DESCRIPTIVE STUDY OF EMERGENCY MEDICAL SERVICES ATTENDED CHILD ABUSE AND INTIMATE PARTNER VIOLENCE INCIDENTS

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ABSTRACT

Intimate partner violence and child abuse and neglect are significant public health issues that are often related. Surveillance systems that monitor these events and the health issue related to these behaviors vary. These systems include surveys, court records, and incident reports. There are pros and cons to each of these systems and given the complex nature of these incidents, a combination of systems is most effective. This study examined a new system to identify intimate partner violence and child abuse and neglect incidents to determine effectiveness and describe the details of incidents occurring in Hawai‘i. The data source was proven to be quite effective with some gaps such as missing information. Overall, incident details such as sex of patient, perpetrator information, and incident/dispatch location were consistent with existing data reporting prevalence in Hawai‘i.

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LIST OF ABBREVIATIONS

BRFSS – Behavioral Risk Factor Surveillance System

CAN – Child Abuse and Neglect

CDC – Center for Disease Control and Prevention

CPS – Child Protective Services

ED – Emergency Department

EMS – Emergency Medical Services

HHIC – Hawai‘i Health Information Corporation

IP – Intimate Partner

IPV – Intimate Partner Violence

NCADV – National Coalition Against Domestic Violence

NISVS – National Intimate Partner and Sexual Violence Survey

PCR – Patient Care Record

PRAMS – Pregnancy Risk Assessment Monitoring System

YRBSS – Youth Risk Behavior Surveillance System

CHAPTER 1. INTRODUCTION

Intimate partner violence (IPV) and child abuse/neglect (CAN) are significant public health issues in the United States. The two incidents are often times comorbid (Widom, Czaja, & Dutton, 2014) therefore it is important to examine both issues. IPV is defined as "[…] physical violence, sexual violence, stalking and psychological aggression (including coercive tactics) by current or former intimate partner (i.e., spouse, boyfriend/girlfriend, dating partner, or ongoing sexual partner)" (Breiding, Basile, Smith, Black, & Mahendra, 2015, p. 11). IPV is sometimes synonymous with domestic violence and the two terms may be used interchangeably. CAN is defined as "any act of series of acts of commission or omission by a parent or other caregiver (e.g. clergy, coach, teacher) that results in harm, potential harm, or threat of harm to a child" (Leeb, Paulozzi, Melanson, Simon, & Arias, 2008, p. 11). This *includes acts of commission* or *child abuse* – "words or overt actions that cause harm, potential harm, or threat of harm to a child. Acts of commission are deliberate and intentional; however, harm to a child may or may not be the intended consequence" (Leeb et al., 2008, p. 11) and *acts of omission* or *child neglect* – "failure to provide needs or to protect from harm or potential harm" (Leeb et al., 2008, p. 11).

Intimate Partner Violence (IPV)

Nationally, every minute about 20 people experience physical IPV and one in four women in the U.S. have been a victim of severe physical abuse by an intimate partner (National Coalition Against Domestic Violence [NCADV], 2015). In Hawai‘i, 9.5% of women have experienced physical abuse by a current or former partner (Hawai‘i Health Data Warehouse [HHDW], 2015). Risk factors for IPV victimization include young age, history of IPV experience, poverty, and pregnancy (Capaldi, Knoble, Shortt, & Kim, 2012). In Hawai‘i, 2.1% of women reported experiencing IPV during their pregnancy in 2012 (HHDW, 2015). Of those women, 4.5% were younger than 20 years old and 3.4% of them were at the 0-130% poverty level (HHDW, 2015). In addition to life circumstances, ethnicity serves as a risk factor for IPV. Native Hawaiians, Filipinos, and Other Pacific Islanders are at higher risk for IPV given cultural perceptions of the definitions and tolerances of abuse (Oneha, Magnussen, & Shoultz, 2009; Shoultz, Magnussen, Kreidman, Oneha, Iannce-Spencer, & Hayashi-Simpliciano, 2015). Some cultures define abuse in intimate partner relationships differently. For instance, Oneha, Magnussen, and Shoultz (2009) found that generally, Native Hawaiians defined abuse as a situation in which they would need to seek emergency care but nothing less than that. The

