.W. Hauck, T.R. Fanning, and B.J. Turner, "The Relationship of Clinic Experience With Advanced HIV and Survival of Women With AIDS" (see note 110).

123. U.S. Department of Health and Human Services, *Controlling TB in Correctional Facilities*, Rockville, MD: U.S. Department of Health and Human Services,

Public Health Service, 1995: 1–58; Centers for Disease Control and Prevention, "Prevention and Control of Tuberculosis in Correctional Facilities," *Morbidity and Mortality Weekly Report* 45(RR–8)(1996): 1–27.

124. Wilcock, K., T.M. Hammett, R. Widom, and J. Epstein, *Tuberculosis in Correctional Facilities 1994–95,* Research in Brief, Washington, DC: U.S. Department of Justice, National Institute of Justice, July 1996, NCJ 157809: 1–12.

125. Kline, S.E., L.L. Hedemark, and S.F. Davies, "Outbreak of Tuberculosis Among Regular Patrons of a Neighborhood Bar," *New England Journal of Medicine* 333(4)(1995): 222–227.

126. Ferebee, S.H., "Controlled Chemophrophylaxis Trials in Tuberculosis: A General Review," *Advanced Tuberculosis Research* 17(1970): 28–106.

127. Frieden, T.R., P.I. Fujiwara, R.M. Washko, and M.A. Hamburg, "Tuberculosis in New York City—Turning the Tide," *New England Journal of Medicine* 333(4)(1995): 229–233; Weis, S.E., P.C. Slocum, F.X. Blais, B. King, M. Nunn, G.B. Matney, E. Gomez, and B.H. Foresman, "The Effect of Directly Observed Therapy on the Rates of Drug Resistance and Relapse in Tuberculosis," *New England Journal of Medicine* 330(17)(1994): 1179–1184.

128. Braden, C.R., I.M. Onorato, and J.H. Kent, "Tuberculosis Epidemiology—United States," in *Tuberculosis*, 1st ed., W.N. Rom and S. Garay, eds., New York: Little, Brown, and Company, 1996: 85–97.

129. Centers for Disease Control and Prevention, "Tuberculosis Morbidity—United States, 1995," *Morbidity and Mortality Weekly Report* 45(18)(1996): 365–370.

130. Stead, W.W., "Undetected Tuberculosis in Prison: Sources of Infection for Community at Large" (see note 5); Abeles, H., H. Feibes, E. Mandel, and J.A. Girard, "The Large City Prison—A Reservoir of Tuberculosis: Tuberculosis Control Among Sentenced Male Prisoners in New York City," *American Review of Respiratory Diseases* 101(5)(1970): 706–709.

131. Wright, H.C., G. McAneny, and G. Cromwell, "History of the Care of Dependents—New York City," in *Report of the Committee on Inquiry Into the Departments of Health, Charities, and Bellevue and Allied Hospitals*, New York: J.J. Little and Ives Co., 1913: 427–448.

132. Ibid.

133. Boyce, L.L., ed., *The Health Officers' Manual and Public Health Law of the State of New York,* Albany: Matthew Bender Co., 1902: 159–160.

134. Hutton, M.D., G.M. Cauthen, and A.B. Bloch, "Results of a 29-State Survey of Tuberculosis in Nursing Homes and Correctional Facilities," *Public Health Reports* 108(3)(1993): 305–314.

135. Braun, M.M., B.I. Truman, B. Maguire, G.T. Di Fernando, Jr., G. Wormser, R. Broaddus, and D.L. Morse, "Increasing Incidence of Tuberculosis in a Prison Inmate Population: Association with HIV Infection," *Journal of the American Medical Association* 261(3)(1989): 393–397.

136. Centers for Disease Control and Prevention, "Tuberculosis Morbidity—United States, 1995" (see note 129).

137. New York City Department of Health, *Health of the City: Focus on Tuberculosis,* New York: New York City Department of Health, 1995: 33.

138. Hammett, T.M., P. Harmon, and W. Rhodes, "The Burden of Infectious Disease Among Inmates and Releasees From Correctional Facilities" (see note 13).

139. Valway, S.E., S.B. Richards, J. Kovacovich, R.B. Griefinger, J.T. Crawford, and S.W. Dooley, "Outbreak of Multidrug-Resistant Tuberculosis in a New York State Prison, 1991," *American Journal of Epidemiology* 140: 113–122; Bergmire-Sweat, D., B. Barnett, J. Taylor, S.L. Harris, G.H. Mazurek, and V. Reddy, "Tuberculosis Outbreak in a Texas Prison," Thirty-Fifth Interscience Conference on Antimicrobial Agents and Chemotherapy, September 17–20, 1995, San Francisco: K122; Centers for Disease Control and Prevention, "Tuberculosis Transmission in a State Correctional Institution—California, 1990–1991," *Morbidity and Mortality Weekly Report* 41(49)(1992): 927–929; Centers for Disease Control and Prevention, "Probable Transmission of Multidrugresistant Tuberculosis in a Correctional Facility—California," *Morbidity and Mortality Weekly Report* 42(3)(1993): 48–51.

140. Bellin, E.Y., D.D. Fletcher, and S.M. Safyer, "Association of Tuberculosis Infection With Increased Time in or Admission to the New York City Jail System," *Journal of the American Medical Association*

26(17)(1993): 2228–2231; Centers for Disease Control and Prevention, "Prevention and Control of Tuberculosis in Correctional Facilities" (see note 123); "Where Tuberculosis Breeds" (editorial), *New York Times*, May 11, 1993.

141. Iseman, M.D., "Evolution of Drug-Resistant Tuberculosis: A Tale of Two Species," *Proceedings of the National Academy of Sciences* 91(7)(1994): 2428–2429; Shuter, J., and E.Y. Bellin, "Tuberculosis in the Correctional Facility," in *Clinical Practice in Correctional Medicine*, M. Puisis, ed., St. Louis: Mosby, 1998: 109–126.

142. Valway, S.E., S.B. Richards, J. Kovacovich, R.B. Griefinger, J.T. Crawford, and S.W. Dooley, "Outbreak of Multidrug-Resistant Tuberculosis in a New York State Prison, 1991" (see note 139); Centers for Disease Control and Prevention, "Probable Transmission of Multidrugresistant Tuberculosis in a Correctional Facility—California" (see note 139).

143. Frieden, T.R., P.I. Fujiwara, R.M. Washko, and M.A. Hamburg, "Tuberculosis in New York City—Turning the Tide" (see note 127); Weis, S.E., P.C. Slocum, F.X. Blais, B. King, M. Nunn, G.B. Matney, E. Gomez, and B.H. Foresman, "The Effect of Directly Observed Therapy on the Rates of Drug Resistance and Relapse in Tuberculosis" (see note 127).

144. Reichman, L.B., "How to Ensure the Continued Resurgence of Tuberculosis," *Lancet* 347(8995)(1996): 175–177.

145. Daley, C.L., P.M. Small, G.F. Schecter, G.K. Schoolnik, R.A. McAdam, W.R. Jacobs, Jr., and P.C. Hopewell, "An Outbreak of Tuberculosis With Accelerated Progression Among Persons Infected With the Human Immunedeficiency Virus," New England Journal of Medicine 326(4(1992): 231–235.

146. U.S. Department of Health and Human Services, *Controlling TB in Correctional Facilities* (note 123); Centers for Disease Control and Prevention, "Prevention and Control of Tuberculosis in Correctional Facilities" (see note 123); Simone, P.M., and M. Puisis, "Tuberculosis Screening," in *Clinical Practice in Correctional Medicine*, M. Puisis, ed., St. Louis: Mosby, 1998: 101–108; Shuter, J., and E.Y. Bellin, "Tuberculosis in the Correctional Facility" (see note 141).

147. Wilcock, K., T.M. Hammett, R. Widom, and J. Epstein, *Tuberculosis in Correctional Facilities 1994–95* (see note 124).

148. Centers for Disease Control and Prevention, "Guidelines for Preventing the Transmission of *Mycobacterium tuberculosis* in Health Care Facilities, 1994," *Morbidity and Mortality Weekly Report* 43(RR–13)(1994): 1–132; Segal-Maurer, S., and G. Kalkut, "Environmental Control of Tuberculosis: Continuing Controversy," *Clinical Infectious Diseases* 19(2): 299–308.

149. Wilcock, K., T.M. Hammett, R. Widom, and J. Epstein, *Tuberculosis in Correctional Facilities 1994–95* (see note 124).

150. Ibid.

151. Riley, R.L., and A.S. Moodie, "Infectivity of Patients with Pulmonary Tuberculosis in Inner City Homes," *American Review of Respiratory Diseases* 110(6)(1974): 810–812.

152. U.S. Department of Health and Human Services, *Controlling TB in Correctional Facilities* (note 123); Centers for Disease Control and Prevention, "Prevention and Control of Tuberculosis in Correctional Facilities" (see note 123).

