The TASER® Device: Human Research Update

Jeffrey D. Ho, MD, FACEP

Dept. of Emergency Medicine
Hennepin County Medical Center/University of MN Medical School

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Professional Qualifications

- Emergency Medicine Physician
- Minnesota Peace Officer
- Academic Medical Researcher
Disclosure

- Consultant to TASER International (Non-Employee)
- Personal Shareholder (No Options)
- Partial Funding of some research projects from TASER International
- Conflict Management Plan through the Minneapolis Medical Research Foundation
- Conflict Management by Scientific Peer Review
Objectives

- Frame the Issue
  - The perception of “Why people die after TASER exposure”.
  - 2 Primary Reasons for this perception
    - Misunderstanding electricity
    - Misapplication of logic

- Present the Human Research on TASER devices

- Answer any questions
Why do people die after arrest?

- **Historic Precedent**
  - Custodial Sudden Death has been documented since mid-1800.
  - Pepper Spray, Hogtying, etc.
  - Custodial Sudden Deaths occur when no TASER, Pepper Spray, Hogtie, Neck Restraint, Prone Positioning has been used.
    - Are we focusing on the correct problem?

- **Public Focus on TASER in Modern Society**
  - Misunderstanding electricity
  - Misapplication of logic
Misunderstanding Electricity

- Electricity = Danger
- Wall Sockets
- Overhead Power Lines
- Electricity as a form of Capital Punishment
Misunderstanding Electricity

- If Electricity causes a cardiac arrest, it does so in a very predictable fashion. Ventricular Tachycardia (VT), Ventricular Fibrillation (VF) result.

- Why then, are the cases of sudden custodial death documented as rhythms other than VF or VT upon paramedic arrival? (They are typically Pulseless Electrical Activity or Asystole)

- Why then, does history have documentation of sudden custodial death cases before the invention of the TASER in rhythms other than VF or VT?
Misapplication of Logic

- The “Post Hoc Fallacy”
  - “After this, therefore because of this.”
  - Assumes events close in time have a cause/effect relationship
  - Scientific process is needed to either validate or refute

- Example: Rooster crowing associated with the sun rising
TASER Research

- TASER devices are not toys
- They are not therapeutic medical devices
- They should be evaluated in the context of their use
- Start with the question of “What happens if...?”
  - Not with the question of “Can I cause this...?”
Animal Research

- Animal models can point towards certain directions but interpret the results with caution.

- Animal models are not great human substitutes.
  - Animals are anatomically different.
  - Most are smaller in mass than a human.
  - Some animal research has had concerning conclusions.
  - These conclusions are reached in artificial environments.
  - Human study in these areas have shown opposite conclusions.
Existing Human Evidence

- TASER International has estimated over 675,000 voluntary training exposures with no deaths

- What similarities exist in my studies?
  - Health/Age/Gender
  - Stature
  - Probe Position
Human Research

  - No significant findings

  - 15 second exposure
  - People breathe faster during exposure
Minute ventilation Before = 13.2, pH Before = 7.4
Minute ventilation During = 18.7
pH After = 7.4
Human Research

  - 15 seconds on acidic, exhausted adults
  - **No worsening of acidosis that is already present**

  - Review of TASER use during mental illness encounters.
  - TASER use 45% of time instead of justifiable deadly force
Human Research

  - No EKG changes found after exposure

  - Alcohol consumption causes respiratory slowing  
  - No changes when TASER is used on intoxicated humans
Human Research

  - No elevation in core temperature found
Human Research (Drive Stun)

  - Drive stuns do not markedly change physiology

  - Dynamic demonstration that breathing occurs
↑ = diaphragm
Human Research

  - Replicates 3 concerning swine studies
  - No evidence of cardiac rhythm problem in humans
Human Research

- Current Work:
  - XREP work on humans
  - C2 work on humans
  - X26 methamphetamine study
  - X26 human studies examining various physiology parameters under various stress factors
Grappling and Pepper Spray exposure appear to be more stressful than TASER
Validation Studies


Conclusions

- Beware of faulty logic
- The current body of human research does not support a connection between the TASER device and sudden death through any mechanism that is known to modern medicine
Questions?