common perception is that this harmful form of relationship conflict resolution, IPV, is a "family matter" (Oneha, Magnussen, & Shoultz, 2009). In Hawai'i, physical abuse rates among Native Hawaiians (2013 – 10.2%, 95% CI: 7.4 – 13; 2015 – 11.1%, 95% CI: 7.8 – 14.3) and Filipino (2013 – 12.6%, 95% CI: 7.0 – 18.1; 2015 – 8.8%, 95% CI: 5.1 - 12.5) high school students has remained stable from 2013 to 2015 (HHDW, 2016). Although not statistically significant, Native Hawaiians (11.1%, 95% CI: 7.8 – 14.3) high school students had higher 12-month prevalence rates of physical abuse by their date than Caucasian (6.5%, 95% CI: 1.0 – 11.9) high school students in 2015 and had significantly higher rates of physical abuse than Japanese (3.7%, 95% CI: 0.0 – 7.5) high school students in the same year (HHDW, 2016). Lastly, Native Hawaiian (13.9%, 95% CI: 10.1 – 17.8) and Filipino (15.3%, 95% CI: 11.4 – 19.2) high school students also had higher rates of sexual abuse (forced to do sexual things by their partner, past 12 months) than Caucasian (6.8%, 95% CI: 4.3 – 9.4) high school students in 2015 (HHDW, 2016).

Consequences of IPV include injury, death, and risky health behaviors (CDC, 2015). Many women suffer long term physical conditions (e.g. asthma, cardiovascular disease, migraines, etc.) and psychological conditions such as depression and anxiety (CDC, 2015). Some IPV cases result in death, via homicide or suicide (CDC, 2015). Often times, IPV survivors may engage in risky health behaviors to cope with the trauma such as unprotected sex, drug or alcohol abuse, and tobacco use (CDC, 2015). These consequences of IPV in turn cost the U.S. $8.3 billion including $460 million for rape cases, $6.2 billion for physical assault cases, $461 million for stalking cases, and $1.2 billion for the value of the lives lost to homicide and suicide (CDC, 2015). Consequences are also not limited to the direct victim of IPV as well (Lamers-Winkelman, Willemen, & Visser (2012). Children witnessing IPV can be indirectly effected and suffer from long-term consequence similar to IPV victims. Furthermore, children can be directly involved in IPV, cases in which they are struck by a parent in which the child was not the intended target. Ultimately, the CDC determines exposing children to violence or unsafe environments as neglect and therefore it is identified as child abuse (Leeb, Paulozzi, Melanson, Simon, & Arias, 2008).

Child Abuse and Neglect (CAN)

Often, children who experience abuse and neglect are involved in IPV later in life (Widom, Czaja, & Dutton, 2014). Therefore, CAN is important to study along-side IPV. In 2014,

702,000 children were victims of CAN in the U.S. (U.S. Department of Health and Human Service, 2014). In 2014, specifically in Hawai‘i, there were 1,382 confirmed cases of CAN (State of Hawai‘i – Department of Human Services [DHS], 2014). Fifty-two percent of those cases were on O‘ahu, 24.2% on Big Island, 16.2% on Maui, and 7.6% on Kaua‘i. Of those cases, 572 of them involved physical abuse and 582 cases involved neglect (DHS, 2014). The majority of the cases (19.6%) involved children under the age of one and 42.6% were of Hawaiian/Part-Hawaiian ethnicity (DHS, 2014).

Just like IPV, there are severe consequences, short and long term, for CAN that include, injury, death, risky health behaviors, and future IPV involvement. Children that experienced abuse and neglect can have long lasting physical conditions due to injury by the perpetrator and suffer devastating psychological conditions such as depression, anxiety, post-traumatic-stress disorder, social issues, and eating disorders (CDC, 2016). Similar to IPV, CAN may result in death either by homicide committed by the perpetrator or suicide (U.S. Department of Health and Human Services, 2012). In 2014, 1,580 children died from abuse and neglect (U.S. Department of Health and Human Services, 2014). Lastly, victims of child abuse/neglect are at high risk of being involved in IPV later on in life as perpetrators and/or victims (Widom, Czaja, & Dutton, 2014). Widom et al, (2014) found that both male and female victims of childhood neglect are at greater risk of physically injuring their partner later in adulthood. They found that female victims of childhood neglect are more likely to be injured by their partner later in adulthood. The lifetime cost per victim in nonfatal child maltreatment cases is $210,012 (Fang, Brown, Florence, & Mercy, 2012). In fatal cases, the cost is $1,272,900 which includes medical and productivity losses (Fang et al., 2012).

