Commentary on Conducted Energy Weapon Safety and Associated Research

Chris Lawrence, Instructor, Ontario Police College, Aylmer, Ontario

Conducted energy weapons (CEW) research discussions are fraught with misunderstandings and partial truths. While vendor-funded research is nothing new, society has reason to be suspicious of it. Other professions rely upon it and are aware of its problems. Conversely, not every peer-reviewed article provides wholly reliable information. The intent of this article is to assist law enforcement officials and the public in evaluating CEW research and safety issues by providing background information usually absent from most media accounts.

Conducted energy weapons—even the name can be a point of dispute. Should they be called weapons or devices? Are they more appropriately termed neuromuscular incapacitation weapons, stun guns, less-lethal weapons, or intermediate weapons? If our society cannot even agree on a concept as simple as a name, how can we be expected to agree on their proper use or on research outcomes as to whether or not they are safe?

Sidestepping the issue of terminology, this paper will use the term conducted energy weapon and define them as any device designed to use an electrical discharge for the purpose of gaining lawful subject control while acting as an agent of the state. Agent of the state includes police and correctional officers as well as other law enforcement officials who may become responsible for enforcement and public order maintenance—for example, National Guard troops deployed as an aid to the civil power during major incidents such as a hurricane or flood. The term does not include citizen self-defence use.

This definition addresses the position that law enforcement use of a CEW is de facto a method of torture (Stanbrook, 2008). Federal statute within a developed, common law country exempts officers when they are used during arrest procedures (Criminal Code, 1985). In other words, using force to effect a lawful arrest which results in the subject experiencing substantial discomfort is not torture but, rather, use de jure and consistent with international convention (UN Convention Against Torture, 1984; UN Office of the High Commission for Human Rights, 1979, 1990). The UN’s concept of torture is associated with extracting confessions or statements and eliciting punishment—not with the force used to effect an arrest (Ingelse, 2001). Police use of force to protect themselves is consistent with current prudent police practice (Canadian Association of Chiefs of Police, 2000).

Focusing for a moment on the issue of sudden deaths, this is not the first time a series of deaths have alarmed a citizenry (Lancisi, White, & Boursy, 1971) nor will it likely be the last (Keller, 2002; Pandemic Influenza, 2008). In the early 18th century, Pope Clement XI addressed an alarming number of sudden, unexpected deaths in Rome beginning in the spring of 1705. Theories for the cause of the problem included divine displeasure, “the rotten quality of the tobacco . . . fetid exhalations from past earthquakes, then again the abuse of chocolate, and finally an unknown virus within
their surroundings” (Lancisi et al., 1971, p. xix). Giovanni Maria Lancisi, personal physician to the Pontiff, was directed to perform autopsies on the recently departed.

Once the true causes were determined—“pathological lesions of the brain and heart, . . . the first description of syphilis of the heart and of growths on the valves, . . . hypertrophy and dilation of the heart . . .”(Bett, 1954, p. 781)—Lancisi suggested that the results be published. The accuracy of information provided to the public by the media of the day concerned him:

And because, in consequence of the supreme command of the Pontiff, sufficient inquiry has now been made through autopsies and other observations into the causes of these rampant sudden deaths, we consider it as consonant with good sense to weigh carefully in the scale of judgment the examinations performed and faithfully described. These we permit now indeed the more willingly to issue forth into the hands of men, since we have seen here and there a number of dissertations published in the Tuscan2 and the Latin languages about the sudden deaths of this year. These dissertations, although discussing the subject splendidly, nevertheless, because of the scantiness of their observations and their extremely inadequate investigation of the causes, do in no sense embrace the subject in its entirety. (Lancisi et al., 1971, p. xx)

The questions asked above are essentially the same as those asked today: “What is causing these unexplained deaths?”

In November 2007, Amnesty International USA Executive Director Larry Cox placed the number of deaths following police use of CEWs at 300 (CBS News, 2007). It seems that number is never amended even after a thorough investigation, some including inquests, concludes that the CEW played no role in the death. For example, on May 2, 2008, an Ohio court decided medical examiners must be prepared to present “evidence on the use and effect of TASER devices” (TASER v. Kohler, 2008, p. 11) should there be a “request for review of the Chief Medical Examiner’s cause and manner and mode of death determinations” (p. 1):

Even though the Medical Examiner’s conclusions are entitled to much weight, and assuming a nonbinding presumption in favor of the Medical Examiner, the Plaintiffs have proven their claims for changing the reports of autopsy and death certificates on the three individuals by more than a preponderance of evidence. (pp. 11-12)

In short, if one is unable to point to credible science to support an opinion, then that “opinion” cannot be expected to withstand a challenge, particularly if that challenge is based upon an opinion that does. Questionable decisions can lead to erosions of public confidence with potentially serious long-term consequences (Batty, 2006; “Inquiry into Pediatric Forensic Pathology in Ontario,” 2008).

The fact is that people have died after an altercation with the police long before CEWs were widely used by police (Wetli & Fishbain, 1985). Reports of death following restraint first appeared in 1650 before policing was even organized (Dewhurst, 1981); mentally ill patients have died after agitation and/or exhaustion without any police involvement (Adland, 1947; Bell, 1849; Billig & Freeman, 1944; Calmeil, 1832; Derby, 1933; Griesinger, 1867; Josephy, 1949; Kraines, 1934; Shulack,
1938, 1944, 1946); and some have died without being restrained at all (Rosh, Sampson, & Hirsch, 2003).

Modern police-related deaths have been blamed on a variety of causes:

- **Prone positioning**: A theory whose scientific validity has been questioned (Chan, Vilke, & Neuman, 1998; Chan, Vilke, Neuman, & Clausen, 1997; Chan et al., 2004; Di Maio & Di Maio, 2005; Reay, Flinger, Stillwell, & Arnold, 1992; Reay & Howard, 1999; Ross & Chan, 2006)
- **Pepper Spray**: Very few adhere to this theory any longer (Chan et al., 2000; Granfield, Onnen, & Petty, 1994; Smith & Stopford, 1999)
- **Neck restraints**: A recent Canadian Police Research Centre review of the topic addressed the misinformation associated with this issue (Hall & Butler, 2007)
- **And today, CEWs**

To paraphrase Dr. John Ratey (2001), an associate clinical professor of psychiatry at Harvard Medical School, part of the problem may involve scientists looking for the one component that explains the entire problem. Sudden deaths following an altercation with police are believed to be a complex, multifactoral event (Di Maio & Di Maio, 2005; Lawrence, 2005; Lawrence & Mohr, 2004; Ross & Chan, 2006), and death following restraint is not just a police problem. It also occurs in medical and healthcare settings (Mohr, Petti, & Mohr, 2003; Weiss, 1998). Deaths could involve a series of interactions between metabolic systems, any one of which could lead to sudden death (Laur, 2004).

Despite the history and terminology issues, the question remains: “Are CEWs safe?” According to a recent article published in a peer-reviewed medical journal, maybe not—at least in the swine model (Nanthakumar et al., 2008). This paper is actually a review of the authors’ earlier work (Nanthakumar et al., 2006) with greater consideration given to one aspect, myocardial capture. Using real-world circumstances and human interaction, they appear to have a high safety factor (Bozeman et al., 2007). An independent prospective Canadian study involving similar parameters as Bozeman et al. has recently moved past the data analysis stage and can be expected to report outcomes soon. At best, CEWs seem to pose a low risk of death and injury. Several research documents carry the caveat that while their conclusions may address one issue, further research is required or necessary to fully understand findings within the context of field use on a real population (Ho et al., 2006; Jauchem et al., 2006; Levine et al., 2006; Manojlovic et al., 2005; Nanthakumar et al., 2006, 2008).

In examining the CEW research landscape, there are basically three sources of research:

1. **Vendor-conducted research**: The vendor or more likely the manufacturer conducts research and reports their findings.
2. **Vendor-sponsored research**: The vendor provided researchers with either money and/or equipment to allow the investigation to be conducted.
3. **Independent research**: Research is conducted independently of any person or entity with a monetary interest in the outcome.

The public benefits from vendor-conducted research. For example, the Ford Motor Company spent 22.7 billion dollars in the years 2005 to 2007 in engineering, research, and development. Their intent was to build a better car. Ford spent an additional 15.5 billion in advertising, including major sponsorship of the Super
Bowl®. The public benefits from both the automotive innovation and from the money infused into the economy through their advertising budget as well as any sponsored entertainment. With respect to vendor-sponsored research, The Boeing Company (2008) spent over 17 billion dollars on research and development over the past five years. Indeed, Boeing intends on expanding their research capacity:

Accordingly, in addition to conducting our own internal R&D, Boeing is partnering with some of the best research agencies, universities and companies around the world. In doing so, we are leveraging their technologies and expertise to ensure we stay ahead of the competition by providing the most innovative and affordable aerospace solutions the world has to offer. Moreover, this approach provides Boeing with broader access to the $1 trillion invested annually in R&D around the world. (p. 17)

Partnering with universities means there is a potential for tax money to benefit private enterprise in that public funding drives, at least partially, public universities. This point is raised not to condemn partnerships but to remind ourselves that corporate interests are intrinsic to many facets of daily life.

The cars driven and the aircraft flown on a daily basis depend in large part on vendor-conducted and vendor-sponsored research. The difference between these two products and CEWs is that automobiles and aircraft are subject to government testing and regulation; CEWs are not. That responsibility rests with legislators not law enforcement. Firearms are not subject to specific quality regulations in the manner that transportation products are. Batons and pepper spray are also without government certification. With respect to research on police batons, a search on PubMed (National Library of Medicine, 2008) conducted May 6, 2008, using the term police baton returned 11 documents, including five case studies. A similar search using the term oleoresin capsicum returned 19 papers. Batons have been carried by law enforcement officials even before Peel’s organization of the British police (Babington, 1990), yet they are largely ignored by medical researchers despite their historic and ubiquitous presence in law enforcement. Pepper spray has been studied to a greater extent.

The real problem with vendor-associated CEW research stems from past experiences where science is discovered to be either wrong or subject to industry manipulation. Society’s experience with the tobacco industry and the hazards of smoking comes quickly to mind. For years, cigarette companies advised that there was no causal link between cigarette smoking and lung cancer. Today, in many places in North America, it is illegal to smoke in a public area. Another ongoing court case involves a large pharmaceutical company, their 2004 withdrawal of a pain medication, and the research associated with the drug’s side effects and associated health risks (Taylor, 2008).

In concept, research that results in publication within peer-reviewed journals should be of dependable quality. According to an editorial in a respected medical journal, that dependability is now being questioned:

The profession of medicine, in every aspect—clinical, education, and research—has been inundated with profound influence from the pharmaceutical and medical device industries. This has occurred because physicians have allowed it to happen, and it is time to stop. (DeAngelis & Fontanarosa, 2008, p. 1833)
In 2005, the Journal of the American Medical Association (JAMA) and the BMJ Publishing Group held the Fifth International Congress on Peer Review and Biomedical Publication in Chicago. Two of the sponsors included companies that were involved substantially in the publishing of peer-reviewed medical journals and textbooks: Elsevier and Wolters Kluwer Health (International Congress on Peer Review and Biomedical Publication, 2005). During the Congress of 2001, at about the same time as CEWs were being deployed in increasing numbers, the sponsors of this academic endeavor included the following corporations:

- Pfizer Inc.
- Aventis Pharma
- AstraZeneca
- Merck & Co Inc.
- Eli Lilly & Co.
- Takeda Pharmaceuticals North America

It seems that other professions outside of law enforcement have received support from business interests. Indeed, the participants discussed reliability issues surrounding peer-reviewed medical literature (Chew & Armstrong, 2001; Singh, 2001). Taylor’s (2008) news article indicates that questions concerning publication bias arose as early as 1994. In making his point, he refers to a Canadian study that examined 56 “industry-funded trials for non-steroidal anti-inflammatory drugs, which are used for treating arthritis” (p. A10). Not one found unfavorable results, and it was reported that the trials had been designed to favor the sponsor (Rochon et al., 1994). It seems there may be more windows for stone-throwing-critics than first believed.

The purpose of these examples is not to blame another system for the public’s concerns about police use of CEWs but to illustrate that even systems held in high esteem are not flawless. Clearly, experts in every field of endeavor exist, and their assistance is invaluable to our collective existence. Experts rely upon their related industry for information, and that is simply the way it is. True independence from any industry support may be very difficult to maintain. Assurances can be given to offset concerns, and some peer-reviewed journals are requiring that the author disclose financial and professional relationships.

In closing, it may be best to review the problem objectively and in context to see what can be made of it. The stone-throwing-critics, on all sides, may want to re-examine the structure of their own house before hurling future rocks—no group seems to have the truth cornered. The problem of sudden, unexplained deaths has been with us for longer than a particular weapon system or restraint method, policing, or even modern medicine.

For the sake of those who have lost someone and for those who have passed, let us make an informed decision. Let us do what is right rather than what is convenient. We are all in this together.

Note: The comments and opinions expressed are those of the author and are not necessarily those of the Ontario Police College, the Ministry of Community Safety and Correctional Service, or any other agency.
Conflict of Interest: The author has no financial connection with any weapon or police equipment manufacturer. The author is on staff at the Ontario Police College; is a project partner at the Canadian Police Research Centre – Defense Research Development Canada; and is a technical advisor to the Force Science Research Center, Minnesota State University–Mankato.

Endnotes
1 Excerpt from Criminal Code (1985), RSC, c. 46, 269.1:

(1) Torture – Every official, or every person acting at the instigation of or with the consent or acquiescence of an official, who inflicts torture on any other person is guilty of an indictable offence and is liable to imprisonment for a term not exceeding 14 years.

(2) Definitions – For the purpose of this section, “official” means
(a) a peace officer,
(b) a public officer,
(c) a member of the Canadian Armed Forces, or
(d) any person who may exercise powers, pursuant to a law in force in a foreign state, that would, in Canada be exercised by a person referred to in paragraph (a), (b), or (c), whether the person exercises powers in Canada or outside Canada;

“torture” means any act or omission by which severe pain or suffering, whether physical or mental, is intentionally inflicted on any person
(a) for a purpose including
   (i) obtaining from the purpose or from a third person information or a statement,
   (ii) punishing the person for an act that the person or a third person has committed or is suspected of having committed, and
   (iii) intimidating or coercing the person or a third person, or
(b) for any reason based on discrimination of any kind

but does not include any act or omission arising only from, inherent in or incidental to lawful sanctions (author’s emphasis).

2 A prominent language of the day

References


*Criminal code*. RSC, c. 46, s.269.1 (1985).


**Chris Lawrence**, MA, is an instructor at the Ontario Police College in Aylmer, Ontario. With over 29 years of police-related experience including 25 years as an instructor, his past assignments have included Patrol, Special Services, Criminal Investigation, and Training. He has given presentations on police use of force and sudden in-custody deaths throughout North America, as well as in Australia and Europe, to police executives, investigators, trainers, and line officers, as well as to medical and legal staff. He has also provided expert opinion evidence in several North American jurisdictions.