REPORT 6 OF THE COUNCIL ON SCIENCE AND PUBLIC HEALTH (A-09)
Use of Tasers® by Law Enforcement Agencies
(Reference Committee D)

EXECUTIVE SUMMARY

Objective: To review the technology of conducted electrical devices (CEDs) such as Tasers®, the evidence on their direct physiological effects, and existing data on the morbidity and mortality associated with their use by law enforcement personnel. General guidelines on use-of-force policies and the role played by CEDs also are noted, and their relevance to public health and the health care system is discussed.

Methods: English-language reports on studies using human or animal subjects were selected from a PubMed search of the literature from 1985 to March 2009 using the text terms "taser," or "conducted electrical device" or the MeSH terms "law enforcement/methods" or "weapons," in combination with "electric injuries," and "diagnosis," "etiology," "physiopathology," "prevention and control," "mortality," or "forensic medicine." Additional articles were identified by manual review of the references cited in these publications. Web sites of Taser International, the U.S Department of Justice, the Canadian House of Commons, Amnesty International, and the International Association of Police Chiefs also were searched for relevant resources.

Results: The design of CEDs has evolved over the last 20 years. Tasers® are the primary CEDs used by law enforcement. Despite the designation of the Taser® as a less lethal or less-than-lethal weapon, Amnesty International has catalogued a temporal association between the use of CEDs and more than 330 in-custody sudden deaths in North America between June 2001 and August 2008, all involving M-26 or X-26 Tasers®. Swine models have demonstrated the ability of Tasers® to induce ventricular arrhythmias. Limited Taser® discharges applied to healthy human volunteers generally appear to be safe. Such studies cannot fully evaluate the responses of individuals who are confrontational, have taken drugs, or are desperate for escape, highly agitated, and combative.

Higher risk situations for restraint-related fatalities seem to be associated with pre-existing cardiovascular disease in individuals who have taken psychostimulants or other drugs and engage in a struggle against law enforcement personnel and then are subjected to restraint maneuvers (with or without Taser® use). The sudden in-custody deaths of individuals who are combative and in a highly agitated state have been attributed to the presence of "excited delirium." The latter is not a validated diagnostic entity in either the International Classification of Diseases or the *Diagnostic and Statistical Manual of Mental Disorders*, but is a more generally accepted entity in forensic pathology.

Conclusion: Concerns about the use of CEDs fall into three general areas: (1) they are used too frequently and at lower levels on the use-of-force continuum than indicated; (2) appropriate training and supervision of CED use is lacking in some jurisdictions; and (3) CEDs may contribute to the death of suspects, either directly or indirectly. Arrest-related deaths are not new and predate the deployment of CEDs. Most studies undertaken by law enforcement agencies (and others) indicate that deploying CEDs relative to other use-of-force options, such as pepper spray, physical force, police dogs, and batons, reduces injuries to officers and suspects and reduces the use of lethal force. If deployed according to an appropriate use-of-force policy, and used in conjunction

Action of the AMA House of Delegates 2009 Annual Meeting: Council on Science and Public Health Report 6 Recommendations Adopted as Amended and Remainder of Report Filed.

with a medically driven quality assurance process, Taser® use by law enforcement officers appears to be a safe and effective tool to place uncooperative or combative subjects into custody.

REPORT OF THE COUNCIL ON SCIENCE AND PUBLIC HEALTH

CSAPH Report 6-A-09

Subject: Use of Tasers® by Law Enforcement Agencies (Resolution 401, A-08)

Presented by: Carolyn B. Robinowitz, MD, Chair

Referred to: Reference Committee D (James L. Milam, MD, Chair)

Resolution 401, "Tasers," introduced by the American Academy of Child and Adolescent Psychiatry, American Psychiatric Association, American Academy of Psychiatry and the Law, and the American Academy of Pediatrics and referred at the 2008 Annual Meeting, asks:

> That our American Medical Association (AMA) Council on Science and Public Health prepare a report summarizing the scientific data on morbidity and mortality associated with the use of Tasers;
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> That our AMA advocate for the development of appropriate guidelines to ensure that Tasers are only used in a manner which minimizes the risk of injury or death; and
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> That our AMA encourage The Joint Commission and other appropriate accreditation and regulatory agencies to develop standards and guidelines regarding the use of Tasers in hospitals and other health care facilities.

Conducted electrical devices (CEDs) were designed as non-lethal weapons to assist law enforcement personnel in subduing subjects who actively resist arrest, or who present a serious threat to themselves or others. As these new tools have become more prominent in the law enforcement arsenal, their deployment has been temporally associated with more than 330 arrest-related or in-custody deaths since 2001.[1] The association of CEDs such as Tasers®[a] with fatalities, dramatized by video evidence, has led to further scrutiny of their use by human rights advocacy groups, government oversight bodies, law enforcement organizations themselves, and the media.

This report reviews the technology of CEDs, evidence of their direct physiological effects, and data on the morbidity and mortality associated with their use by law enforcement. The vast majority of published data concern the use of Tasers®. General guidelines on use-of-force policies and the role played by CEDs are noted, and their relevance to public health and the health care system is discussed.

[a] TASER is an acronym for Thomas A. Swift Electronic Rifle

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METHODS

English-language reports on studies using human or animal subjects were selected from a PubMed search of the literature from 1985 to March 2009 using the text terms “taser,” or “conducted electrical device” or the MeSH terms “law enforcement/methods” or “weapons,” in combination with “electric injuries,” and “diagnosis,” “etiology,” “physiopathology,” “prevention and control,” “mortality,” or “forensic medicine.” Additional articles were identified by manual review of the references cited in these publications. Web sites of Taser International, the U.S. Department of Justice, the Canadian House of Commons, Amnesty International, and the International Association of Police Chiefs also were searched for relevant resources.

BACKGROUND

Conducted Electrical Weapons

The design of CEDs, especially Tasers®, has evolved over the last 20 years. Early versions of CEDs (e.g., stun guns) did not incapacitate subjects, and primarily attempted to achieve compliance through the infliction of pain. Current Taser® models are more efficient in incapacitating criminal suspects, and are the primary CEDs used by law enforcement. According to the manufacturer, Tasers® are currently used in more than12,750 law enforcement, military, and correctional agencies around the world, including more than two-thirds of law enforcement agencies in the United States.[2] Taser International produces various models for law enforcement personnel (M-26 and X-26), as well as civilian models (C2 and X-26C), which are less powerful.

The most recent evolution of the Taser® for law enforcement is the X-26 model. The X-26 is battery operated with a removable cartridge containing coiled electrical wires at the front, coupled with a data port that records the time and date of activation, and also incorporates an audio and video recording camera. Propelled by compressed nitrogen, the X-26 cartridge can launch the two tethered insulated wires with barbed probes up to 35 feet. When the trigger is depressed, a pulse wave with a high voltage leading edge (up to 50,000 V in open circuit) is delivered followed by a pulsed low amperage current delivered over 5 seconds. Both probes must attach to the skin or clothing. The initial short duration, high voltage signal allows a current path to be established through clothing via an “arc” of ionized air. The standard discharge cycle can be terminated early by the officer or can be extended, as long as the barbs remain in sufficient contact with the individual, by holding or repeatedly depressing the trigger. With the cartridge removed, the Taser® also can be used in push stun mode by directly applying a pair of electrical contact points (approximately 1.5 inches apart at the tip) to the subject. In comparison, the most recent civilian model (C2) can launch the probes up to 15 feet and can deliver a 30-second energy burst, thus enabling the subject to escape during that time period. The C2 also can be used in stun mode.

When used in the probe mode (i.e., barbed wires propelled by compressed nitrogen), the pulsed, low-amperage current activates α-motor neurons causing strong, repetitive contractions of skeletal muscles and temporary immobilization. The affected muscle mass area is determined by the probe’s position and separation. In addition to temporary incapacitation, sensory nerves are stimulated causing substantial discomfort and pain.

Another company, Stinger Systems, also markets a projectile CED in the United States (the S-200).[3] The open circuit maximum voltage, pulse waveform, cycle duration, current characteristics, and peak amperage of the S-200 differ somewhat from the Taser X-26.

Federal, State, and Local Laws

Because they use compressed nitrogen rather than gunpowder to propel the probes, the federal Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF) does not classify the Taser® as a firearm; therefore, their sale to civilians is not subject to federal restrictions. The Transportation Safety Administration prohibits airline passengers from possessing Tasers®, but can authorize their use by trained flight crew members.

Outside of the realm of law enforcement, at least 43 states allow civilians to purchase Tasers®, based on variable state statutes or local ordinances.[4] Some jurisdictions regulate CEDs as firearms or restrict where such devices can be carried. The issue of CED availability and potential use by civilians is not further examined in this report.

POLICIES AND PROCEDURES RELATED TO USE OF FORCE, INCLUDING TASERS®

Police officers are legally and morally required to use the lowest level of force necessary to control a situation and to deescalate at the earliest opportunity. Use-of-force policies are based on a continuum that provides various recommended options when encountering a subject based on the subject's actions and the officer's perception of the situation. Subject actions are classified as: (1) compliant; (2) passive resistance; (3) active resistance; (4) assault causing physical injury; or (5) assault that could cause serious physical injury or death. A model (continuum) for use-of-force options has been developed by the Federal Law Enforcement Training Center (FLETC), Department of Homeland Security.[5,6] When confronted with the potential for serious physical injury or death, police officers can respond with lethal force (i.e., firearms). The use of firearms under such circumstances is associated with a subject mortality of approximately 50%. Thus, alternatives to lethal force and better methods to subdue individuals that limit injuries and death are important tools.

Some semantic confusion exists regarding the classification of CEDs. The Department of Justice's National Institute of Justice (NIJ) classifies CEDs as a "less-lethal" technology. The NIJ defines a less-lethal weapon as "any apprehension or restraint device that, when used as designed and intended, has less potential for causing death or serious injury than conventional police weapons."[7] Such weapons (i.e., CEDS, chemical sprays, blunt force projectiles, directed energy devices) are designed to temporarily incapacitate or restrain an individual when lethal force is not appropriate. The ideal less-lethal weapon incapacitates a potentially dangerous person to facilitate his or her safe arrest, with only minimal risk of injury or death to the subject, law enforcement personnel, or bystanders. Others classify CEDs as a "less-than-lethal" weapon, which implies that use ordinarily will not result in lethality, but that a greater likelihood of serious bodily injury or death exists compared with "non-lethal" interventions.[8,9]

Although many law enforcement agencies rely on the FLETC continuum for training and decision-making in the field, a report issued by the General Accounting Office in 2005 found that the threshold at which Taser® use is deemed appropriate varied among police departments.[5] Some departments restricted its use to situations involving harmful assault or serious threats to oneself or others, while others permitted Taser® deployment at much lower thresholds; for example, on subjects who were "passively resisting" by not responding to lawful verbal commands of the officer. Training and recertification requirements for Taser® use also varied among police departments.

Guidelines for CED Use

Law enforcement agencies attempt to ensure proper deployment of CEDs by establishing and employing use-of-force policies, training requirements, operational protocols, and safety procedures. Because questions have been raised about the patterns of CED use and whether their use poses significant health risks, many related issues have emerged among law enforcement agencies. These include appropriate placement of CEDs on the use-of-force continuum; activation parameters involving at-risk populations (see below); training questions, including mandatory exposure of officers to these devices; risks for injury and death in exposed subjects; and policies and procedures that are necessary to better ensure safe encounters between police officers and criminal suspects. Accordingly, detailed national guidelines, containing more than 50 provisions for CED use, have been developed by the U.S. Department of Justice and Police Executive Research Forum to inform officers on their appropriate deployment within the use-of-force continuum.[10]

The discussion below focuses on research that has been conducted on the physiologic effects of CEDs in animals and humans, their effects on subjects who have been targeted, and information relevant to their impact (after deployment) on police injuries and the use of lethal force.

PHYSIOLOGIC EFFECTS: ANIMAL MODELS AND HUMAN SUBJECTS

The occurrence of sudden deaths in close proximity to CED use immediately raised speculation about their potential direct effects on cardiac and respiratory function.

Cardiac Effects

Several studies on the cardiac effects of Tasers® have been conducted in anesthetized, ventilated swine models, both by industry-sponsored and independent investigators. Standard Taser® discharges are largely ineffective in generating ventricular fibrillation in the swine model,[11] and other studies support the view that a large safety factor, proportional to body mass, exists for inducing ventricular fibrillation.[12,13] Other studies have demonstrated the ability of Tasers® (or devices modified to generate Taser-like waveforms) to provoke ventricular tachycardia, and rarely, ventricular fibrillation. Ventricular arrhythmias typically are provoked only with prolonged discharges and electrode placements that bracket the heart, ensuring a transcardiac path.[14-17] Standard Taser® discharge can induce capture of implantable pacemakers and provoke discharge of implantable defibrillators in swine models, but sustained arrhythmias generally do not occur under such conditions.[18,19] These results have led some to hypothesize that thin stature and chest impalement may lower the safety margin for Taser® discharges in human subjects.[7]