Surveillance

Given the complicated nature of IPV and CAN, there are many sources used to capture an accurate picture of incidences, details, and trends. Popular methods include surveys, court conviction/records, and incident reports. Surveys provide self-report data on past incidents and can be a cost-effective and time-saving way to collect information about these sensitive topics. Surveys used to collect IPV and CAN data in Hawai‘i include The National Intimate Partner and Sexual Violence Survey (NISVS), The Pregnancy Risk Assessment Monitoring System (PRAMS), The Youth Risk Behavior Surveillance System (YRBSS), and The Behavioral Risk

Factor Surveillance System (BRFSS). These surveys provide national and state-level data pertaining to a wide range health-related risk behaviors and incidents, including IPV and CAN. Court records can be evaluated for rates of IPV and CAN. For instance, the state of Hawai‘i uses records of CAN cases sent in for investigation and those that have gone to trial to evaluate "confirmed" cases of child maltreatment (DHS, 2014). Agency reports such as police department, fire department, emergency medical services (EMS), emergency department (ED), child protective services (CPS), and IPV prevention agencies can provide a different response and view on IPV and CAN. Utilizing incident reports provides on-scene data recording and face-to-face interviews that may allow for more in depth questioning (Kim, Dubowitz, Hudson-Martin, & Lane, 2008)**.** This method is commonly used for injury surveillance around the world and locally (Hawai‘i State Department of Health, 2012; McKenzie, Scott, Campbell, & McClure, 2010; Mckenzie & Scott, 2011; Biroscak, Smith, Roznowski, Tucker, & Carlson, 2006; Boergerhoff, Goodwin, Gerberick, Anderson, Kochevar, & Waller, 1999).

Current EMS and ED Research

Although there are many methods to obtain data on IPV and CAN, EMS and ED data can provide a unique and useful perspective (McKenzie, Scott, Campbell, & McClure, 2010). Around the country and world, community providers and public health researchers have taken advantage of this resource (McKenzie et al., 2010; McKenzie & Scott, 2011; Biroscak, Smith, Roznowski, Tucker, & Carlson, 2006; Boergerhoff, Goodwin, Gerberick, Anderson, Kochevar, & Waller, 1999). However, currently many of the data collected from the ED is not necessarily from EMS records. Although ED records provide useful data when identifying violence cases, some patients refuse further care, transportation to ED, and therefore may not be represented if reliance is solely on ED records. Identification may also be a barrier to the accuracy of ED records and that pre-hospital environmental clues may lead to proper identification of IPV in such cases (Ernst & Weiss, 2008). Therefore, the proposed study will utilize the EMS narrative text linked with ED records for a broader approach to IPV and CAN surveillance in Hawai‘i.

Purpose/Hypothesis

Purpose. The purpose of this study is two-fold: (1) evaluate the EMS dispatch narratives linked with ED data as an efficient data source for surveillance of IPV and CAN incidents and correlates, and (2) present information regarding EMS attended incidents of IPV and CAN.

Hypothesis. Our primary hypothesis is that the EMS dispatch narratives linked with other EMS data fields and hospital records will be an efficient data source for surveillance of IPV and CAN determined by criteria defined by the "Updated Guidelines for Evaluating Public Health Surveillance Systems" (German et al., 2001). Our exploratory hypothesis is to investigate EMS-attended incidents and correlates (e.g. how many cases involved specific kinds of abuse? or how many cases were rated as "severe"?) of IPV and CAN in Hawai'i from 2013 – 2015.

Original Contributions and Rationale

This data source, EMS dispatch narratives, have never been used to analyze IPV or CAN incidents or correlates in Hawai'i. However, this data source has been used for other injuries such as motor-vehicle crashes (Hawai'i State Department of Health, 2012) and is in the process of being used to assess drowning incidents.

Previous studies have suggested the usefulness of field incident documentation such as EMS narratives to collecting information and understanding the details of IPV and CAN incidents. Furthermore, surveys, which are the main source of data about IPV and CAN, are very helpful on a general scale but the limitations lead us to believe there is a need for an additional data source that does not require self-reporting and recollection of an event. EMS-attended cases provide information from a direct report written by EMS professionals. Based on previous research, we chose to explore this unique data source, from the EMS and ED databases to hopefully obtain additional information to assist in drawing a clear picture of the IPV and CAN issues in Hawai'i.

CHAPTER 2. LITERATURE REVIEW

Studying IPV and CAN tends to be complicated given the amount of underreporting in the field (NCADV, 2015). Therefore, there are many difference forms of surveillance systems used to collect data on the subject that include: (1) surveys, (2) court/conviction records, and (3) incident reports (Rosenbaum & Langhinrchsen-Rohling, 2006; Schnitzer, Covington, Wirtz, Verhoek-Oftedahl, & Palusci, 2008; McKenzie & Scott, 2011; Biroscak, Smith, Roznoski, Tucker, and Carlson, 2006; Joshi & Sorenson, 2010; McKenzie, Scott, Campbell, and McClure, 2009). Each one of these methods (Table 1) have different strengths and weaknesses and provide different viewpoints.