153. Wilcock, K., T.M. Hammett, R. Widom, and J. Epstein, *Tuberculosis in Correctional Facilities 1994–95* (see note 124).

154. Centers for Disease Control and Prevention, "Prevention and Control of Tuberculosis in Correctional Facilities" (see note 123).

155. Nolan, C.M., L. Roll, S.V. Goldberg, and A.M. Elarth, "Directly Observed Isoniazid Preventive Therapy for Released Jail Inmates," *American Journal of Respiratory and Critical Care Medicine* 155(2)(1997): 583–586.

156. Alcabes, P., P. Vossenas, R. Cohen, C. Braslow, D. Michaels, and S. Zoloth, "Compliance with Isoniazid Prophylaxis in Jail," *American Review of Respiratory Diseases* 140(5)(1989): 1194–1197.

157. Centers for Disease Control and Prevention, "Prevention and Control of Tuberculosis in Correctional Facilities" (see note 123).

158. ACCP/ATS Consensus Conference, "Institutional Control Measures for Tuberculosis in the Era of Multiple Drug Resistance," *Chest* (108)(6)(1995): 1690–1710.

159. Layton, M., T. Frieden, and K. Henning, "Screening of Inmates for Tuberculosis by Chest X-Rays," presented at the 34th Interscience Conference on Antimicrobial Agents and Chemotherapy, October 4–7, 1994, Orlando, FL: J113.

160. Robinson, W.S., "Hepatitis B Virus and Hepatitis D Virus," in *Principles and Practice of Infectious Diseases*, G.L. Mandell, J.E. Bennett, and R. Dolin, eds., New York: Churchill Livingstone, 1995: 1406–1439.

161. Centers for Disease Control and Prevention, "Recommendations for Prevention and Control of Hepatitis C Virus (HCV) Infection and HCV-Related Chronic Disease," *Morbidity and Mortality Weekly Report* 47(RR–19)(1998): 1–39.

162. Ibid.

163. Ibid.

164. Allen, J.G., D. Dawson, W.A. Sayman, et al., "Blood Transfusions and Serum Hepatitis: Use of Monochloroacetate as an Antibacterial Agent in Plasma," *Annals of Surgery* 150(1959): 455–468; Koff, R.S., and T.C. Chalmers, "Prisoner Blood Donors and Posttransfusion (Icteric) Viral Hepatitis," *Transfusion* 7(6)(1967): 436–439.

165. Allen, J.G., D. Dawson, W.A. Sayman, et al., "Blood Transfusions and Serum Hepatitis: Use of Monochloroacetate as an Antibacterial Agent in Plasma" (see note 164); Koff, R.S., and T.C. Chalmers, "Prisoner Blood Donors and Posttransfusion (Icteric) Viral Hepatitis" (see note 164).

166. Allen, J.G., D. Dawson, W.A. Sayman, et al., "Blood Transfusions and Serum Hepatitis: Use of Monochloroacetate as an Antibacterial Agent in Plasma" (see note 164).

167. Ibid.

168. Schafer, I.A., and J.W. Mosley, "A Study of Viral Hepatitis in a Penal Institution," *Annals of Internal Medicine* 49(1958): 1162–1177.

169. Kibby, T., J. Devine, and C. Love, "Prevalence of Hepatitis B Among Men Admitted to a Federal Prison," *New England Journal of Medicine* 306(3)(1982): 175; Bader, T., "Hepatitis B Carriers in the Prison Population," *New England Journal of Medicine* 308(5)(1983): 281; Ruiz, J.D., and J. Mikanda, *Seroprevalence of HIV, Hepatitis B, Hepatitic C, and Risk Behaviors Among Inmates Entering the California Correctional System*. California Department of Health Services, Office of AIDS, HIV/AIDS Epidemiology Office, March 1996; Mikl, J., A. Dzierbicki, P.F. Smith, et al., "Trends in HIV Infection Rates Among New York State (NYS) Prison Inmates, 1987–97," paper presented at the 12th World AIDS Congress, June 30, 1998, Geneva, Switzerland, Abstract 23516; Vlahov, D., K.E. Nelson, T.C. Quinn, and N. Kendig, "Prevalence and Incidence of Hepatitis C Virus Among Male Prison Inmates in Maryland," *European Journal of Epidemiology* 9(5)(1993): 566–569; Fennie, K.P., P.A. Selwyn, and F.L. Altice, "Hepatitis C Virus Seroprevalence and Seroincidence in a Cohort of HIV+ and HIV– Female Inmates," paper presented at the XI International Conference on AIDS, July 9, 1996, Vancouver, British Columbia, Abstract Tu.C.2655.

170. Centers for Disease Control and Prevention, "Recommendations for Prevention and Control of Hepatitis C Virus (HCV) Infection and HCV-Related Chronic Disease" (see note 161); Centers for Disease Control, "Hepatitis B Virus: A Comprehensive Strategy for Eliminating Transmission in the United States Through Universal Childhood Vaccination: Recommendations of the Immunization Practice Advisory Committee (ACIP)," *Morbidity and Mortality Weekly Report* 40(RR–13)(1991): 1–25; ACP Task Force on Adult Immunization and Infectious Diseases Society of America, *Guide for Adult Immunization,* Philadelphia: American College of Physicians, 1995: 32.

171. Mikl, J., A. Dzierbicki, P.F. Smith, et al., "Trends in HIV Infection Rates Among New York State (NYS) Prison Inmates, 1987–97" (see note 169).

172. Ruiz, J.D., and J. Mikanda, *Seroprevalence of HIV, Hepatitis B, Hepatitis C, and Risk Behaviors Among Inmates Entering the California Correctional System* (see note 169).

173. E.Y. Bellin, unpublished observation.

174. McQuillan, G.M., P.J. Coleman, D. Kruszon-Moran, L.A. Moyer, S.B. Lambert, and H.S. Margolis, "Prevalence of Hepatitis B Virus Infection in the United States: The National Health and Nutrition Examination Surveys, 1976 through 1994," *American Journal of Public Health* 89(1)(1999): 14–18.

175. Hammett, T.M., P. Harmon, and W. Rhodes, "The Burden of Infectious Disease Among Inmates and Releasees From Correctional Facilities" (see note 13).

176. Centers for Disease Control and Prevention, "Recommendations for Prevention and Control of Hepatitis C Virus (HCV) Infection and HCV-Related Chronic Disease" (see note 161); Centers for Disease Control, "Hepatitis B Virus: A Comprehensive Strategy for Eliminating Transmission in the United States Through Universal Childhood Vaccination: Recommendations of the Immunization Practice Advisory Committee (ACIP)" (see note 170); ACP Task Force on Adult Immunization and Infectious Diseases Society of America, *Guide for Adult Immunization* (see note 170).

177. Centers for Disease Control and Prevention, "Recommendations for Prevention and Control of Hepatitis C Virus (HCV) Infection and HCV-Related Chronic Disease" (see note 161); Omata, M. "Treatment of Chronic Hepatitis B Infection," *New England Journal of Medicine* 339(2)(1998): 114–115.

178. Centers for Disease Control, "Hepatitis B Virus: A Comprehensive Strategy for Eliminating Transmission in the United States Through Universal Childhood Vaccination: Recommendations of the Immunization Practice Advisory Committee (ACIP)" (see note 170).

179. McQuillan, G.M., P.J. Coleman, D. Kruszon-Moran, L.A. Moyer, S.B. Lambert, and H.S. Margolis, "Prevalence of Hepatitis B Virus Infection in the United States: The National Health and Nutrition Examination Surveys, 1976 through 1994" (see note 174).

180. Centers for Disease Control, "Hepatitis B Virus: A Comprehensive Strategy for Eliminating Transmission in the United States Through Universal Childhood Vaccination: Recommendations of the Immunization Practice Advisory Committee (ACIP)" (see note 170); ACP Task Force on Adult Immunization and Infectious Diseases Society of America, *Guide for Adult Immunization* (see note 170).

181. ACP Task Force on Adult Immunization and Infectious Diseases Society of America, *Guide for Adult Immunization* (see note 170).

182. Jaiswal, S.P., M.V. Asolkar, R. Vijayvargiya, and D.S. Chitnis, "Immunogenicity of Low Dose Hepatitis B Vaccine by the Intradermal Route and Persistence of Anti-HBs After Three Years," *Indian Journal of Medical Research* 102(1995): 129–133; Contractor, Q.Q., S.N. Marathe, V.V. Parab, and V.V. Kale, "Accelerated, Low-Dose, Intradermal Hepatitis B Vaccine," *Indian Journal of Gastroenterology* 16(1)(1997): 37.

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Chronic Disease Panel

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Communicable Disease Panel

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Appendix B: Biographies of Contributors

FREDERICK L. ALTICE, M.D., is associate professor of medicine, AIDS Program, at Yale University School of Medicine. He is also director of the HIV in Prisons Program in the State of Connecticut and the Community Health Care Van Project. A graduate of Emory University, he is a researcher, writer, and lecturer who is active in the American Public Health Association, the Infectious Disease Society of America, and the Society for Correctional Physicians. He is also one of the founders of HEPP News (HIV Education Prison Project), a forum for correctional problem solving. He has written numerous articles and papers. His chapters "Overview of HIV Care" and "Use of Antiretroviral Agents in the Treatment of HIV" in the 1998 publication *Clinical Practice in Correctional Medicine* were cited for distinction. He served as a member of the NCCHC–NIJ expert panel on communicable disease.

B. JAYE ANNO, Ph.D., CCHP–A, is a criminologist specializing in correctional health administration and compliance with national correctional health care standards. She operates a correctional health care consulting firm. Dr. Anno is an experienced researcher, lecturer, and author in correctional health care. She is the principal author of the major reference book for the field, *Prison Health Care: Guidelines for the Management of an Adequate Delivery System*, and has written numerous other articles and reports on correctional health care topics. She is a past editor of the *Journal on Correctional Health Care*, and writes a column, "Q & A on NCCHC Standards," for the quarterly newspaper *CORRECTCARE*. Dr. Anno received the Distinguished Service Award of the American Correctional Health Services Association and the NCCHC's Award of Merit. In 1999, she received the "Award of Excellence in Correctional Health Care Communications" from the National Commission on Correctional Health Care. She served on the steering committee of the NCCHC–NIJ project on *The Health Status of Soon-To-Be-Released Inmates.*

CARL C. BELL, M.D., FAPA, CCHP, FAC Psych, is president and chief executive officer, Community Health Council & Foundation, Inc, and a Clinical professor of psychiatry and public health, University of Illinois. He is coprincipal investigator of the Chicago African-American Youth Health Behavior Project, Health Research and Policy Center. He is a collaborator of the Chicago HIV Prevention and Adolescent Mental Health Project (CHAMP) and a coprincipal investigator of the Informed Consent in Urban AIDS and Mental Health Research Project, University of Illinois Department of Psychiatry. He is a founding and member and past board chairman of the National Commission on Correctional Health Care. During his 30 years of psychiatric practice, Dr. Bell has published more than 200 articles on mental health issues. He is author of many publications, including *Getting Rid of Rats: Perspectives of a Black Community Psychiatrist* and coauthor of *Suicide and Homicide Among Adolescents.* He was a member of the Violence Against Women Advisory Council appointed by Janet Reno, Attorney General, and Donna Shalala, Secretary, Department of Health and Human Services, from 1995 to 2000. He served as a member of the NCCHC–NIJ expert panel on mental illness.

ERAN BELLIN, M.D., is the director of the Montefiore Medical Center Department of Outcomes Analysis and Decision Support and an associate professor of epidemiology and social medicine at the Albert Einstein College of Medicine. From 1974 to 1977, Dr. Bellin directed the Montefiore Rikers Island Health Program, which provided ongoing medical care for approximately 100,000 inmates. He

served as director of infectious disease services on Rikers from 1989 to 1994, developing the plans for, and serving as consultant to, the 140-bed negative pressure respiratory isolation facility built in the jail. His case control study published in 1993 in the *Journal of the American Medical Association* demonstrated the risk of clinical tuberculosis from incarceration in the New York City jail. He served as a member of the NCCHC–NIJ expert panel on communicable disease.

ELISSA P. BENEDEK, M.D., is clinical professor of psychiatry at the University of Michigan Medical Center. She is past president of the American Psychiatric Association (1990–91). She served as director of research and training at the Center for Forensic Psychiatry in Ann Arbor, Michigan, for 25 years. The center trains psychiatric fellows to work in correctional psychiatry and forensic psychiatry. Her research interest focuses on violence and violent behavior in child, adolescent, and adult populations. She served as a member of the NCCHC–NIJ expert panel on mental illness.

R. SCOTT CHAVEZ, M.P.A., PA–C, CCHP, is vice president for the National Commission on Correctional Health Care and served as project coordinator for the NCCHC–NIJ *The Health Status on Soon-To-Be-Released Inmates* project. Mr. Chavez's responsibilities with NCCHC include technical assistance on health care standards, quality improvement, risk management, and organizational development in correctional health care systems. Mr. Chavez is principal investigator for a CDC grant to the NCCHC on "Hepatitis Curricula for Correctional Officers and Inmates." He has authored chapters on physician assistant utilization in corrections for *Health Care Management Issues in Corrections* and *Physician Assistant: A Guide to Clinical Practice*. He has a master's in public administration from the University of Nebraska, Omaha, and is a Ph.D. candidate at the Health Services Division of Walden University. His dissertation is on the differences, trends, and predictors of quality health care in public and private correctional health care systems.

JOHN H. CLARK, M.D., M.P.H., CCHP–A, is the chief medical officer for the Los Angeles County Sheriff's Department. Dr. Clark graduated from Meharry Medical College in 1971 and trained at the University of Southern California Medical Center and Martin Luther King Jr., General Hospital in Los Angeles, California. He received a master's in health services and hospital administration from the University of California–Los Angeles. His professional activities include the American Correctional Health Services Association (Past President), American Jail Association (Board of Directors), and he is a Certified Correctional Health Professional–Advanced. Dr. Clark has published on a variety of topics in the correctional health profession including managing tuberculosis, paraplegics, inmate self-medication programs, and developing HIV disease policies for the correctional environment. He has lectured nationally and has served as a consultant and expert witness dealing with civil rights litigation related to correctional health care issues. He served as a member of the NCCHC–NIJ expert panel on communicable disease.

THOMAS J. CONKLIN, M.D., CCHP–A, is director of health services at the Hampden County Correctional Center in Ludlow, Massachusetts. He has developed a public health model of care for corrections that effectively stresses assessment, effective treatment, education, prevention, and continuity of care by referring inmates to their neighborhood health centers following discharge. Dr. Conklin is board certified in psychiatry and is certified in administration by the American Psychiatric Association. Dr. Conklin was the first chairman of the department of psychology and neurology in the Touro Infirmary in New Orleans, Louisiana. He is a fellow of the American Psychiatric Association. He also has numerous publications and presentations focusing on health care in hospitals and in corrections. He served as a member of the NCCHC–NIJ expert panel on mental illness.

CHERYL CRAWFORD, M.P.A., J.D., is Deputy Director, Office of Development and Communications, National Institute of Justice (NIJ). NIJ was established by Congress to develop and disseminate knowledge that will reduce crime, enhance public safety, and improve the administration of justice. She coordinates project management and integrative services for three divisions (Communications, Development, and International) in NIJ's Office of Development & Communications. From 1987 to 1998, Ms. Crawford managed NIJ's correctional health care research and dissemination portfolio. She has spoken and written extensively on correctional health care issues, including the impact of HIV/AIDS and TB in corrections and the costs of correctional health care. She manages the Reentry Partnership Initiative, a multiagency, multisite effort focused on transitioning offenders from prison to community; this effort includes health components. She received her B.A. in criminal justice from the University of Wisconsin–Platteville and her master's in public administration and J.D. from the University of Wisconsin–Madison. Ms. Crawford served as a member of the steering committee of the NCCHC–NIJ project on *The Health Status of Soon-To-Be-Released Inmates*.

PHYLLIS E. CRUISE, B.A., received her B.A. in education in psychology from Southern Illinois University. She has been employed at Centers for Disease Control and Prevention since 1978. She is the senior public health advisor assigned to the Texas Department of Health Tuberculosis Elimination Division. Ms. Cruise developed and implemented the Texas legislation that mandates TB screening for staff and inmates. Ms. Cruise supervises the project that monitors the mandated screening activities, and includes contact, followup, tracking and continuity of care of inmates and staff with active TB disease or who have been exposed to active tuberculosis. Ms. Cruise is the author of *Prevention and Control of Tuberculosis in Correctional Facilities—Recommendations of the Advisory Council for the Elimination of Tuberculosis*. She has appeared as an expert panel member and developed national satellite programs, training seminars, and videos addressing issues affecting the control of tuberculosis in correctional facilities. She has also provided consultation to local, State, and Federal correctional agencies. She served as a member of the NCCHC–NIJ expert panel on communicable disease.

HAZEL D. DEAN-GAITOR, Sc.D., M.P.H., earned her B.S. in biology from Spelman College and her M.P.H. and Sc.D. from Tulane University School of Public Health and Tropical Medicine. She is an epidemiologist at the Centers for Disease Control and Prevention (CDC) in the National Center for HIV, STD, and TB Prevention. She is responsible for formulating, implementing, and evaluating CDC's national HIV/AIDS surveillance system among racial and ethnic minorities and special populations (e.g., incarcerated persons). She conducts complex statistical and epidemiological analyses of racial and ethnic minorities and special populations collected through this surveillance system. She serves as the HIV/AIDS Surveillance Branch's primary technical resource on surveillance of racial and ethnic minorities and special populations. Dr. Dean-Gaitor represents the CDC on the United States Department of Health and Human Services Crisis Response Team to Combat HIV/AIDS in Racial and Ethnic Minority Populations and the NCCHC–NIJ expert panels on communicable and chronic disease. She has written or contributed to numerous reports, papers and presentations on HIV/AIDS, with special emphasis on persons reported from correctional settings, trends among foreign-born persons with AIDS, and AIDS in bisexual minority men.

ANNE DE GROOT, M.D., is the head of the TB/HIV research laboratory at the International Health Institute, where she and colleagues are working on the development of HIV and TB vaccines. She received her B.A. from Smith College in 1978 and her M.D. from the University of Chicago. She trained in internal medicine at the New England Medical Center in vaccine research, and received her specialized training in infectious diseases at the New England Medical Center. She is a faculty member of the Brown University School of Medicine. Dr. De Groot has provided HIV care to incarcerated individuals at a number of different corrections institutions since 1989. She founded and directed the HIV clinic at the

Massachusetts Correctional Institution at Framingham. She also served on the Governor's AIDS Task Force. Dr. De Groot has been working on developing a standard of care for HIV-infected and at-risk incarcerated women. She founded and cochairs the HIV Education Prison Project (HEPP) at the Brown University AIDS Program, which publishes a monthly newsletter on HIV management in prisons and jails that reaches more than 2,000 correctional HIV professionals. She served as a member of the NCCHC–NIJ expert panel on communicable disease.

LORI DE RAVELLO, M.P.H., has more than 9 years of experience in international and domestic public health program operations and management. Since 1996, she has worked as a public health advisor in the Division of Reproductive Health, National Center for Chronic Disease Prevention and Health Promotion at the Centers for Disease Control and Prevention in Atlanta, Georgia. Her duties include that of project officer for an HIV-prevention training intervention in U.S. reproductive health settings, primary investigator for a retrospective research study looking at the reproductive health status of pregnant inmates in the State of Georgia, and chair of the Cross-Center Corrections Work Group. She has a bachelor's degree in international relations/Latin American studies from the University of New Mexico and a master's degree in international public health with a concentration in administration and management from the University of Alabama at Birmingham. She served as a U.S. Peace Corps volunteer in Honduras from 1990 to 1991. Ms. de Ravello served as a member of the NCCHC–NIJ expert panel on chronic disease.

PETER FINN, M.A., is a research associate at Abt Associates Inc. He received his B.A. in history from Harvard College and M.A. in history from the University of California at Berkeley. The U.S. Department of Justice, National Institute of Justice (NIJ), has published his series of reports on life skills programs for prison and jail inmates and job placement programs for ex-offenders. In 2000, NIJ published his book, *Addressing Correctional Officer Stress: Programs and Strategies*, a companion report to his study, *Developing a Law Enforcement Stress Program for Officers and Their Families*, also published by NIJ. Mr. Finn was part of the research team that visited prisons and interviewing health care administrators and providers as part of Abt Associates' comprehensive assessment of prison health services in Washington State. He served as technical writer for the NCCHC–NIJ *The Health Status of Soon-To-Be-Released Inmates* project.

JUARLYN L. GAITER, Ph.D., is a supervisory behavioral scientist in the Behavioral Intervention Research Branch at the Center for Disease Control and Prevention. She received her master's and Ph.D. in experimental child psychology from Brown University and certification as a clinical psychologist at the George Washington University. Dr. Gaiter initiated and established the first HIV/AIDS Prevention research project for prison populations at the CDC. She has written and coauthored articles in this area and has held a number of research and management positions during her 10-year career in public health. Her research interests focus on maternal and child health, faith, health and healing, pediatric and developmental psychology, and the effects of racism on health outcomes for African-Americans. She served as a member of the NCCHC–NIJ expert panel on mental illness.

ANDREW L. GOLDBERG, M.A., is a social science analyst in the Office of Research and Evaluation at the National Institute of Justice. He received his B.A. from Drew University in political science in 1990 and his M.A. from the University at Albany (NY) in criminal justice in 1992. At NIJ, Mr. Goldberg's areas of focus include correctional health care, sentencing, and adjudication research projects. He served as a member of the steering committee of the NCCHC–NIJ *The Health Status of Soon-To-Be-Released Inmates* project.

RODERIC GOTTULA, M.D., is an assistant professor in the Department of Family Medicine at the University of Colorado Health Sciences Center. He is immediate past president of the Society of Correctional Physicians. He received his M.D. at the University of Nebraska College of Medicine in 1975, and completed his family medicine residency at Iowa Lutheran Hospital in Des Moines, Iowa, in 1978. From 1991 to 1995, Dr. Gottula served as the medical director for the Colorado Department of Corrections. He has remained active in the area of health care and criminal justice. He has lectured at national and local conferences on criminal justice and health care. He served as a member of the NCCHC–NIJ expert panel on chronic disease.

ROBERT B. GREIFINGER, M.D., is a medical management consultant. His work focuses on the design, management, quality improvement, and utilization management systems in managed care organizations and correctional health care systems. He has extensive experience in the development and management of complex community and institutional health care programs, and demonstrated strengths in leadership, negotiation, communication, and the bridging of clinical and public policy interests. His clients include managed care organizations and state and local correctional systems. He has a variety of assignments as a court-appointed expert to investigate and design remedies for ailing correctional health care systems. Dr. Greifinger has published extensively in the area of correctional health care. He is a frequent speaker on public policy, communicable disease control and quality management in corrections. He works closely with the National Committee for Quality Assurance (NCQA) and sits on a variety of national health care advisory committees. Through NCCHC, Dr. Greifinger is the principal investigator for the NIJ-funded project on *The Health Status of Soon-To-Be-Released Inmates*.

THEODORE M. HAMMETT, Ph.D., is a vice president at Abt Associates Inc., a leading policy research firm with headquarters in Cambridge, Massachusetts. Dr. Hammett's work has focused on public health, corrections, and criminal justice. Since 1985, he has directed a series of nine national studies of HIV/AIDS, STDs, and TB in correctional facilities under the joint sponsorship of NIJ and the Centers for Disease Control and Prevention (CDC). He is coprincipal investigator of the evaluation and program support center for seven grants to States for enhancement of HIV prevention, treatment, and continuity of care in correctional settings. He is also directing an evaluation of the Hampden County (Massachusetts) Correctional Center's public health model of correctional health care. Dr. Hammett has spoken before national and international conferences, testified before the National Commission on AIDS, and participated in an invited consultation on HIV/AIDS in Prisons at the World Health Organization in Geneva. He has published many books, articles, and reports on HIV/AIDS, TB, and STDs as they affect criminal justice agencies, inmates, and drug-involved populations. Dr. Hammett served as a member of the NCCHC–NIJ expert panel on communicable disease.

EDWARD A. HARRISON, M.M., CCHP, is president of the National Commission on Correctional Health Care, overseeing a not-for-profit organization that develops programs and policies aimed at improving the delivery and quality of health services in detention and correctional facilities throughout the United States. He has spoken and written extensively on public health and correctional health care matters, addressing State legislatures, county commissioners, the United States Congress, and public and private local, State, and national agencies. In advocating higher quality correctional medical services, Mr. Harrison has focused the NCCHC's resources on improved standards for health services delivery, more educational opportunities and better recognition for correctional health care professionals, increased quality assessment and improvement programs for the field, and greater research and better understanding of all aspects of correctional health care. He earned his master's of management from Northwestern University's J.L. Kellogg Graduate School of Management. Mr. Harrison served as a member of the steering committee for the NCCHC–NIJ project on *The Health Status of Soon-To-Be-Released Inmates*.

HOLLY A. HILLS, Ph.D., is an associate professor in the department of community mental health at the Louis de la Parte Florida Mental Health Institute, University of South Florida (USF). She is a licensed clinical psychologist who received her Ph.D. in clinical and health psychology from the University of Florida. Since joining the USF faculty in 1990, Dr. Hills has conducted research and supervised clinical work that focused on individuals with comorbid mental illness and substance use disorders. Over much of the past decade she has worked with the Florida Department of Corrections as a lead consultant in the development and evaluation of prison-based residential treatment programs for male and female inmates with co-occurring disorders. Dr. Hills has been a collaborator and consultant on the national GAINS Center project, a Federal partnership that promotes improved services for people with co-occurring disorders in the justice system. Her recent efforts include being awarded funds by the Center for Substance Abuse Treatment (CSAT) as a coinvestigator to develop a practice and research collaborative (PRC) in the Tampa Bay area. This initiative seeks to improve collaboration among researchers, practitioners, policymakers, and criminal justice personnel who work with substance-involved individuals in the justice system. Dr. Hills served as a member of the NCCHC–NIJ expert panel on mental illness.

MARTIN F. HORN, M.A., is the former Pennsylvania Secretary of Corrections since his nomination by Governor Tom Ridge in February 1995. He has 30 years of varied corrections experience, having served as a parole officer, senior parole officer, director of parole operations and executive director and chief operating officer for the New York State Division of Parole. He also was assistant professor of criminal justice at State University College at Utica, N.Y. Mr. Horn served as director of temporary release, assistant commissioner, and prison superintendent for the New York Department of Correctional Services. He earned a bachelor's in government from Franklin and Marshall College in Lancaster, Pennsylvania, and a master's in criminal justice from John Jay College, City University of New York. He serves as vice chairman of the Law Enforcement and Corrections Technology Advisory Committee, and is a member of the American Correctional Association, the Association of State Corrections Administrators and the Pennsylvania Prison Wardens Association. Mr. Horn served as a member of the NCCHC–NIJ expert panel on mental illness.

CARLTON A. HORNUNG, Ph.D., M.P.H., is professor of medicine, director of the Center for Epidemiology and Clinical Investigation, and director of the Clinical Research, Epidemiology, and Statistics Training Program at the University of Louisville School of Medicine. Dr. Hornung completed his bachelor's at the State University of New York at Buffalo, his master's and Ph.D. degrees at the Maxwell Graduate School of Syracuse University, and his postdoctoral and master's of public health training at the Johns Hopkins University. Before moving to the University of Louisville in 1997, Dr. Hornung was professor of medicine and adjunct professor of epidemiology and biostatistics at the University of South Carolina. He has served as visiting professor of medicine at the University of Medicine and Pharmacy in Cluj-Napoca, Romania, and as member of the Romanian National Advisory Committee on Cardiovascular Disease. His research interests focus on atherosclerotic vascular disease. He was a vanguard investigator for the NIH Antihypertensive, Lipid Lowering to Prevent Heart Attack Trial (ALLHAT) and a coinvestigator in the New Approaches to Coronary Intervention (NACI) Registry. He has authored or coauthored more than 70 peer-reviewed publications and more than 200 abstracts. Dr. Hornung served as a member of the NCCHC–NIJ expert panel on chronic disease.

T. STEPHEN JONES, M.D., M.P.H., has been the associate director for science of the Centers for Disease Control and Prevention (CDC), Division of HIV/AIDS Prevention—Intervention Research and Support since 1997 and has been the special assistant for substance abuse and HIV prevention in the Division of HIV/AIDS Prevention since 1990. He has worked on HIV prevention related to drug injection since 1987, with major interests in HIV serologic studies of injection drug users (IDUs), HIV counseling and testing in drug treatment programs, evaluation of syringe exchange programs, and making sterile injection equipment more available to IDUs. From 1979 to 1987, he worked on CDC international health

programs promoting childhood immunization in Latin America and child survival programs in Africa. He participated in the World Health Organization's smallpox eradication programs in India, Bangladesh, and Somalia. He received his M.D. from Columbia University, and his M.P.H. at the University of Michigan. Dr. Jones served as a member of the NCCHC–NIJ expert panel on communicable disease.

CAPTAIN NEWTON KENDIG, M.D., Medical Director, Federal Bureau of Prisons (BOP), began his career with the Bureau of Prisons as the chief physician and the chief of infectious diseases at the Central Office in 1996. Before transferring to the BOP, Captain Kendig was the medical director of the Maryland Division of Corrections from 1991 to 1996. He completed his internship/residency in internal medicine at the University of Rochester Strong Memorial Hospital in Rochester, New York, in 1986. He completed his fellowship in infectious diseases at Johns Hopkins University in Baltimore, Maryland, and was a clinical associate of the U.S. Public Health Service at the National Institute of Aging, National Institutes of Health, Baltimore, Maryland. Captain Kendig has received numerous awards, including Outstanding Service Medal 1998, Outstanding Unit Citation 1998, Commendation Medal 1997, Unit Commendation 1997, and Alpha Omega Alpha Honor Society 1983. Captain Kendig served as a member of the NCCHC–NIJ expert panel on communicable disease.

LAMBERT N. KING, M.D., Ph.D., is the medical director and senior vice president for medical and academic affairs of St. Vincent's Hospital and Medical Center of New York. He is also vice dean and professor of clinical community and preventive medicine at New York Medical College. Dr. King received his B.A. in the honors program from the University of Kentucky where he was elected to Phi Beta Kappa. Dr. King received his M.D. and Ph.D. in experimental pathology from the University of Chicago in 1971. He completed a residency in internal medicine at Cook County Hospital in 1974 and is a Diplomate of the American Board of Internal Medicine. He is a Fellow of The New York Academy of Medicine. Dr. King has made numerous presentations and published extensively concerning health care delivery needs and systems in jails and prisons. He contributed to the identification of B19 parvovirus as a treatable cause of aplastic anemia in patients with HIV infection. Dr. King has been a consultant or director for numerous advisory boards and committees and has served as a member of a court-appointed physician panel and as special master reviewing the medical care provided at Menard Correction Center in Illinois. He has served as cochairman of the New York State AIDS Center Liaison Committee since 1988 and the New York AIDS Center Advisory Committee since 1997. Dr. King served as a member of the NCCHC–NIJ expert panel on chronic disease.

JULIE R. KRAUT, Ph.D., is a prevention effectiveness postdoctoral fellow at the Centers for Disease Control and Prevention. She received her Ph.D. in economics from Pennsylvania State University in 1998. She is based in a health services research and evaluation group in the Division of Sexually Transmitted Diseases (STD) Prevention. During her tenure at CDC, she has conducted economic and demographic analyses of access to care and health care utilization issues, and taught economic analysis methods including cost-benefit, cost-effectiveness, and cost-utility analysis methods. Dr. Kraut was a facilitator for the preconference skill-builder at the Prevention '99 Conference and for the Prevention Effectiveness Methods Course taught at CDC. Dr. Kraut presented at the 1999 Population Association of America Meeting and did a poster presentation at the 1999 International Society for Sexually Transmitted Diseases Research Meeting. Her work on estimating the costs and benefits of various screening and treatment strategies for STDs in incarcerated populations resulted in her serving as a consultant to the NCCHC–NIJ expert panel on communicable disease.

ROBERT LYERLA, Ph.D., is an epidemiologist in the Hepatitis Branch, Division of Viral and Rickettsial Diseases at the Centers for Disease Control and Prevention. He received his B.S. in biochemistry from Bradley University, and his Ph.D. in Statistics from Southern Illinois University. He is a former member of the CDC's Epidemic Intelligence Service, Class of 1995, serving in Russia (diphtheria

epidemic), Copenhagen, and Madrid as well as with the Atlanta Olympic Games Health Staff. His research focuses on hepatitis in dialysis units, among injecting drug users, incarcerated individuals, and other high-risk groups. He is an officer in the Commissioned Corps of the United States Public Health Service. Dr. Lyerla served as a member of the NCCHC–NIJ expert panel on communicable disease.

MAUREEN MANGOTICH, M.D., M.P.H., is a medical director for Pfizer Health Solutions (PHS). She works on clinical content development for a proprietary disease management application and other custom development projects and provides clinical sales and implementation support for PHS disease management programs. Before joining Pfizer, Dr. Mangotich developed procedure-based appropriateness guidelines at Value Health Sciences (now Protocare Sciences). Her medical management experience includes positions at Health Alliance Plan (associate medical director for quality improvement) and Aetna Health Plans (corporate medical director for provider quality). She frequently lectures on quality improvement in health care. She has been a National Committee for Quality Assurance (NCQA) surveyor since 1991, is a member of the NCQA Review Oversight Committee (ROC), and serves on the planning committee and faculty for NCQA's Credentialing and Delegation conferences. Dr. Mangotich is a board-certified general internist who completed her internal medicine residency and a master's in public health at University of California, Los Angeles. She received her M.D. from the University of Arizona. She served as a member of the NCCHC–NIJ expert panel on chronic disease.

FRED A. MARTICH has been the deputy chief of the Behavioral Interventions and Research Branch, Division of STD Prevention, Centers for Disease Control and Prevention in Atlanta, Georgia, since October 1998. He has served as chairman of CDC's Cross Centers Correctional Work Group and is a member of the Planning Committee for this group. Before this position, he was deputy chief of HIV Prevention Operations for 2 years. Before that, he served as project officer for STD/HIV prevention with State health departments and community-based organizations for 10 years. He worked in STD prevention field assignments with CDC for 23 years in Ohio, Chicago, Wisconsin, and Alabama. He received his B.S. from Duquesne University in Pittsburgh, Pennsylvania, and attended graduate studies in public administration at Oshkosh University in Oshkosh, Wisconsin. He served as a member of the NCCHC–NIJ expert panel on communicable disease.

ERIC E. MAST, M.D., M.P.H., is chief of the Surveillance Unit and acting chief of the Prevention Research Unit in the Hepatitis Branch at the Centers for Disease Control and Prevention. He received his A.B. in Biology at the University of Illinois in Urbana, his M.D. at the University of Illinois in Chicago/ Peoria, and his M.P.H at the Harvard School of Public Health. His postgraduate training included a pediatric residency at the University of Wisconsin and a preventive medicine residency at the Centers for Disease Control and Prevention (CDC). From 1985 to 1987, he was medical program director for Save the Children in UmRuwaba, Sudan. He joined the CDC in 1987 as an epidemic intelligence service officer and he has worked in the Hepatitis Branch since 1990. He has published numerous articles on the epidemiology and prevention of viral hepatitis. Dr. Mast served as a member of the NCCHC–NIJ expert panel on communicable disease.

W. PAUL MCKINNEY, MD, is the V.V. Cooke Professor of Medicine and chief of the Division of General Internal Medicine and Geriatrics, Department of Medicine, at the University of Louisville. He is also the director of the Center for Health Services and Policy Research and acting director of the Institute for Public Health Research at that institution. Dr. McKinney completed his M.D. at the University of Texas/Southwestern Medical School at Dallas and his internship and residency at the University of Minnesota, Minneapolis-St. Paul. From 1996 through 1999, he was editor of the *SGIM Forum*, the national newsletter for the Society of General Internal Medicine, and served as an ex officio member of its council. In 1999, he also served as a U.S. Public Health Service Primary Care Policy Fellow

representing SGIM. He has active interests in health services research and research involving medical informatics, clinical epidemiology, and preventive services delivery. Since 1998, Dr. McKinney has been a liaison member of the Advisory Committee on Immunization Practices of the Centers for Disease Control and Prevention. He served as a member of the NCCHC–NIJ expert panel on chronic disease.

JOHN R. MILES, B.A., M.P.A., is the Special Assistant for Corrections and Substance Abuse, Office of the Director, National Center for HIV/AIDS, STD and TB Prevention. His assignments as a public health advisor with CDC span a career of 33 years and have included diverse public health program development and management experiences from grassroots community crossroads to the large urban centers of Chicago and New York City. Before his assignment with CDC in Atlanta, he spent 12 years with the New York City Department of Health as Program Coordinator of STD Control, AIDS Program Director, and Assistant Director and Director of the Bureau of STD Control. As Special Assistant for Corrections and Substance Abuse, he works to develop and strengthen effective intra-agency collaborations between the Department of Health and Human Services and Department of Justice agencies, and national, State, and local organizations to effect policies that will improve access and continuity of care for HIV, STD, and TB among drug users and incarcerated populations. Mr. Miles received his master's of public administration from Baruch College, City University of New York, and a B.A. from the University of Kansas. He served on the steering committee of the NCCHC– NIJ project on *The Health Status of Soon-To-Be-Released Inmates*.

MARILYN C. MOSES, M.S., has been a social science program analyst with the National Institute of Justice (NIJ) since June 1991. Ms. Moses has been the NIJ program manager for *The Health Status of Soon-To-Be-Released Inmates* project. Ms. Moses has a bachelor's in paralegal studies from the University of Maryland and a master's in criminal justice from the University of Baltimore. She is working on a second master's in publication design. Ms. Moses specializes in correctional health care, female offenders, children of incarcerated parents, correctional industry enhancement, the development of public-private criminal justice partnerships, correctional training and education, offender job training and placement, offender reentry, mental health in corrections, correctional officer stress, and rural crime and policing and has published widely in these areas. Ms. Moses was cited as one of the "Best in the Business" by the American Correctional Association for her work on behalf of children of incarcerated parents. She is the creator and editor for Civic Research Institute's *Offender Employment Report*—a first-of-its-kind publication that is published six times per year. She served on the steering committee of the NCCHC–NIJ project on *The Health Status of Soon-To-Be-Released Inmates.*

PRADAN A. NATHAN, M.D., is the associate division director for health services at the Texas Department of Criminal Justice. He received his medical degree from Madurai University Medical College in India. He completed residencies in psychiatry at the National Institute of Mental Health and Neurosciences in India and the Texas Research Institute of Mental Sciences at Houston, Texas, and he completed a fellowship in forensic psychiatry at University Hospitals, Cleveland, Ohio. Dr. Nathan has worked in court psychiatric clinics, community mental health centers and state hospital systems, and private practice. He has been associated with the Texas Department of Criminal Justice as a unit psychiatrist, a regional psychiatrist, and a clinical director of a 550-bed psychiatric inpatient unit. He is an instructor in institutional and correctional health, Departments of Preventive Medicine and Community Health at University of Texas Medical Branch at Galveston. He is board certified in general psychiatry and forensic psychiatry by the American Board of Psychiatry and Neurology. Dr. Nathan served as a member of the NCCHC–NIJ expert panel on mental illness.

MARGARET J. OXTOBY, M.D., is director of the Bureau of Tuberculosis Control at the New York State Department of Health. Since coming to the TB Program in 1993, she has worked closely with the New York State Department of Correctional Services in developing effective TB prevention and control

activities in the state prison system. She received her B.A. from Harvard University and her M.D. from Case Western Reserve University. She completed a pediatric residency at Duke University and a preventive medicine residency at the Centers for Disease Control and Prevention, where she worked as a medical epidemiologist focusing first on bacterial diseases and later on pediatric AIDS. Dr. Oxtoby served as a member of the NCCHC–NIJ expert panel on communicable disease.

JOSEPH E. PARIS, Ph.D., M.D., CCHP, obtained his M.D. from Boston University and is board certified in internal medicine. He began his career in correctional medicine in 1985 in the Florida Department of Corrections. In 1995, he came to the Georgia Department of Corrections in Atlanta and became statewide medical director. Dr. Paris is a founding member and the 1999–2000 President of the Society of Correctional Physicians. He is a past president of the Florida Chapter of the American Correctional Health Services Association (ACHSA), a Certified Correctional Health Professional, and the author of more than 50 specialized correctional publications or national presentations, including three chapters in *Clinical Practice in Correctional Medicine*. He organized and hosted the 1999 ACHSA Multidisciplinary Conference in Atlanta, Georgia. Dr. Paris served as a member of the NCCHC–NIJ expert panel on chronic disease.

MICHAEL PUISIS, D.O., is corporate medical director for Addus HealthCare's Correctional Division. He is the editor of *Clinical Practice in Correctional Medicine*. He participated on the task force for standards revision for the 1996 NCCHC jail standards and served on the committee to revise the correctional health care standards for the American Public Health Association. Dr. Puisis served as a member of the advisory board for the evaluation of the Centers for Disease Control and Prevention guidelines for TB control in jails in 1999. Dr. Puisis served as a member of the NCCHC–NIJ expert panel on chronic disease.

DIANNE RECHTINE, M.D., CCHP–A, is a medical executive director for the Florida Department of Corrections. Her duties include managing the health care for approximately 15,000 offenders housed in several major institutions. Dr. Rechtine received her undergraduate and medical education at West Virginia University. She is a Fellow of the American Academy of Family Physicians and practiced in southwest Florida before coming to work for the prison system 14 years ago. She has been a physician surveyor for the National Commission on Correctional Health Care for several years and serves on their Surveyor Advisory Committee. She has served as a member of the Standards Revision Committee for the American Correctional Association. Dr. Rechtine is a charter member of the Society of Correctional Physicians and serves as chairman of the Council of Chapters of the American Correctional Health Services Association. She is certified as a Correctional Health Professional and has achieved Advanced status. She is chairman of the Florida Department of Corrections Continuing Medical Education, was chairman of the Committee for Chronic Care, and has been a faculty member of the Mini-Residency Program for Correctional HIV since its inception. Dr. Rechtine served as a member of the NCCHC–NIJ expert panel on chronic disease.

BETTY RIDER, M.A., M.S., is director of managed care services for the North Carolina Division of Prisons Health Services Section. Her correctional health care experience includes senior management positions with major national managed care companies providing health care to correctional facilities and the uniformed services. In 1999, Ms. Rider served on the joint CDC–National Tuberculosis Center task force that developed new guidelines for TB education/training in corrections. She is an associate editor of *HEPP News*, a national journal published by the Brown University School of Medicine's Correctional HIV Program. She has presented and published extensively on correctional managed care issues, pharmacoeconomics of antiretroviral therapies, and correctional health care delivery systems. Ms. Rider received an M.S. in healthcare administration from Trinity University, an M.A. in counseling psychology from Eastern Kentucky University, and a B.A. in social science/economics from Trinity University. She

is a member of the American Correctional Association, the American Correctional Health Services Association, the American College of Health Care Executives, and the Healthcare Financial Management Association. She is a member of the National Minority HIV Council's advisory board and served as a member of the joint NCCHC–NIJ communicable disease expert panel on *The Health Status of Soon-To-Be-Released Inmates*.

CLYDE B. SCHECHTER, M.A., M.D., is director of medical education and associate professor in the Department of Community and Preventive Medicine at Mount Sinai School of Medicine in New York City. He received his B.A and M.A. in mathematics and his M.D. from Columbia University. He is board certified in internal medicine, general preventive medicine, and public health and has published extensively on simulation modeling of screening and treatment of chronic diseases including hypertension, tuberculosis, and cervical cancer. His research interests focus on mathematical models of health processes, and cost-effectiveness analysis, particularly as applied to population screening. He has served on the editorial boards of *Medical Decision Making* and the *Mount Sinai Journal of Medicine*, and is a regular reviewer of research grants submitted to the National Board of Medical Examiners. He has been a consultant to many corporations on aspects of health benefit management. Dr. Schechter served as an expert consultant to the NCCHC–NIJ expert panel on chronic disease.

GEORGE P. SCHMID, M.D., M.Sc., is assistant branch chief for Science, Program Development, and Support Branch, Division of STD Prevention, Center for HIV, STD, and TB Prevention, Centers for Disease Control and Prevention (CDC). He is a subspecialist in infectious diseases, with training in internal medicine and family medicine, and has a M.Sc. in Health Services Management from the London School of Hygiene and Tropical Medicine. Dr. Schmid has spent 20 years at CDC, the past 16 in the Division of STD Prevention. He has considerable experience in the epidemiologic, clinical, laboratory, programmatic and economic aspects of STD prevention. His position centers on the transfer of research findings into clinical practice. He is the coordinating editor of the STD Collaborative Review Group within the Cochrane Collaboration; section editor on sexual health, *Clinical Evidence*; and chairman, CDC Institutional Review Board for Emergency Response. Dr. Schmid served as a member of the NCCHC–NIJ expert panel on communicable disease.

RONALD M. SHANSKY, M.D., M.P.H., is a consultant in correctional medicine and the Federal court-appointed receiver for medical and mental health services for the Washington, D.C., jail. He received his B.S. in philosophy at the University of Wisconsin and his M.D. from the Medical College of Wisconsin. He has obtained a master's in public health and is Board certified in internal medicine and quality assurance. He has been a surveyor for the JCAHO and is a board member of the National Commission on Correctional Health Care (NCCHC). Dr. Shansky is a Fellow of the Society of Correctional Physicians and was the first recipient of the Society's Armond Start Award for Excellence in Correctional Medicine. He is an associate editor and contributor to the textbook *The Clinical Practice of Correctional Medicine*. He served as a member of the NCCHC–NIJ expert panel on chronic disease.

JONATHAN SHUTER, M.D., is the director of clinical research in the AIDS Center of Montefiore Medical Center. He received his M.D. from Boston University School of Medicine. He is a member of the Division of Infectious Diseases in the Department of Medicine at Montefiore Medical Center and is an assistant professor of internal medicine at the Albert Einstein College of Medicine. Dr. Shuter was the director of infectious diseases for Rikers Island Health Services between 1994 and 1997. He has published a number of articles pertaining to tuberculosis, sexually transmitted diseases, and HIV infection in the correctional setting. In 1998–99, Dr. Shuter served as an expert consultant to the NCCHC–NIJ expert panel on communicable disease.

HAL SMITH is the executive director and chief executive officer of Central New York Psychiatric Center and its satellite mental health clinics that provide a comprehensive system of mental health services to the New York State and local correctional systems. He is associate professor of administrative psychiatry at the SUNY Upstate Health Science Center and adjunct professor of law at the Syracuse University College of Law. He was director of forensic services for the New York State Office of Mental Health and has held a variety of clinical and administrative positions in forensic and correctional mental health settings. He provides mental health/criminal justice consultation services. He was appointed to the NCCHC–NIJ expert panel on mental illness.

ANNE SPAULDING, M.D., graduated from Brown University and Medical College of Virginia. After a residency at Brown, she moved on to a fellowship in infectious diseases at the University of Massachusetts Medical Center, Worcester, Massachusetts, where she pursued bench research in flaviviruses. She is now on the staff at Rhode Island Hospital and attends in an HIV clinic. She is a clinical assistant professor at Brown University School of Medicine. She also serves as the medical program director for the Rhode Island Department of Corrections. Dr. Spaulding is president-elect of the Society of Correctional Physicians. Dr. Spaulding served as a member of the NCCHC–NIJ expert panel on communicable disease.

HENRY T. STEADMAN, Ph.D., is president of Policy Research Associates, Inc. Previously Dr. Steadman ran a nationally known research bureau for 17 years for the New York State Office of Mental Health. His work has resulted in 6 books, over 100 articles in a wide range of professional journals, 18 chapters, and many reports. Dr. Steadman's major research focus is persons with co-occurring disorders in the justice system, violence risk assessment, homelessness and mental illness, and women and co-occurring disorders. Dr. Steadman received his B.A. and M.A. in sociology from Boston College and his Ph.D. in sociology from the University of North Carolina at Chapel Hill. In 1987, Dr. Steadman received the Amicus Award from the American Academy of Psychiatry and the Law. He also received the Philippe Pinel Award from the International Academy of Law and Mental Health in 1988, the Saleem A. Shah Award in 1994 from the State Mental Health Forensic Directors, the 1998 Distinguished Contribution to Forensic Psychology from the American Academy of Forensic Psychology, and the 1999 Isaac Ray Award from the American Psychiatric Association for his outstanding contributions to the psychiatric aspects of jurisprudence. Dr. Steadman served as a member of the NCCHC–NIJ expert panel on mental illness.

STEVEN SZEBENYI, M.D., is the former head of the Division of HIV Medicine and professor in the Department of Medicine at Albany Medical College in Albany, New York. He was also director of the AIDS Treatment Center at Albany Medical Center Hospital and medical director of the correctional health program at Albany Medical Center. He was extensively involved with HIV/AIDS education programs for correctional health practitioners, including a nationally broadcast videoconference series, an HIV fellowship program, a telemedicine project and frequent lecturing. Dr. Szebenyi was a member of the New York State Department of Health AIDS Institute Medical Care Criteria Committee and the New York State Department of Correctional Services HIV Practice Guidelines Committee. He is medical director for Blue Shield of Northeastern New York in Albany, NY. He served as a member of the NCCHC–NIJ expert panel on communicable disease.

ZACHARY TAYLOR, M.D., M.S., is chief of the Prevention Effectiveness Section, Division of Tuberculosis Elimination, National Center for HIV, STD, and TB Prevention, Centers for Disease Control and Prevention. He received his B.S. in chemistry at LaGrange College, his M.S. at the University of Maryland at Baltimore, and his M.D. at the Medical College of Georgia. His research interests focus on the cost-effectiveness of screening for tuberculosis and evaluation of tuberculosis

control programs. Dr. Taylor served as a member of the NCCHC–NIJ expert panel on communicable disease.

LINDA A. TEPLIN, Ph.D., is professor of psychiatry and director of the Psycho-legal Studies Program at Northwestern University Medical School. She received her Ph.D. from Northwestern University in 1975. She has done research on the criminalization of the mentally ill, epidemiologic characteristics of jail detainees, and correlates of violence. Her honors include the American Psychological Association's career award for "Distinguished Contributions to Research in Public Policy" (1992), the MERIT Award from the National Institute of Mental Health (1995), and the Young Scientist Award from the National Alliance for the Mentally Ill (1990). Dr. Teplin is conducting two studies: the Northwestern Juvenile Project and the Northwestern Victimization Project. The Northwestern Juvenile Project is a longitudinal study of a sample of 1,800 youth who previously had been subjects in a study of juvenile detainees. The project examines the changing alcohol, drug, and mental health service needs of these high-risk youth, their use of services, and the behaviors that put them at increased risk for violence, IV drug use, and HIV/AIDS. The Northwestern Victimization Project is a unique study of criminal victimization patterns among severely mentally ill persons who live in the community. Both studies are funded by a consortium of Federal agencies and private foundations. Dr. Teplin served as a member of the NCCHC–NIJ expert panel on mental illness.

DAVID L. THOMAS, M.D., J.D., began his correctional career as an institutional physician, later as a regional physician and the Chief of Clinical Services, and is now the Director of Health Services, all within the Florida Department of Corrections. From 1984 until 1994, he was a member of the Florida House of Representatives and served as the Republican Whip for 6 years. Dr. Thomas is a Vietnam veteran who achieved the rank of Permanent Captain (Acting Major) in the U.S. Army and was awarded the Bronze Star. Dr. Thomas has published two novels on drug smuggling in Florida and the Gulf Coast, and has been lead author on several publications in peer-reviewed medical journals. Dr. Thomas served as a member of the NCCHC–NIJ communicable disease expert panel.

DONNA TOMLINSON, M.D., M.Sc., is a research fellow in preventive cardiology at Beth Israel Medical Center in New York. She graduated from St. George's University, School of Medicine in 1996. She completed a preventive medicine residency at Mount Sinai Medical Center and received her M.Sc. in community medicine from Mount Sinai School of Medicine in 1999. She is board certified in general preventive medicine and public health. Her clinical interest is in the prevention of cardiovascular disease through lifestyle modifications. Her research interests are in simulation modeling and cost-benefit analysis. Dr. Tomlinson served as a consultant on the NCCHC–NIJ expert panel on chronic disease.

BEENA VARGHESE, Ph.D., is a health economist with the Division of HIV/AIDS Prevention at the Centers for Disease Control and Prevention. She is also member of the International Health Economic Association and Cochrane Economics Methods Group. She received her M.S. in agriculture economics from North Dakota State University in 1993 and her Ph.D. in health economics from the University of Memphis in l997. In 1997–98, she was a short-term consultant for UNAIDS, Geneva, and the Ministry of Health, Kazakhstan. She has presented her work at various national and international conferences. Her research interests include decision analysis, cost-effectiveness and prevention effectiveness methods. Dr. Varghese served as a consultant to the NCCHC–NIJ expert panel on communicable disease.

BONITA M. VEYSEY, Ph.D., is an assistant professor in the Rutgers University School of Criminal Justice and the director of the Center for Justice and Mental Health Research. Dr. Veysey worked as a researcher in mental health services and corrections policies for 15 years before joining the Rutgers faculty. She served as both the associate director and the director of the Women's Core of the National

GAINS Center for Persons with Co-occurring Disorders in the Criminal Justice System. She has participated in several national advisory groups on issues relating to the supervision and treatment of offenders' mental illnesses. Her research interests include interactions between the mental health and criminal justice systems, correctional supervision of female offenders, and public health risks as they relate to continuity of care. She received her doctorate in sociology from the State University of New York at Albany in 1993. Dr. Veysey served as a consultant to the NCCHC–NIJ expert panel on mental illness.

RICH VOIGT, M.A., is assistant to the branch chief, Division of STD Prevention, Centers for Disease Control and Prevention. He received his M.A. in sociology at Wichita State University, Wichita, Kansas. His program interests focus on providing technical assistance for implementing early health screening and treatment services for incarcerated people. He served as a member of the NCCHC–NIJ expert panel on communicable disease.

HENRY C. WEINSTEIN, M.D., is the director of the program in Psychiatry and the Law at New York University Medical Center and the Bellevue Hospital Center. For more than 20 years, he was the director of the Forensic Psychiatry Service (the psychiatric prison ward) at Bellevue. He represents the American Psychiatric Association on the Board of Directors of the National Commission on Correctional Health Care and is the president of the Caucus of Psychiatrists Practicing in Criminal Justice Settings. He chaired the APA Task Force that has recently revised the APA Guidelines on Psychiatric Services in Jails and Prisons. Dr. Weinstein served as a member of the NCCHC–NIJ expert panel on mental illness.

LAURA WINTERFIELD, Ph.D., joined the Office of Research and Evaluation of the National Institute of Justice in August 1997, where she managed the drug treatment portfolio and developed researcher-practitioner partnerships. She has been Division Director for the Justice Systems Divisions since mid-l999. From 1984 to 1993, she worked at the Vera Institute researching career criminals, evaluating prosecutorial and court-based innovations, and assessing the appropriateness and effectiveness of New York City's alternative-to-incarceration programs. From 1993 to 1997, she worked at the New York City Criminal Justice Agency. She developed a release-on-recognizance prediction tool for adult court arraignment judges and predictive tools for identifying offenders most likely to receive a sanction within the range targeted for an alternative disposition. She has been actively involved in all aspects of criminal justice research since the early 1970s, including courts, field services, alternatives to incarceration, and treatment approaches. Her areas of expertise include delinquency and crime prevention, the development of prediction models for criminal justice decisionmaking, estimating the impacts of diversion programs on incarceration, and evaluation research. She received her Ph.D. in sociology from the University of Colorado. Dr. Winterfield served on the steering committee of the NCCHC–NIJ project on *The Health Status of Soon-To-Be-Released Inmates*.

Appendix C: Information About the National Commission on Correctional Health Care and Its Position Statements

The National Commission on Correctional Health Care (NCCHC) is a not-for-profit, 501(c)(3) organization committed to improving the quality of care in our nation's jails, prisons, and juvenile detention and confinement facilities. NCCHC is supported by national organizations listed below representing the fields of health, law, and corrections.

In the early 1970s, the American Medical Association (AMA) studied the conditions in jails. Finding inadequate, disorganized health services and a lack of national standards to guide correctional institutions, the AMA in collaboration with other organizations established a program that eventually, in the early 1980s, became the National Commission on Correctional Health Care. NCCHC's early mission was to evaluate, formulate policy, and develop programs for a floundering area clearly in need of assistance.

Today, NCCHC's leadership in setting standards for health services and improving health care in correctional facilities is widely recognized. NCCHC's *Standards for Health Services* are written in separate volumes for prisons, jails, and juvenile confinement facilities. The *Standards* represent NCCHC's recommended requirements for the management of a correctional health services system, covering the general areas of care and treatment, health records, administration, personnel, and medical and legal issues. The *Standards* have helped the Nation's correctional and detention facilities improve the health of their inmates, staff, and the communities to which they return; increase the efficiency of their health services delivery; and strengthen their organizational effectiveness.

As well as establishing standards, each year NCCHC sponsors correctional health care's major educational and scientific conferences. Each fall, the annual National Conference on Correctional Health Care draws physicians, nurses, psychologists, scientists, and other health care providers and researchers to learn about contemporary practices and issues in the field of correctional health care. Each spring, the Clinical Updates conference provides the latest information on infectious and chronic disease research and treatments, as well as other timely clinical issues in correctional health care.

With a network of nationally recognized experts in health care administration and delivery, NCCHC offers an accreditation program for correctional facilities that meet NCCHC standards, provides technical assistance and quality improvement reviews on correctional health care management and policy issues, and develops and publishes research on the correctional health care field. In addition, NCCHC operates the national certification program for correctional health professionals, sponsors other educational and training programs, and publishes numerous support texts.

The members of the NCCHC volunteer Board of Directors set policies and guide the organization's program efforts. Each is appointed to the board by one of 34 supporting organizations.

American Academy of Child & Adolescent Psychiatry
Louis Kraus, M.D.

American Academy of Pediatrics
James W.M. Owens, M.D., M.P.H., CCHP

American Academy of Physician Assistants
Peter C. Ober, PA-C, J.D., CCHP

American Academy of Psychiatry & the Law
Charles A. Meyer, Jr., M.D., CCHP-A

American Association of Physician Specialists
Jere G. Sutton, D.O.

American Association of Public Health Physicians
Jonathan B. Weisbuch, M.D., M.P.H.

American Bar Association
Susan L. Kay, J.D.

American College of Emergency Physicians
William Haeck, M.D., CCHP

American College of Healthcare Executives
Eugene A. Migliaccio, Dr.P.H., CCHP

American College of Neuropsychiatrists
Bernard Feigelman, D.O.

American College of Physicians
John M. Robertson, M.D., M.P.H.

American Correctional Health Services Association
JoRene Kerns, B.S.N., CCHP

American Counseling Association
Nancy B. White, L.P.C., M.A.C.

American Dental Association
Thomas E. Shields, II, D.D.S., CCHP

American Diabetes Association
Samuel Eichold, II B.S., M.D.

American Dietetic Association
Jenny Roper, M.S., R.D.

American Jail Association
Beverley Wilber

American Medical Association
Alvin J. Thompson, M.D., M.A.C.P., CCHP

American Nurses Association
Kleanthe Caruso, R.N., M.S.N., CCHP

American Osteopathic Association
George J. Pramstaller, D.O., CCHP

American Pharmaceutical Association
Robert L. Hilton, R.Ph., CCHP

American Psychiatric Association
Henry C. Weinstein, M.D., CCHP

American Psychological Association
Thomas J. Fagan, Ph.D.

American Public Health Association
Robert Cohen, M.D.

American Society of Addiction Medicine
H. Blair Carlson, M.D., CCHP

John Howard Association
Charles A. Fasano

National Association of County and City Health Officials
Douglas A. Mack, M.D.

National Association of Counties
Kenneth J. Kuipers, Ph.D.

National District Attorneys Association
The Honorable Richard A. Devine

National Juvenile Detention Association
David W. Roush, Ph.D.

National Medical Association
Carl C. Bell, M.D., CCHP

National Sheriffs' Association
Sheriff Richard L. Warren

Society for Adolescent Medicine
Ronald Feinstein, M.D.

Society of Correctional Physicians
Ronald M. Shansky, M.D.

In addition to the standards, NCCHC periodically adopts position statements that address issues of importance in the management of health care in corrections. The following are available as of the date of this publication.

Automated External Defibrillators in Correctional Settings

Charging Inmates a Fee for Health Care Services

Competency for Execution

Continuity of Care

Correctional Health Care and the Prevention of Violence

DNA Analysis

Drug Testing of Correctional Staff

Health Care Funding for Incarcerated Youth

Health Services to Adolescents in Adult Facilities

Licensed Health Care Providers in Correctional Institutions

Management of Hepatitis B in Correctional Facilities

Management of Hepatitis C in Correctional Facilities

Management of HIV in Correctional Facilities

Management of Tuberculosis in Correctional Facilities

Mental Health Services in Correctional Settings

Telemedicine Technology in Correctional Facilities

Third Party Reimbursement for Correctional Health Care

Women's Health Care in Correctional Settings

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