Because they have a heart-body weight ratio and general cardiac anatomy similar to that of humans, swine have been used in the testing and development of pacemakers and implantable cardiac defibrillators. However, swine have a relatively low threshold for ventricular fibrillation, in part, because their Purkinje fibers cross the entire ventricular wall, in contrast to human hearts in which these fibers are largely confined to a thin layer in the endocardium. Additionally, the cardiac impulse proceeds from the epicardium to the endocardium in swine, potentially increasing their sensitivity to externally applied electrical currents compared with humans. These differences diminish the relevance of this model for evaluating the safety of CED exposure in humans.[20]

Theoretical modeling suggests that Tasers® are extremely unlikely to directly trigger cardiac arrhythmias in humans.[21] Experimental human studies have examined the cardiac and metabolic safety of Tasers®, largely using limited duration discharges applied to the dorsum of healthy,

resting volunteers. In such subjects, a 2- to 10-second Taser® discharge provokes a modest increase in heart rate (generally already high due to anticipatory anxiety) and changes in the PR and QT interval that are not clinically significant.[22-26] Additionally, short-lived increases in minute ventilation and tidal volume occur, accompanied by small changes in serum lactate, bicarbonate and creatine kinase (at varying time points), but no clinically significant changes in systemic pH or electrolyte balance. Similarly, a 15-second discharge from a Taser X-26 does not increase the core body temperature of resting, non-environmentally stressed adult subjects.[27] Furthermore, no evidence of dysrhythmia or myocardial ischemia is apparent, even when the barbs are positioned on the thorax and cardiac apex.[23] Case reports indicate that standard Taser® discharges induce ventricular capture in patients with pacemakers, and also can capture, but do not trigger the discharge of implantable cardiac defibrillators.[28,29] Whether the pacemaker is signaling that Tasers® induce ventricular capture, or whether the pacemaker is simply capturing the electrical train of the Taser® pulse is not established.

Although CED activation in normal volunteers appears to be very safe, these studies do not sufficiently reproduce the risks of Taser® exposure among criminal suspects, in whom coexisting medical and psychiatric conditions, alcohol and drug use, and other factors are often present. Human volunteers report that CED exposure is an extremely unpleasant experience, inducing both physiologic and psychological stress. Some experimental studies have begun to address these confounding factors. For example, preliminary reports of CED exposure in healthy volunteers designed to simulate (to a degree) the physiologic effects of fleeing from or struggling with police officers suggest that changes in systemic pH, lactate, and other markers are comparable to those associated with exercise of the same duration.[30-33] Such studies cannot fully evaluate the responses of individuals who are confrontational, have taken drugs, or are desperate for escape, highly agitated, and combative.

MORBIDITY AND MORTALITY

The emerging relevance of Taser® use for emergency room care was noted almost 25 years ago.[34] Despite the designation of the Taser® as a less lethal, or less-than-lethal weapon, Amnesty International has catalogued a temporal association between the use of CEDs and more than 330 in-custody sudden deaths in North America between June 2001 and August 2008, all involving M-26 or X-26 Tasers®.[1] Therefore, some debate still centers on whether to describe CEDs as non-lethal, less-than-lethal, or less lethal, and as impact or non-impact weapons. Because CEDs have been deployed at lower thresholds on the use-of-force continuum, deaths occurring in association with their use make the safety and deployment of CEDs a significant public health issue.

Most but not all studies undertaken by law enforcement agencies (and others) indicate that deploying CEDs relative to other use-of-force options such as pepper spray, physical force, police dogs, and batons reduces injuries to officers and suspects and reduces the use of lethal force.[8,35-40] CED activation also has recognized risks. For example, a potential exists for the probes to penetrate vulnerable parts of the body such as the eyes, mouth, head, or genitals, or large vessels in the neck and groin region. The strong muscle contractions induced by CEDs cause falls and impact-related injuries (e.g., fractures and head injuries), particularly in elderly individuals or pregnant women. Because experimental studies are inherently limited, epidemiologic and prospective investigations during actual weapon use are vitally important in conducting a realistic risk assessment of these weapons.

Mortality

Arrest-related deaths are not new and predate the deployment of CEDs. Initial studies on early CED weapons concluded that their association with in-custody deaths shared characteristics (to a large degree) with other in-custody deaths. Deceased subjects had a high prevalence of alcohol or other drug use, especially stimulants or phencyclidine (PCP), were agitated or exhibited otherwise bizarre behavior, engaged in intense physical struggle, and were subjected to various types of physical restraint.[41-43]

In 43% of autopsy reports reviewed by Amnesty International, the deceased had been shocked in the chest.[1] In more than half of the autopsy reports, the subjects (average age 36 years) had evident cardiovascular disease, an incidence that is significantly higher than that occurring in the general population of 36-year-old adult males. Some of those who died had no underlying disease or drugs in their system, but collapsed after being subjected to repeated or prolonged shocks and/or shocks to the chest, heightening concern that these factors may increase the risk of death or injury, even in relatively healthy individuals. These findings led Amnesty International to call for a suspension in the use of CEDs pending further (objective) study, or, at a minimum to "limit their use to situations where they are immediately necessary to avoid or reduce the likelihood of recourse to firearms."[1]

One case series based on a convenience sample of in-custody deaths between January 2001 and January 2005 identified 75 deaths that were associated with Tasers®.[44] Thirty-seven autopsy reports were made available for review. This study also revealed cardiovascular disease in more than half of the deceased subjects. Additionally, 78% had used substances, mostly stimulants, and 76% exhibited features typical of "excited delirium" (see below). Taser® use was considered a potential or contributory cause of death in 27% of these subjects. The generalizability of this study is limited because it was based on easily identifiable cases, was restricted to available autopsy reports, relied on (historical) information from police reports, and lacked access to official medical records. However, the overall findings are consistent with prior studies of restraint-related fatalities, with the authors noting:

> As has been stated elsewhere, it is likely that such pre-existing disease, when combined with stimulant use, struggle against law enforcement, and definitive restraint maneuvers (Taser® or otherwise), creates a high-risk situation for restraint-related fatalities.[7]

Similarly, the Police Executive Research Forum referred to a study it had commissioned of 118 deaths following Taser® activations, noting that "the results indicated that multiple and continuous activations of CEDs may increase the risk of death or serious injury, and that there may be a higher risk of death in people under the influence of drugs."[10]

Excited Delirium

Although not a validated diagnostic entity in either the International Classification of Diseases or the *Diagnostic and Statistical Manual of Mental Disorders*, "excited delirium" is a widely accepted entity in forensic pathology and is cited by medical examiners to explain the sudden in-custody deaths of individuals who are combative and in a highly agitated state.[45] Excited delirium is broadly defined as a state of agitation, excitability, paranoia, aggression, and apparent immunity to pain, often associated with stimulant use and certain psychiatric disorders. The signs and symptoms typically ascribed to "excited delirium" include bizarre or violent behavior, hyperactivity, hyperthermia, confusion, great strength, sweating and removal of clothing, and imperviousness to pain. Speculation about triggering factors include sudden and intense activation of the sympathetic nervous system, with hyperthermia, and/or acidosis, which could trigger life-

threatening arrhythmias in susceptible individuals. Biochemical studies have shown alterations in the function of dopamine neurons and specific gene activation products in the central nervous system of such individuals.[45] The intense pain associated with Taser® exposure, the psychological distress of incapacitation, and hazards associated with various restraint methods also could contribute.

Of note, one study of emergency department cases over a six-year period evaluated 216 subjects who had been restrained in the "hobble" position; 20 of these subjects died suddenly and unexpectedly.[46] Almost all of these subjects had cardiovascular disease or were under the influence of a stimulant. Four had been exposed to pepper spray, three to CEDs, and two had both exposures. The authors concluded that "such individuals are at a higher risk for sudden death, particularly those who are obese, under the influence of stimulant drugs, or have underlying (cardiovascular) disease." Ongoing debate exists on whether certain forms of physical restraint such as the "hobble" position and "hogtying" place some individuals at risk for positional asphyxia, even in the absence of the use of pepper spray or CEDs.

Governmental Review

Widespread media attention to some Taser®-associated deaths has triggered governmental review of their use in both Canada and the United States.[5,7,47] In June 2008, the National Institute of Justice published an interim report of its ongoing inquiry into deaths following police use of CEDs.[7] Although this interim report acknowledged the need for more research into the effects of CEDs, it concluded that medical evidence is lacking to support the view that CEDs pose a "significant risk" for inducing cardiac dysrhythmia when "deployed reasonably" and that law enforcement officials "need not refrain from deploying CEDs provided the devices are used in accordance with accepted national guidelines."[10,36] The report also urged "caution" in the use of "multiple activations." In its guidelines for CED use, the Police Executive Research Forum also recommends that, following the application of a CED, officers should "use a restraint technique that does not impair respiration."[10,36]

In response to the highly publicized death of a subject in the Vancouver airport, the Canadian House of Commons Standing Committee on Public Safety and National Security evaluated CED use and recommended that the Royal Canadian Mounted Police restrict the use of the Taser® by classifying it (effective no later than December 15, 2008) as an "impact weapon" rather than an intermediate weapon, so that its "use can be authorized only in situations where the subject is displaying assaultive behaviour or posing a threat of death or grievous bodily harm to the police, himself or the public."[47] The Committee further advised that this restriction should not be lifted "before independent research has indicated that use of the Taser® poses no unreasonable risk for the subject."

To more clearly establish the potential role of Tasers® in arrest-related deaths, the following information would be useful: (1) total in-custody deaths (or deaths proximate to restraint); (2) total Taser® deployments (or field applications); and (3) total in-custody deaths not involving Taser® use. Since 2003, all U.S. law enforcement agencies are required to not only report, but also categorize all in-custody deaths.[48] During the period from 2003 to 2005, 47 states and the District of Columbia reported 2,002 arrest-related deaths proximal to law enforcement's use of force, including 1,095 homicides by law enforcement personnel, 96% of which involved the use of a firearm by the arresting officer.[49] Approximately 4% of persons who died had been placed under physical restraints. CEDs were involved in 36 arrest-related deaths during this period. In 17 of these, the CED was causally linked to the death. This report acknowledges that the ability of CEDs

to cause death is a subject of debate, and that due to reporting gaps, these 36 cases do not represent a complete count of all deaths in which the use of a CED was involved.

Prospective Field Evaluations

Two recent studies are instructive.[50,51] One prospective, multicenter, observational study tracked a consecutive case series of all CED weapon uses against criminal suspects at six U.S. law enforcement agencies for three years (2005-2008).[50] Physician site investigators reviewed police and medical records to identify and classify injuries sustained by subjects after CED use. To quality for consideration, law enforcement agencies had to use conducted electrical weapons, have a physician already affiliated with the agency's tactical team with access to agency records, provide routine pre-incarceration medical screening to all arrestees (jail intake, paramedic evaluation at the scene, physician evaluation in hospital emergency departments), and perform mandatory use-of-force reviews after each CED use. CEDs were used against 1,201 subjects during a 36-month period; probe mode was used in 65% of subjects, stun mode in 27%, and both modes in the remainder. The mean number of discharges was 1.8 (median = 1).

Significant injuries (i.e., those requiring hospital admission, producing long-term disability, or that were life threatening) occurred in three subjects (0.25%), including two intracranial injuries from falls and one case of rhabdomyolysis. The remainder were classified as suffering minor or no injuries. The majority of mild injuries were superficial puncture wounds from the darts, and some blunt trauma or bruising attributable to falls. Two subjects died in police custody, but medical examiners eliminated CED use as a causal or contributory factor in both cases. Both subjects had struggled violently with police, and required additional restraint measures. One suffered from cardiomyopathy and had cocaine in his system; the other was being treated for mental illness (unspecified), and was subdued only after pepper spray application, two CED discharges, and restraint in the prone position. The subject collapsed 5 minutes after CED discharge, and was subsequently found to have an extremely high serum concentration of olanzapine. This outcome was judged to be "typical of other in-custody deaths."

The most carefully controlled prospective study involved an analysis of 426 consecutive CED activations in the Dallas police department from November 2004 through January 2006.[51] The study established on ongoing registry of CED application (Taser® X-26) after introduction of the device into the force continuum. All suspects who were subdued following CED activation were evaluated by paramedics, the jail intake nurse, or a police department tactical physician. In addition, the on-call tactical physician, if not already on the scene, was notified of the activation. Medical review of the registry entrants ultimately was conducted by the physician-led medical team.

One subject collapsed during transfer from the ground to the ambulance (after two standard discharges) and subsequently died. This individual had high serum concentrations of cocaine and metabolites and a core body temperature of > 107° F on arrival at the emergency room. No other suspect had an injury requiring treatment other than simple first aid. In 5.4% of the deployments the Taser® was deemed to have clearly prevented the use of lethal force. This study helps to corroborate the safety profile for CED use when a prescribed policy is followed. The use of a comprehensive training program likely contributed to the strong safety record in this study, as well as the fact that police personnel knew all Taser® applications would be strictly evaluated for compliance with established departmental use-of-force policies.

USE OF CONDUCTED ELECTRICAL DEVICES IN HEALTH CARE FACILITIES

In many hospitals security is provided by contract agencies or off-duty law enforcement personnel. The Joint Commission standard EC.2.10 addresses security, noting: "The hospital identifies and manages its security risks." The Element of Performance for EC.2.10.1 states: "The hospital develops and maintains a written management plan describing the process it implements to effectively manage the security of patients, staff, and other people coming to the hospital's facilities." Furthermore, the Joint Commission surveys hospitals to ensure that the hospital complies with the policies that it has established based on the risk assessment for that facility. Available personnel and security assessments vary greatly among hospitals, so a uniform Joint Commission-based guideline on the use of CEDs in hospitals is probably not warranted.

Concern has been expressed, as noted above, about the use of CEDs in individuals who are not compliant with law enforcement because of existing mental health problems. Although a few media reports of CED use in violent patients confined to mental health facilities have appeared, no systematic review or study of CED use for controlling violent patients or their use as negative reinforcement in uncooperative patients is available. Psychiatric facilities that accept Medicaid or Medicare payments are not permitted to use CEDs. Regardless, CEDs should not be used for the purpose of negative reinforcement in such patients.

SUMMARY AND CONCLUSION

Concerns about the use of CEDs fall into three general areas: (1) they are used too frequently and at lower levels on the use-of-force continuum than indicated; (2) appropriate training and supervision of CED use is lacking in some jurisdictions; and (3) CEDs may contribute to the death of suspects, either directly or indirectly.

CEDs have a role to play in law enforcement and prudent use can save lives during interventions that would otherwise involve the use of deadly force. If deployed according to an appropriate use-of-force policy, and used in conjunction with a medically driven quality assurance process, Taser® use by law enforcement officers appears to be a safe and effective tool to place uncooperative or combative subjects into custody. Treating CEDs as "only a substitute for deadly force, would endanger officers and negate the benefit that has been demonstrated."[8] Training protocols should emphasize that multiple activations and continuous cycling of CEDs appear to increase the risk of death or serious injury.[10]

The growing use of CEDs makes it virtually inevitable that more cases of in-custody death are occurring in proximity to CED activation. As noted by Link and Estes, important variables confounding Taser®-related deaths "cannot be fully investigated in retrospective reviews, registries, or reproduced in clinical investigations."[52] The "influence of confounding clinical factors such as excited delirium, physical restraint techniques, underlying cardiovascular disease, hyperadrenergic states, metabolic derangements, or the influence of alcohol, stimulants, or other drugs remains unknown in epidemiologic investigations, and uncontrollable in clinical investigations."

Ongoing issues include: (1) the need for clear usage guidelines, including restrictions on the application of multiple discharges; (2) an appreciation of the potential risks of injury and death associated with CED use and the gaps in knowledge about potential factors that affect the relative safety of deployment, and the risks of sudden death after exposure and physical restraint; (3) the need for independent peer-reviewed research into the safety (and usefulness) of CEDs in field

applications; and (4) the need to establish a more comprehensive national database of in-custody deaths.

RECOMMENDATIONS

The Council on Science and Public Health recommends that the following statements be adopted in lieu of Resolution 401(A-08) and the remainder of the report be filed:

1. That our American Medical Association recommend that law enforcement departments and agencies should have in place specific guidelines, rigorous training, and an accountability system for the use of conducted electrical devices (CEDs) that is modeled after available national guidelines. (New HOD Policy)

2. That our AMA encourage additional independent research involving actual field deployment of CEDs to better understand the risks and benefits under conditions of actual use. Federal, state, and local agencies should accurately report and analyze the parameters of CED use in field applications. (Directive to Take Action)

3. That our AMA establish policy that law enforcement departments and agencies have a standardized approach to the medical evaluation, management and post-exposure monitoring of subjects exposed to CEDs. (New HOD Policy)

Fiscal Note: Less than $500

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