Surveys

Surveys can be a cost-effective way of obtaining information for a variety of public health issues. They can also provide timely information by administering them annually, getting a clear snapshot of the state of health within a population. This method of data collection has strengths and weaknesses, especially when applied to sensitive topics such as IPV and CAN. It is well known that IPV incidents are underreported due to the nature of the crime, fear of retaliation, or protection of a partner (NCADV, 2015). DiLillo, DeGue, Kras, Di Loreto-Colgan, and Nash (2006) found that when it comes to surveys and sensitive content, participants were more likely to disclose honest information if given a computer-assisted survey rather than a face-to-face interview. Black, Kresnow, Simon, Arias, and Shelley (2006) also found participants were likely to answer more honestly if interviewed via telephone.

However, Rosenbaum and Langhinrchsen-Rohling (2006) suggest surveys may not be an ideal choice for collecting data on sensitive topics given the risks. Ellsberg and Heise (2002) explain surveys can re-victimize participants by asking them to recall traumatic events. Although telephone surveys seemed to provide more disclosure, Rosenbaum, Rabenhorst, Reddy, Fleming, and Howells (2006) found no difference in participants' comfort, or lack thereof, whether the survey was administered via telephone, in person interview, or pen and paper further confirming the risks of surveys. Langhinrichsen-Rohling, Arata, O'Brien, Bowers, and Kilbert (2006) also found that regardless of the kind of survey participants completed, those with a history of traumatic events experienced negative feelings while completing the survey. Lastly, Rosenbaum and Langhinrchsen-Rohling (2006) mention that information collected via surveys may not be

entirely accurate due to memory and the participants' ability to examine their own feelings about certain events. They suggest that human interaction may allow the participants to provide more accurate information (Rosenbaum & Langhinrchsen-Rohling, 2006).

Court/conviction records

Since IPV and CAN are illegal acts, court records can be evaluated for rates of these incidents. For instance, the state of Hawai‘i uses records of child abuse cases sent in for investigation and those that have gone to trial to evaluate "confirmed" cases of CAN. For some states, the majority of surveillance data on IPV and/or CAN may come from court records (Schnitzer, Covington, Wirtz, Verhoek-Oftedahl, & Palusci, 2008). For collecting information on illegal activity such as IPV and CAN, this method of surveillance may provide the ability to confirm the accuracy of other data.

However, Schnitzer, Covington, Wirtz, Verhoek-Oftedahl, and Palusci (2008) found that alone, court records could not give an accurate representation of the state of CAN but instead a combination of sources such as court records and agency reports would be needed to provide sufficient surveillance. For IPV cases, given the fact that cases tend to be underreported and under-prosecuted, court records may not be a proper source of data. Furthermore, juvenile records for teen dating violence cases, may be impossible or difficult to access (Mankey, Baca, Rondenell, Webb, McHugh, 2006). These cases can also include racial biases that can influence statistics regarding certain populations. In Hawai‘i, research has found that Native Hawaiians and Pacific Islanders are disproportionately represented in the court system and this could be due to racial biases influencing prison sentencing and rehabilitation (Office of Hawaiian Affairs [OHA], 2010).

Incident Reports

Agency reports such as police department, fire department, EMS, ED, child protective services (CPS), and IPV prevention agencies can provide a different response and view on IPV and CAN. In addition to the convenience, the benefit to this method is the ability to probe and clarify the victims' information (Kim, Dubowitz, Hudson-Martin, & Lane, 2008).

The use of ED data is popular for CAN cases (McKenzie & Scott, 2011). McKenzie and Scott (2009) found that ED and hospital admission data provides very useful details for effective surveillance of CAN cases, where self-report data collection may be difficult. Biroscak, Smith,

Roznoski, Tucker, and Carlson (2006) also found the use of ED data for surveillance of IPV was an effective method. However, they note that an improvement in identification of IPV was necessary for the source to be fully reliable.

Joshi and Sorenson (2010) found the use of data from police-attended IPV incidents was a useful method of obtaining important details such as victim-perpetrator relationship and legal disposition. However, they also noted that limitations to this method of data collection are accurate identification of IPV cases and completion of input fields. Furthermore, McKenzie, Scott, Campbell, and McClure (2009) found that specifically using text narratives from health data can provide valuable details for injury cases.

However, victims may be hesitant or unwilling to cooperate with police or CPS or IPV agencies for reasons including fear of retaliation, protecting perpetrator, dependence (Ellsberg & Heise, 2002), fear of being judged (Kim, Dubowitz, Hudson-Martin, & Lane, 2008), personal definitions of abuse, and/or cultural norms (Oneha, Magnussen, & Shoultz, 2009; Shoultz, Magnussen, Kreidman, Oneha, Iannce-Spencer, & Hayashi-Simpliciano, 2015**).** Data collection depends on accurate identification of IPV or CAN cases as well as collecting useful information for analysis and dissemination**.** Victims' privacy and safety may be at risk when collecting this information as well (Rosenbaum & Langhinrschsen-Rohling, 2006). Therefore, medical, law enforcement, and social work professionals must be trained to handle the situation with confidentiality for the victims' safety and wellbeing.

Table 1. Pros and Cons by Surveillance Type

Method	Pros	Cons
Surveys	• Cost-effect • More disclosure • Easier to collect	• Risks of re-victimization • Recall bias
Conviction/Court Records	• Confirmation • Monitor illegal activity	• Not reliable alone • Access restrictions • Case has to come to court
Incident Reports	• Ability to ask for clarification • Obtain unique details	• Coding errors • Improper identification • Case has to be reported

CHAPTER 3. METHODS

Data Source

The main data source used for this study was the narrative section of electronic Patient Care Reports (PCRs), narrative fields of the EMS report, completed by EMS providers in the state of Hawai‘i, collected over the 2013 through 2015 period. Supplemental data sources were the existing standard fields in the EMS reports and hospital records obtained through Hawai‘i Health Information Corporation (HHIC). The EMS reports were submitted to an online database, National EMS Information System (NEMSIS), immediately after the EMS case was completed, which was accessed by the EMS Injury Prevention Branch (EMSIPSB) Injury Epidemiologist.

Sampling

To obtain a comprehensive list for sampling, candidate cases were selected initially by identifying cases which contained the word “assault” in either the cause of injury or dispatch complaint fields of the PCR. Following this procedure, inclusion and exclusion criteria were then used to define sampling lists. The sampling list allows for a random sampling method to be applied, in IPV cases, to obtain a representative sample for analysis. Different criteria were established for IPV and CAN given the definitions, populations, and other factors (Table 2). All CAN cases were reviewed. However, IPV cases selected from the EMS database were then sampled until a total of at least 500 “positive cases” were collected. Positive cases were defined by a classification system based on definitions of IPV by the CDC. This classification system is provided in the procedure portion of this thesis accompanied by explanation. We randomly sampled from the average 1,565 candidate cases per year to attain a target sample of at least 500 relevant cases. We selected approximately 20% from records with Incident Location indicating “Home/Residence” (773 per year, on average), and approximately 5% of records with other values for this field (792 per year). This 4-to-1 sampling ratio was repeated until 500 relevant cases were reviewed; it was anticipated that a large proportion, perhaps 50%, of candidate cases would not be related to CAN or IPV. A total of 855 IPV and 267 CAN cases were reviewed resulting in a false positive rate of 40.4% for IPV and 42.3% for CAN. Additional cases of both CAN and IPV were identified by external cause of injury codes in records linked to HHIC data.

Table 2. Inclusion Criteria and Method for IPV and CAN Cases

Inclusion Category	Inclusion Criteria	Cases Meeting Criteria
IPV	• Female only • 12- 50 years	1,565 candidate cases per year, from 2013 - 2015
CAN	• Male & Female • 0 – 11 years	86 per year, from 2013-2015

Measures and Analysis Approach

The variables for each data source are generally different with some overlap. In cases where overlap occurs among data sources, results are presented for the variable that includes the least amount of missing data and/or provides the most detailed information. For a list of all variables and origins, see appendix. Due the exploratory nature of this study, many different variables were included in this surveillance of IPV and CAN. Additionally, some of this information were unattainable via the information reported in the narrative. Variables that present <5% frequencies will not be reported for privacy of patients. For consistency with coding cases appropriately, training was provided by the EMSIPB epidemiologist and a live practice took place where both the researcher and the epidemiologist coded the cases together. All statistical analysis was done using SPSS 24.0 and Microsoft Excel. For nominal variables, such as age, measures of central tendency and range are presented. For categorical variables, frequencies including percentages are presented. Although IPV and CAN generally have similar variables, there are minor differences due to some unique variables for either abuse type. Variables used were categorized in four main categories: (1) incident classification, (2) patient information, (3) perpetrator information, (4) incident details and (5) evaluation.

Incident classification. Incident classification is a variable added to evaluate the false positive rate in the study. This variable has a set criteria to ensure coding was consistent. These criteria were different between IPV and CAN data and were based on CDC definitions and guidelines (Breiding, Basile, Smith, Black, & Mahendra, 2015; Leeb, Paulozzi, Melanson, Simon, & Arias, 2008). Given the discretional nature of this variable, a random selection of ten

cases were also reviewed separately by the researcher and then by the epidemiologist where 80% were in agreement for IPV and 60% agreement for CAN.

IPV classification criteria. IPV cases classified as "definite," were cases in which the perpetrator was identified as current or former partner, or the parent of the victim's child and violence/abuse occurred. Cases were also classified as "definite" when EMS defined the case as a "domestic altercation" or "domestic dispute." In some cases, EMS omitted the patient/perpetrator relationship but described the case as "domestic" in nature and therefore the case was coded as "definite."

Cases coded as "probable" were those in which the perpetrator was identified as an "acquaintance" or "friend" and violence/abuse occurred, including indirect, unintentional, or unclear violence/abuse. The justification for coding "acquaintance" or "friend" cases as "probable" is the common occurrence of victims not being forthcoming with the details of their abusive relationships (O'Shea, K.M., 2005).

"Possible" cases are those in which the relationship between the patient and perpetrator is not listed and/or the reviewer has reason to believe the perpetrator is an intimate partner. An example of this type of case regarding IPV could be that a victim was in her home when the assailant approached her, striking her in the face. In this case, the assailant is not identified but given the context of the situation (victim was in her home) and the omission that the assailant broke in to her home, it may be reasonable to assume this case could involve IPV. The justification to include these cases is to show the need for improvement in the system regarding accurately and consistently recording the relationship between the victim and the assailant. It is also important to include this information for the same reason "probable" cases are still included, uncooperative/under reporting trends in IPV cases.

Cases determined to be "not a case" were those in which the perpetrator was listed as a non-intimate partner such as a family member, stranger or they were listed as "unknown' by the victim. These cases also include those in which multiple perpetrators are listed since it is less likely that these cases are IPV related but rather interpersonal violence. Lastly, "not a case" classifications were given to those cases in which a verbal altercation took place but no clear distinguishable abuse occurred. For example, if an argument broke out among a couple and 9-1-1 was activated but the victim does not report abuse, even psychological abuse such as threats or

breaking objects, then the case would be classified as "not a case" due to the absence of actual abuse. Information regarding why a case was classified "not a case" were recorded. A simple table (Table 3) is presented below for reference of the classification criteria.

Table 3. IPV Classification Criteria

Definite	• Perpetrator identified as current or former partner, or parent of child* • violence/abuse occurred • EMS defines the case as a "domestic altercation or dispute"**
Probable	• Perpetrator is identified as "acquaintance" or "friend" • Violence/abuse occurred • Cases involving indirect or unclear violence
Possible	• Relationship between patient and perpetrator is not listed • Reviewer has reason to believe the perpetrator is an intimate partner.
Not a Case	• Perpetrator is identified as a non-intimate partner (family, stranger, etc.) • Perpetrator is identified as "unknown" to the victim • Cases with multiple perpetrators • Self-harm cases • Verbal altercations that do not result in any form of distinguishable abuse

* CDC considers the parent of a victim's child an "intimate partner" even if they were never in an official relationship.

** There were some cases where the perpetrator was not identified as a partner (by omission) but EMS defined the case as "domestic" and therefore said case was coded as "definite"

CAN classification criteria. CAN cases classified as "definite" were cases in which the perpetrator was identified as a caregiver such as family, babysitter, teacher, etc. in which abuse/neglect occurred. If the perpetrator is identified as a sibling, the narrative must suggest that the victim was under the care/supervision of said sibling. For example: if the parents were not home when the incident occurred the sibling will be considered a caregiver and the case would be considered "definite."

Cases coded as "probable" were those in which the perpetrator was identified as a caregiver or a known person that could be a caregiver. This classification also includes cases in which the incident is unclear or the victim is unable or unwilling to corroborate the abuse/neglect. For example: if a child cannot speak yet but EMS was activated due to abuse allegations based on the physical or behavioral presentation of the child rather than actual testimony or witness to the incident, this case would be classified as "probable." Unintentional cases are also classified as "probable" based on the CDC definition of CAN.

"Possible" cases are those in which the relationship between the patient and perpetrator is not listed and/or the reviewer has reason to believe the perpetrator is a caregiver. Cases determined to be "not a case" were those in which the perpetrator was listed as a non-caregiver such as a classmate, friend, or they were listed as "unknown' by the victim. Lastly, "not a case" classifications were also given to those cases in which a verbal altercation took place but no clear distinguishable abuse occurred. For example, if an argument broke out and 9-1-1 was activated but the victim does not report abuse, even psychological abuse or neglect such as threats, breaking objects, or being exposed to violence, then the case would be classified as "not a case" due to the absence of actual abuse. However, unlike IPV, CAN classification is considered for cases that involve "failure to supervise" in which no physical abuse may occur but a child is harmed due to lack of supervision (e.g. drinking poisonous substance in the absence of supervision). A simple table (Table 4) is presented below for reference of the classification criteria.

Table 4. CAN Classification Criteria

Definite	• Perpetrator identified as a caregiver such as family, babysitter, teacher, etc. * • violence/abuse/neglect occurred
Probable	• Case is unclear such as accusation in which the victim cannot or is unwilling to corroborate • Perpetrator is identified as a known person and could be a caregiver • Cases involving indirect, unintentional, or unclear violence
Possible	• Relationship between patient and perpetrator is not listed • Reviewer has reason to believe the perpetrator is a caregiver
Not a Case	• Perpetrator is identified as a non-caregiver (classmate, friend, etc.) • Perpetrator is identified as "unknown" to the victim • Self-harm cases • Altercations that do not result in any form of distinguishable abuse **

* Unless there was any indication the victim was in the care/supervision of a sibling, cases that involve a sibling as a perpetrator will be marked as "not a case"

** These do not include cases of humiliation, failure to supervise, or failure to provide which are considered CAN.

Patient information. Patient information includes variables regarding the patient's demographics and health status. These variables include age, sex (CAN only), alcohol use (IPV only), drug use (IPV only), cooperation, medical condition, pregnancy status/length, and military dependent status (CAN only). Patient information was obtained from all three data sources upon availability.

Age. Age data was obtained by the existing EMS fields in nominal (years) form. Descriptive statistics are presented with central tendency measures. Age from any available HHIC linked data pertaining to IPV or CAN cases occurring in 2013 were obtained in the same manner.

Sex (CAN only). Due to the inclusion criteria for IPV cases restricting victims to females only, sex data is only available for CAN cases. This variable was retrieved from the existing EMS fields as well as the narrative and for some cases through the HHIC linked data source. Since sex was not always present in the narrative, data analysis was performed on EMS existing data only.

Ethnicity. Ethnicity was obtained from the HHIC linked data for 2013. This information is acquired at the hospital from the victim directly if they are responsive enough to complete paperwork. Certain ethnicities which represented <5% of the cases were merged with "like groups" to provide larger numbers to protect patient privacy. For example, Chinese, Japanese, Korean, and Other Asian were grouped into one group renamed "Asian."

Alcohol/drug use (IPV only). Existing EMS field for ETOH/Drug Use were recoded to be split up and condensed. This recoding includes "yes" for alcohol use when patient admitted to alcohol use or alcohol was smelled on breath of patient and "yes" for drug use when patient admitted to drug use. All other fields including "none reported," "not applicable," and "unable to complete" were recoded as "no." This data was collected through the narrative but the EMS fields had the least amount of missing data (302 – drug & alcohol vs 412- alcohol/447 - drug) and therefore were used for this analysis.

Cooperation. Cooperation indicates if a patient was generally uncooperative or not forthcoming with EMS initially or overall. This data was obtained from the EMS narrative text. This variable was coded "yes" in cases which EMS personnel identifies the patient as being uncooperative, not forthcoming, poor historian, etc. Data was not recorded if such behavior was not mentioned. We considered this information to be useful given the nature of IPV and CAN as an incident in which victims may refuse to report accurate information for fear of consequences. This information is also used to evaluate the data source as an efficient surveillance system.

Medical condition. Patient condition information was retrieved from the existing EMS field. Ultimately, this input was at the discretion of the EMS personnel, however personnel are trained with standardized criteria to assist them while making this classification. The standards to this classification system were provided by Emergency Medical Technician Professor at Kapiolani Community College (Table 5). A case is considered minor when the patient is suffering from minor illness, minor isolated injury, uncomplicated extremity injuries, and/or if the patient's condition does not meet criteria for serious or critical status. Serious condition

includes two categories: unstable and potentially unstable. A potentially unstable person exhibits chronic difficulty breathing, chest pains that can be relieved by rest or medication, signs of compensated shock, cases of uncomplicated childbirth, isolated fractures, minor burns (<10% of body), dehydration, and acute abdominal pain. An unstable patient exhibits poor general impression, high index related to mechanism of injury, unresponsive with no gag reflex, signs of decompensated shock, multiple long bone fractures, multi-system injuries, uncontrolled bleeding, chest pains, severe difficulty breathing, and severe pain. Lastly, critical conditions include cases in which the patient is receiving CPR, is in respiratory arrest, and/or requiring life-sustaining ventilator or circulatory support.

Table 5. Medical Condition Criteria *

Minor		• Minor illness • Minor isolated injury • Uncomplicated extremity injuries And/or • Any Patient that cannot be categorized as critical, unstable, potentially unstable.
Serious	Potentially Unstable	• Chronic difficulty breathing • Chest pains relieved with rest or medication • Signs & symptoms of compensated shock • Uncomplicated childbirth • Isolated fractures • Burns (<10% body surface area) • Dehydration • Acute abdominal pain
	Unstable	• Poor general impression • High index of suspicion related to mechanism of injury • Unresponsive with no gag reflex • Signs & symptoms of decompensated shock • Multiple long bone fractures • Multi-system injuries • Uncontrolled bleeding • Chest pains (cardiac-related) • Severe difficulty breathing • Severe pain
Critical		• Receiving CPR • Respiratory arrest • Requiring and receiving life-sustaining ventilator and/or circulatory support

* Source: Edward Chico Caballero, Kapiolani Community College

Insurance. Insurance coverage was obtained from the HHIC linked 2013 data. This data was only reported for linked IPV cases due to privacy concerns. Medicaid and Medicare were grouped to provide a reportable frequency (≥5%).

Pregnancy status/length. Pregnancy status was recorded only if patient admitted to being pregnant or possibly pregnant. Pregnancy length was initially recorded manually by the researcher based on the narrative into a text box. Due to sample size and privacy concerns, the true proportion of pregnant victims could not be reported. Additionally, though pregnancy length was recorded in the narrative, this information could not be reported either.

Military dependent status (CAN only). Military dependence information was only obtained for CAN cases. These cases were identified by the narrative text where the victim admitted to having a parent in the military or EMS personnel reported transferring the patient to Tripler Army Medical Center. This information was not confirmed by any other source.

Perpetrator information. Perpetrator information includes variables regarding demographics, relationship, and substance use. These variables include gender, relationship to victim and alcohol use. This information was exclusively collected from the EMS narrative data source.

Gender. Gender of the perpetrator was obtained through the EMS narratives. This information was based on identification by the victim, EMS personnel, or law enforcement and not necessarily by the perpetrators themselves.

Relationship to victim. Relationship between the victim and the perpetrator data was obtained from the EMS narrative text. Observations for this variable are naturally different between IPV and CAN cases. IPV cases included relationships such as spouse, partner, ex-spouse, ex-partner, and other. For IPV, other cases are a result of cases in which there is no option for the type of intimate partner identified in narrative such as "father of victim's child." Even though we could suggest there was a relationship at some point in the past to conceive a child, we cannot accurately place that relationship in any of the determined categories. Other cases also include "friend" or "acquaintance" given the stigma and fear of consequences surrounding IPV reporting. We suggest there may be cases in which the assailant is identified as a friend to avoid this stigma. This may also occur in relationships which may experience criticism, such as homosexual relationships, in which a victim may omit the intimate nature of the relationship to avoid ridicule. Missing data occur when the perpetrator is not identified. This is allowed given the criteria set for "possible cases" indicated by incident certainty. "Possible" case criteria does not require the perpetrator to be identified if the case infers intimate partner

violence. Unknown can also be entered due to the case being classified as a "domestic dispute" but the perpetrator and victim relationship was not provided.

For further analysis data were recoded into current relationship and previous relationship to further simplify the relationship status statistics. Current relationships include spouse and partner inputs. Previous relationships include inputs such as ex-spouse and ex-partner. Other relationships were coded as "unknown" in this case.

Alcohol use. Alcohol use by perpetrator was only entered if EMS personnel identified this as positive. If there was no information provided or the perpetrator denied alcohol use, these entries were left blank. This entry is usually based on EMS observation at the scene or victim confession. However, few cases include the perpetrator's admission of alcohol use. The number of perpetrators that were using alcohol are presented.

Incident details. Due to the amount of information regarding incident details, these variables were further divided into three sub-categories for cleaner presentation: 1) incident orientation, 2) abuse details, and 3) response outcomes. Incident orientation includes variables such as year of dispatch, day of dispatch (e.g. Sunday), time of dispatch, location of dispatch, location of incident, and time between incident and EMS activation. These variables were obtained from both the EMS narrative and the existing fields. Abuse details include variables such as type of abuse, chief complaint anatomic, mechanism of abuse, reason, mutual violence, and history of abuse. Lastly, response outcomes include treatment, transport method, agency responding, diagnosis, cost, and legal outcome.

Incident orientation. All measures of orientation, except incident location and time between incident and EMS activation, were obtained from the EMS existing fields. Year of dispatch is presented by frequency. Day of week of dispatch is presented by frequency per day. Day of week was also recoded to determine and compare frequencies among the weekdays and weekend. Time of emergency service activation was recoded from a continuous variable to categorical variable groups to represent morning (6:00 am – 11:59 am), afternoon (12:00 pm – 5:59 pm) and evening/night (6:00 pm – 5:59 am) as well as day (6:00 am – 5:59 pm) and night (6:00 pm – 5:59 am).

Dispatch and incident location information were obtained by different methods. The dispatch location was obtained by EMS existing fields. Data is presented by county (IPV cases),

neighbor island/Oