

Police/Public Interaction: Arrests, Use of Force by Police, and Resulting Injuries to Subjects and Officers—A Description of Risk in One Major Canadian City

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The controversy surrounding the temporal association of subject death in custody with the use of the conducted energy weapon (CEW) by law enforcement officers has identified the critical need for research to document the operational risk profile of use of force modalities, including the CEW. While several police agencies and independent research bodies in the United States have released information that suggests that the appropriate use of the CEW reduces officer and subject injuries (Angelosanto, 2003; Bozeman, 2007; Bozeman & Winslow, 2007; Butte County Law Enforcement, 2005/2006; Cape Coral Police Department, 2004; Cincinnati Police Department, 2005; Minneapolis Police Department, 2007; Orange County Sheriff's Office/Florida Gulf Coast University Division of Justice, 2004), there is no epidemiological research that either supports or refutes this conclusion within the Canadian policing experience.

Extensive media coverage of events where subjects have died proximal to the use of the CEW by police has heightened concerns about the safety of CEW use. This is augmented by the lack of publication of CEW uses without an adverse outcome and the absence of similarly intense media coverage of persons who die in police custody without the use of the CEW. Thus, publication bias prevents the public and stakeholder community from forming an informed opinion about the actual risk presented by the CEW or other use of force modalities. Similar biased reporting of events has also led the laypublic to have the impression that police use of force is frequent when compared to the overall number of police and public interactions.

Studies in the United States have found that the relative frequency of police use of force (force applied or threatened) when compared with the number of police/public interactions occurs only approximately 1.5% of the time (Bureau of Justice Statistics, 2001). The actual frequency of events where officers actually applied force versus threatened the use of force is not known.

Other studies in the United States which have investigated the injury potential of use of force methods (non-firearm) have consistently found that the highest citizen and officer injuries occur when physical control (hands-on) tactics are used (Garner et al., 2002; Smith, Kaminski, Rojek, Albert, & Mathis, 2007). The use of CEWs and OC spray has been found to result in lower citizen and officer injury rates (Alpert & Dunham, 2004; Seattle Police Department, 2002; Wahl, 2006).

This study is the first in Canada to document the frequency of use of force by police compared to all police-public interactions, force by police compared to citizen arrest, and injury outcome to both citizens and police by force modality.

Use of Force and Risk

A clear understanding of the risk associated with any force intervention is fundamental. A contextual risk comparison considers the balance between what the likely or intended consequences are arising from the application of force (risk) and the acceptability of that risk given the circumstances of the event. A basic, universally accepted tenet of the use of force by police is that the force applied and the risk of its use must be proportional to the seriousness of the crime and the degree of resistance being offered by the subject of police interest. However, without an appreciation of the level of injury or harm likely to result from the use of any type of force modality, sound policies and practices cannot be developed. Adding to the confusion is a lack of published scientific evaluation to counteract the large amount of publicly available incomplete or incorrect information and even intentional artifice.

Critical to the appropriate understanding of anticipated harm from the application of any particular use of force modality is the parallel understanding that use of force incidents are typically dynamic, rapidly evolving and often extremely violent in nature. In this regard, no use of force technique available to police officers can be considered "safe." The theoretical notion of safety with respect to force intervention techniques and devices used by police is not well-understood by the laypublic in Canada. Far from Merriam-Webster's dictionary definition of "safe" as "free from risk or harm" and "secure from threat of danger" or "security from risk," it must be understood that when police officers undertake their duty to preserve the public peace it may become necessary to use force. The application of force by police and the concept of "safety" must therefore be viewed in a contextual framework. This framework is based on the balance between the degree of risk of harm or resistance faced by the police and the use of force options that are reasonably available to the officer and proportionately appropriate at the time force was used. As a result of these dynamic and uncontrollable variables, every use of force encounter between the police and a citizen carries with it the possibility for injury for one or all of the participants, however unexpected that injury might be. In this regard, no use of force technique available to police officers can be considered "safe."

Another aggravating factor faced by the community in understanding the risk of police use of force has been the intense focus on extremely rare events with a negative outcome. As Garner et al. (2002) stated, "Science and policy making are both weakest when attempting to deal with activities that occur very infrequently. . . . Of course when these events do occur, many are prepared to do 'post-dictions' about what caused the event without examining the fact that apparently similar events occur every day without deadly outcome, injury or even complaint" (p. I-18).

Methodology

This is a descriptive evaluation of a prospectively collected, comprehensive data set from the Calgary Police Service (CPS) over a two-year span from January 1, 2006, to December 31, 2007. The data that follows is the first review of the overall

experience and does not include an exhaustive review of all potential subgroup evaluations or extensive medical evaluations, which will occur at a later date for these data.

The CPS is a municipal agency policing a city with a population of over one million people. There is no other police agency involved in any way with the police services to this population, thus all interactions fall within the jurisdiction of this single agency and are recorded in its database.

Police interactions are defined as the total calls for service, on-view calls reported by officers, special duty activities, and all traffic stops. Only dispatched calls for service where face-to-face interaction occurred are included.

It is understood that a police/public interaction does not necessarily constitute an arrest nor reflect a charge laid. The total number of police/public interactions was compared to the total number of persons charged with an offence during the same study period. The information for total number of persons charged was obtained from the relevant police databases and includes all subjects charged with criminal, provincial, or municipal offences.

The total number of persons charged with an offence was subsequently compared to the number of those persons arrested by police during the same study period. The data of total persons arrested was obtained from the police service database and includes both subjects arrested-charged-released and subjects arrested-charged-incarcerated (in police custodial facilities). The total number of subjects arrested was then compared with the total number and types of police force required to affect the arrests. Following this, the total number and type of police use of force modalities was then compared to the resulting injuries to the subjects of police interest as well as the resulting injuries to the officers.

Subject characteristics such as presence of alcohol or drug intoxication and the presence of an emotional disturbance are recorded based on the interpretation of the responding officer at the time of the event, as the event unfolded, and as they were recorded on the use of force report form. Since officers in the street do not have the ability to confirm medical histories or consumption records or to perform toxicologic analysis, categorization of these data reflect the officers' best judgement of the situation at hand and not a classification by information known after the fact. While many critical reviewers would find this classification subjective, officers utilize use of force options based on their assessment of the individual at the time, and assessments of injury patterns and outcomes should reflect those judgements. Simply put, accurate medical histories and toxicologic information are rarely if ever available, and categorization by subsequently known information would alter the generalization of these data to the true field experience which involves the officer's judgement and the categorization of individuals.

The details of use of force in all police/public interactions were recorded prospectively on a use of force report form completed electronically at the time of the interaction as part of the police report. In the CPS, all aspects of police/public interaction involving the use of force are included in an electronic police report completed by officers in the patrol car following the interaction. Each section of the police report, including use of force, is completed by tick box completion of

section-relevant questions. Text answers are permitted only as subsidization of the detail already included in the tick boxes. Completion of the force-option tick box answers are mandatory, allowing consistent categorization of data rather than reliance on a qualitative assessment of text answers. The final electronic police report cannot be submitted successfully if any section is incomplete, ensuring the completeness of the reports that are submitted. The resultant electronic database has evaluable data, which can be accessed by using simple search criteria.

Obviously, no system of use of force reporting will detect incidents in which police officers use force and choose not to report it. While no agency can realistically claim 100% compliance with form submission, compliance with agency rules and regulations regarding submission of use of force reports must be assumed, and the authors anticipate that the ethical, moral, and professional activities of the average police officer in this agency are represented in these reports. There is no systematic method to track events that are not submitted nor to evaluate compliance, although officers are well aware that the best evidence for an officer during a citizen complaint is reflection of the events in a completed police record.

Use of force report forms are included within the overall electronic record of the case and are subject rather than event specific; more than one use of force report form can be contained within one case file number. Since use of force reporting is subject specific and reflects all use of force involving that subject rather than just for the incident as a whole, in cases where multiple officers respond to events in which multiple subjects are involved, the case number allows for a use of force report specific to each subject involved and tracks the use of force for that subject. For situations in which a single officer responds to multiple offenders, the same details can be evaluated for each subject individually. For cases in which there is a single offender and multiple officers, again the use of force report form is specific to the subject and reflects all use of force carried out involving that subject regardless of which officer(s) applied the force. Thus, each subject's experience with use of force is recorded, and multiple representations of the same use of force are not included in the database.

Officers' regimental numbers are allocated to each force option that they apply. Each time an officer applies force to a subject, that officer's regimental number is allocated to that force; and if that officer reports an injury, it can be tracked. The resulting officer injuries are not always suffered by the officer delivering the force modality; at times, an officer present during the altercation may be injured as part of the restraint process. Text additions to use of force reports obviously can be used to clarify the events.

Data concerning the frequency and type of police use of force was obtained from the system which captures all use of force data at levels beginning at the force level called *strikes and stuns*. Minor physical compulsion such as handcuffing or low-level pain compliance techniques such as joint locks (e.g., wristlocks, pressure points) are not captured and could not be included in this analysis. The use of firearms to threaten compliance (subjects challenged by officers with guns drawn) is not included in this study, although the authors did note several instances where this had occurred without the application of other force.

Since the database search for this report focuses on the use of force methods utilized by frontline police officers during their course of duties over the two-

year study period, the data reviewed does not include the use of police service dogs (PSD/K9) or the application of tactical responses such as chemical agents, noise flash diversionary devices (NFDD), or kinetic impact projectiles. Instead, the force response options represented in this study are physical control,¹ CEWs,² baton,³ OC spray,⁴ and the vascular neck restraint (VNR).⁵ It should be noted that threats to use force, the simple display of the force option (baton, OC spray, or CEW), or the application of the laser light beam of the CEW were not counted as use of force events. While all would argue that demonstration of the capability of exerting force induces compliance in some individuals, such displays would not be expected to incur injury. Inclusion of such demonstrations without actual force application would bias the injury profile toward a lower percentage of risk.

In instances where multiple force options were used, the authors used an Intention to Treat Analysis in order to explore all outcomes from the initial use of force chosen by a patrol officer. Under the Intention to Treat Analysis we describe, if an officer originally decided to use one force option to control the subject but was unsuccessful and had to subsequently resort to other force options, any injuries sustained were ascribed to the original force option.

The Intention to Treat Analysis was used to ensure that injuries incurred through the application of the initial force option were ascribed to it which represents the true worst case scenario for the initial force option chosen. In this way, the effects of having a variation in the initial force option choice are examined and a favorable injury profile is not ascribed to an initial force option that is not effective at first application. In the Intention to Treat Analysis, every subject who begins to be restrained by a force option remains analyzed in that group and has their injuries ascribed to that option. Use of the Intention to Treat Analysis is done to avoid the effects of crossover from one force modality to the other and provides information on the overall effect of availability of multiple force options, including CEW.

However, since the authors were specifically interested in the injury pattern of each restraint method, and for the CEW in particular, the injury pattern specifically associated with the CEW was also explored regardless of where it was used in the use of force events. Thus, all resulting mortality and injury is ascribed to the first force option. For example, if the first control attempt was through the use of the CEW and it was unsuccessful with the subject, requiring subsequent physical control, any injuries incurred by the subject or the officer at any time would be ascribed to the CEW. It is understood that this will overestimate the injuries ascribed to the use of force option initially chosen by the officer.

Injuries included are all injuries reported by the subject or the officer and are not simply those injuries felt to be attributable specifically to the use of force option. For example, if a subject had already slashed his wrists prior to the application of force, the subsequent need for treatment would still be evaluated with respect to the force option used. Similarly, if an officer falls and injures him- or herself during the scuffle, the injury would be ascribed to the force option of interest. While this necessarily overinflates the injury rate, it demonstrates a true worst case scenario of the outcome of use of force. More formal evaluation of the actual injury description will be carried out during a later comprehensive medical review of subject outcomes for these data. In this first exploration of these data, subjects' medical charts have not been reviewed. It is unknown at this point whether

subjects received medical treatment for psychiatric disorders or from pre-existing injuries; it is only known that subjects required medical care. As a result, the interpretation of the data may oversubscribe the frequency of injuries to the use of force modality.

Reporting of subject injuries by officers is mandated by the electronic use of force report form which cannot be submitted electronically unless this (and all other) sections are completed. Predefined subject injuries are categorized by the completing officer as *none, minor, minor-outpatient, hospitalization, or fatal*.⁶ Medical charts of subjects were not accessible to the police service for the analysis of this data. As a result of the large sample size and large number of subjects, we are confident that the resulting values described are precise.

Officer injuries were also obtained from the electronic use of force database (from the categories of *none, minor, minor-outpatient, hospitalization, or fatal*) as well as from aggregate data surrounding workers compensation claims and includes the total number of days of abstraction from duty from injuries resulting from use of force incidents during the study period. Medical and individual member Workers Compensation Board data were not accessed.

Police/Public Interactions, Charges, and Arrests

During the study period (2006 and 2007), the agency reported 827,022 police/public interactions (2006: $n = 423,707$; 2007: $n = 403,315$). Out of the 827,022 police/public interactions, a total of 353,899 (2006: $n = 182,101$; 2007: $n = 171,798$) violators were charged with an offence (including all municipal, provincial, and federal offences⁷).

Out of the total 353,899 subjects charged with an offence, police arrested 37,719 subjects (2006: $n = 20,123$; 2007: $n = 17,596$). Thus, 10.7% of all subjects charged with an offence were subject to arrest. When compared to all police/public interactions ($n = 827,022$), police arrests accounted for 4.6%.

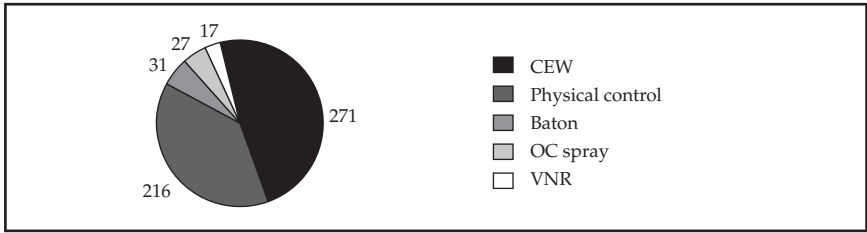
Arrest and Use of Force

In the two-year study period, general police/public interactions were extremely unlikely to result in any use of force. In 827,022 interactions, there were 562 use of force events, or 0.07% of all interactions.

When actual arrests occurred, the use of force remained low. Out of the 37,719 arrests that occurred during the study period, police utilized force (at a level above handcuffing or low-level pain compliance) to affect the arrest on 562 subjects who were resisting at some level. The number of incidents requiring force represented 1.5% of the total number of subjects arrested. Figure 1 represents the breakdown of the types or methods of use of force utilized by police during the arrests of subjects.

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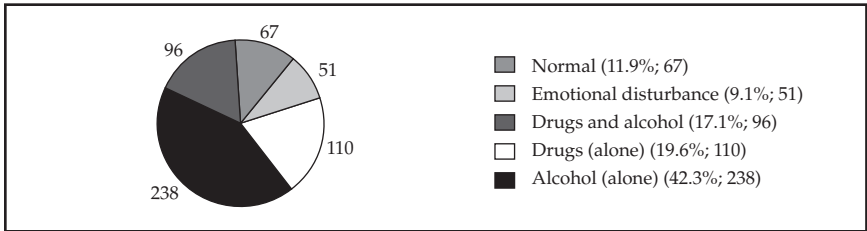
Figure 1. Use of Force by Type



Subject Gender and Condition Profile

Out of the 562 use of force events during the study period, male subjects accounted for 93.6% ($n = 526$) of the population. The physical condition of all subjects on which force was used is represented in Figure 2.

Figure 2. Subject Condition Upon Arrest



Use of Force and Subject Injury

The reasonableness of police use of force methods needs to be viewed in relation to the relative risk profile (risk of injury outcome) and the level or degree of risk of harm being offered by the subject of police interest. This section of the research describes the subject-injury profile from the five force response options available to the officers in the study site.

The most commonly used use of force methodology in this two-year study was the CEW application at 48.2% of all use of force.

Table 1 summarizes the subject and officer injury patterns between the modalities. No injury or injuries not requiring treatment are not reflected in Table 1.

Table 1. Subject and Officer Injury Patterns

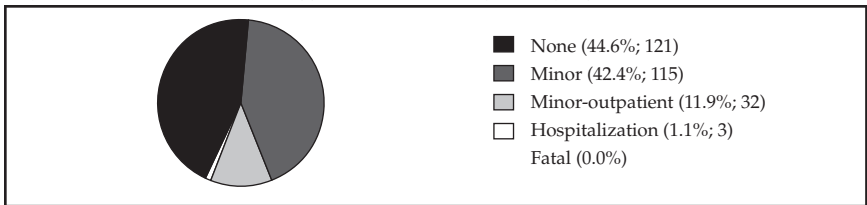
	Subject Injury Requiring Treatment	Officer Injury Requiring Treatment
CEW	13.0%	3.3%
Empty hand control	18.0%	5.5%
Baton	29.0%	12.9%
OC spray	3.7%	0.0%
VNR	5.9%	0.0%

Injury patterns within each restraint/use of force modality are discussed below.

Conducted Energy Weapons

During the 562 use of force related arrests, officers utilized CEWs 48.2% ($n = 271$) of the time. The subject injury profile following the application of the conducted energy device is depicted in Figure 3.

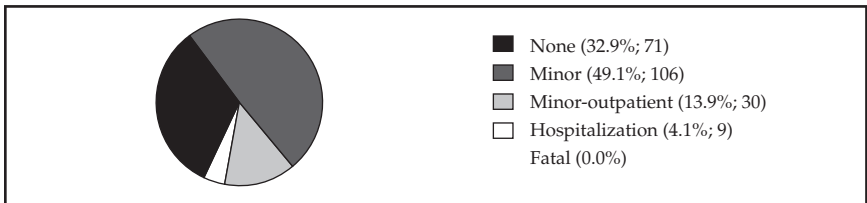
Figure 3. Conducted Energy Weapons Subject Injury



Physical Control

During the 562 use of force related arrests, the next most commonly utilized use of force was empty hand physical control, used 38.5% ($n = 216$) of the time. The subject injury profile following the application of physical control techniques is represented in Figure 4.

Figure 4. Physical Control Subject Injury



Baton

During the 562 use of force related arrests, officers utilized the baton only 5.5% ($n = 31$) of the time. The subject injury profile when the baton is utilized is shown in Figure 5.

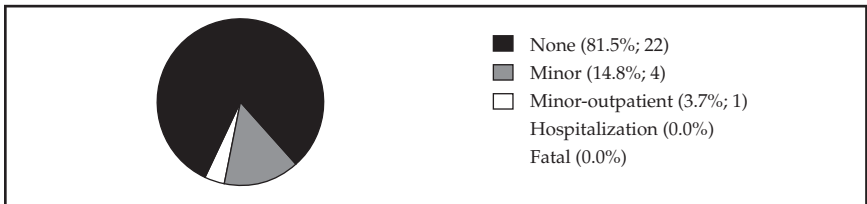
Figure 5. Baton Subject Injury



OC Spray

During the 562 use of force related arrests, officers deployed OC spray 4.8% ($n = 27$) of the time. Figure 6 represents the injury profile when OC spray is utilized.

Figure 6. OC Spray Subject Injury



Vascular Neck Restraint

Out of the 562 force-related arrests, police officers used a VNR in 3.0% ($n = 17$) of the events. The injury profile from VNR use is shown in Figure 7 below.

Figure 7. VNR Subject Injury



Use of Force and Officer Injury

This section presents the injury risk profile in relation to injuries sustained by police officers utilizing force to affect the arrest of subjects (see Figures 8-12).

Figure 8. Conducted Energy Weapons Officer Injury



Figure 9. Physical Control Officer Injury

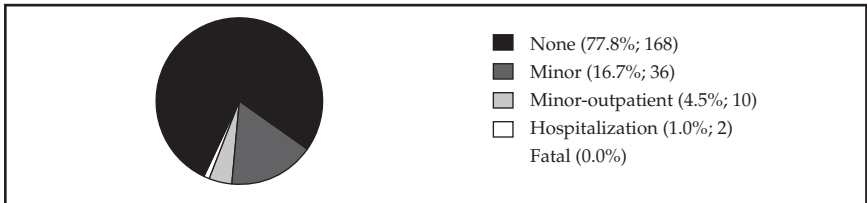


Figure 10. Baton Officer Injury

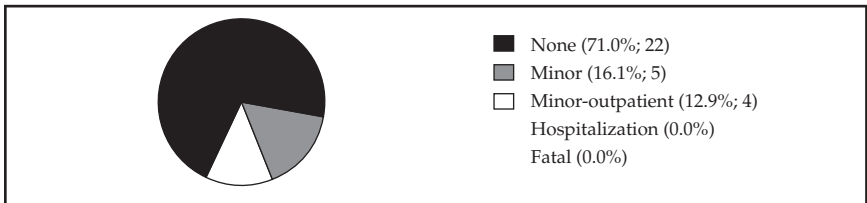
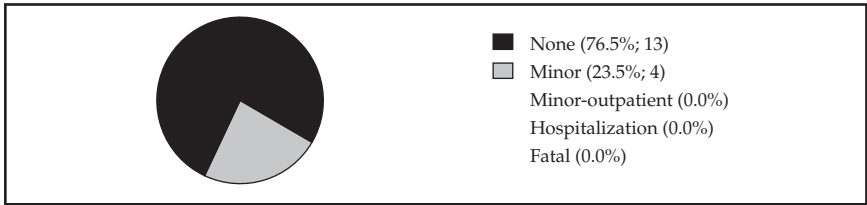


Figure 11. OC Spray Officer Injury



Figure 12. VNR Officer Injury



Officer Injury and Abstraction from Duty

In addition to the foregoing, during the study period, the agency reported the abstraction from duty profile resulting from injuries sustained by police officers during arrest-related events. Officers filed 195 arrest-related injury compensation reports during 2006 and 2007. To put this into a contextual comparison with the total number of use of force incidents reported (562), officers filed an injury compensation claim in 34.7% of the events.⁸

These injuries resulted in 797 days of complete abstraction from duty (2006: *n* = 414; 2007: *n* = 383). Modified or “light” duty (not on patrol) resulting from arrest-related injuries reported by the agency was 2,035 days (2006: *n* = 1,173; 2007: *n* = 862).

Study Findings

- The use of force by police was rare when compared to the overall number of police/public interactions, occurring only 0.07% of the time.
- Arrests occurred in only 4.6% of all police/public interactions
- Use of force by police occurred in 1.5% of all arrests, and arrests were accomplished without the use of force in 98.5% of arrest events.
- Males accounted for 93.6% of all citizens on which force was used.
- 88.1% of all subjects requiring force were under the influence of drugs and/or alcohol or some degree of emotional illness.
- The use of OC spray, when effective, resulted in injuries in 3.7% of subjects.^{9,10} Subjects restrained by OC spray experienced a 9.2% lower frequency of medical treatment than those subjects who were restrained with a CEW.
- Following VNR, 6% of subjects required some form of medical treatment, and 94% of subjects did not require medical treatment.¹¹ Subjects restrained by a VNR experienced a 7% lower frequency of medical treatment than when compared to those subjects restrained with a CEW.
- The use of CEWs resulted in fewer citizen and officer injuries than either physical control or the baton. Thirteen percent of CEW use was associated with subject injury requiring some treatment in hospital, and 87% of all CEW uses

resulted in no or minor subject injuries.¹² In 96.7% of all CEW uses, officers received either no or only minor injuries. There were 9.6% fewer officer injuries requiring medical treatment when a CEW was used when compared to when a baton was used.

- Following baton use, citizens received injuries requiring medical treatment in 29.0% of all cases, and officers required medical treatment in 12.9%. Of those who were controlled with a baton, 16.1% more subjects sustained injuries requiring medical treatment than with a CEW.

Limitations

While the researchers would have preferred to conduct an analysis of data from multiple police agencies across Canada, this effort was confounded by the fact that there is no consistent national database for collecting police use of force information. The statistical reporting of police use of force is not mandated by the federal government nor is it consistently collected at provincial governmental levels. Many major police agencies collect their own corporate use of force data; however, the nature and type of data is inconsistent from agency to agency making a direct comparison or analysis impossible.

Since this study involves only one major Canadian city, it cannot be said to necessarily reflect a broad representation of the risk profile of police use of force in Canada in general but only to those agencies whose policing methodologies and resources are similar to the study centre. This data was also confounded by the fact that in some police/public interactions reported as one interaction more than one public person was present. For example, in a traffic stop, the police/public interaction is recorded as one although oftentimes there is more than one person present in the motor vehicle of interest. Likewise, an *on view* call of checking a suspicious person is recorded as one police/public interaction although more than one person may have been present at the time. It is acknowledged that the data analyzed underrepresents the total number of police/public interactions. However, this underrepresentation results in a *worse case scenario* with respect to the likely or anticipated harm resulting from the police application of force.

Reports of injuries to subjects require that the officer is aware of the subject injury at the time the use of force report was completed. Injuries that were either not observed by the officer or presented with delayed onset after the police/public interaction could not be included in this analysis.

Reports of injuries to officers required that the subject officer reported or recorded the injury either on the use of force report or completed a workers compensation report. Anecdotally, it is typical that many police officers work within a culture that often accepts minor (nondisabling) injuries such as soft tissue injuries to be part of “doing the job” and these injuries are not reported and could not be part of this analysis. Even so, the researchers are confident that injuries to subjects and officers of a nature above those considered being *minor* (no treatment or outpatient only) would be reported in the relevant police databases.

Discussion

The commonly held belief that the conducted energy weapon carries a significant risk of injury or death for the population of interest is not supported by the data. Within the force modality framework most commonly available to police officers, the CEW was less injurious than either the baton or empty hand physical control.

Although the study used the intention to treat analysis, when we removed the incidents where the use of the CEW was unsuccessful ($n = 14$) (thereby requiring subsequent alternative force options—typically physical control), the safety profile of the CEW rose to 88.7% (i.e., no injury or minor injury to subjects only).

The baton was the most injurious use of force method (for both officers and subjects) utilized followed next by empty hand physical control. This data suggests the need for agencies to seek out alternatives to the baton and hands-on physical control tactics if they wish to reduce the frequency and seriousness of police officer and citizen injuries.

Arising from this research project was a clearly identified need for a legislated national police use of force reporting system or, minimally, provincially mandated reporting systems that are consistently aligned on a national level. The stakeholder community would be greatly served and public confidence in its policing services improved by the implementation of a national database reporting system for police use of force.

Further Research

More research is needed to determine the impact of multiple agency variables on police use of force and injury outcome. Further investigation could reveal whether agencies of different size; in different geographical regions; and with different resources, training, and policies results in variations in the injury-risk profile from the use of force.

With respect to the use of physical control and officer and subject injury, during the data review, a noticeable pattern of relationship was observed between the number of police officers present and the frequency and nature of injuries sustained by both citizens and officers. We observed from the aggregate data that more officer and subject injuries occurred in circumstances where only one officer was present. While by no means scientific, this pattern indicates that further research should be conducted to determine how the numbers of officers working together to effect physical control of resisting subjects changes the injury outcome.

Endnotes

¹ *Physical control* means empty hand control tactics above the level of pain compliance techniques such as joint locks and pressure points. These include techniques such as nerve motor point striking and stunning techniques and grounding techniques such as arm-bar takedowns and other balance displacement methods.

² In the study site, the CEW utilized is the Taser® X26.

- ³ In the study site, the baton utilized is the Monadnock Autolock[®] expandable baton with power safety tip.
- ⁴ In the study site, the OC spray utilized is Sabre[®] Red (10% oleoresin capsicum).
- ⁵ In the study site, the VNR utilized is the LVNR[®] as authorized by the National Law Enforcement Training Center.
- ⁶ *Minor* injuries include visible injuries of a trifling nature which did not require medical treatment. *Minor-Outpatient* includes injuries which require medical treatment either at the scene, at the cell block, or at the hospital but which do not result in hospitalization. *Hospitalization* injuries include injuries which required hospitalization for treatment.
- ⁷ Charges relating to traffic offences accounted for 310,255 of the total events.
- ⁸ In a 1993-1995 Miami-Dade study, officers reported injury proximal to use of force events in 38% of the cases (Alpert & Dunham, 1999).
- ⁹ While the statistical safety profile of OC spray appears high, it must be understood that the generally accepted efficacy rate of OC spray is between 75 to 85%. Therefore, this profile is biased by the fact that in many situations experienced officers will choose not to employ OC spray as an option in circumstances where they feel it will not have the desired result. For example, subjects under the influence of drugs, experiencing emotional disturbance, or merely strongly goal-oriented are typically unaffected by OC spray.
- ¹⁰ The OC safety profile is consistent with U.S. studies (Lundgren, 1996; Watson, Stremel, & Westdorp, 1996) which have found that subjects did not receive injuries requiring medical attention in 90% of all uses ($n = 908$).
- ¹¹ Although the study agency categorizes the VNR as physical control, for the purposes of this study, it was categorized by itself due to its higher safety profile compared to other physical control techniques.
- ¹² Interestingly, in a post-implementation study by the Phoenix Police Department, it was determined that subjects did not receive an injury or received only minor injury in 87% of all CEW deployments.

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Chris Butler, a 24-year law enforcement veteran, Acting Inspector Chris Butler is currently assigned to the Executive Office of the Calgary Police Service as the Field Training and Use of Force Coordinator. For several years, Chris was in charge of the delivery of all officer safety, subject control tactics, emergency vehicle operations, Incident Command, and Strategic Communication training for the Calgary Police Service in Calgary, Alberta, Canada, a major Canadian police agency of over 1,600 sworn officers.

During Chris's law enforcement career, he was a member of the Crowd Control Unit for over 12 years and, during this time, was involved in conducting risk assessments and planning operational tactics for events such as the World Petroleum Congress and the G8 Summit.

Chris has been certified as an instructor or instructor trainer in numerous firearms, combatives, less lethal/chemical agents, and emergency vehicle

operation techniques. In addition, Chris has training in special event risk management and is certified as a close protection specialist (ESI-honors).

Chris has made presentations at national and international law enforcement conferences on a variety of topics. From 2006 to 2007, Chris was seconded to the Canadian Police Research Centre where he co-published a national study on the use of neck restraints in policing.

Chris has been qualified at provincial and federal court as an expert in firearms safety, police firearms training, law enforcement use of force training, and evaluation and is certified as an instructor in verbal judo and neuro linguistic programming (NLP) and is also certified in hypnosis and hypnotherapy.

Dr. Christine Hall received her MD from the University of Calgary in 1996 and completed her five-year residency in emergency medicine in the Royal College of Physicians and Surgeons (FRCP) Program in Emergency Medicine at the University of Calgary Faculty of Medicine in 2001. During her residency, Dr. Hall completed a Master's degree in Clinical Epidemiology and completed her thesis in 2003 as a staff physician.

Upon completion of her residency, Dr. Hall became a full-time Emergency Department physician at the Calgary Health Region. She was the Division Chief of Research; the coordinator of Resident Research; a member of the Adult Research Committee for the Calgary Health Region; a member of the departmental executive for the Department of Emergency Medicine, Calgary Health Region; and also served as the Program Director for the FRCP Program in Emergency Medicine during her tenure at the Calgary Health Region. Dr. Hall was a clinical lecturer at the University of Calgary Faculty of Medicine. She also served as a flight physician with the Shock Trauma Air Rescue Society of Alberta for six years. She is now a physician with the Department of Emergency Medicine at the Vancouver Island Health Authority.

Dr. Hall has been participating in the investigation of sudden in-custody death for several years and is the principal investigator for the RESTRAINT Study, a multicenter, international epidemiologic study of features surrounding the use of restraint in police interactions, an effort funded by both the Canadian Police Research Centre and the National Institute of Justice (USA). She collaborates in this research effort with notable experts in the field such as Drs. Ted Chan, Gary Vilke, and Bill Bozeman. Dr. Hall has contributed to the understanding of excited delirium syndrome and in-custody death evaluations through her presentations at seminars and conferences, her participation as an expert witness at relevant inquests and investigations, and in her ongoing research efforts. She has participated in several reviews of restraint methodologies, including the CPRC technical report surrounding the use of conducted energy weapons.

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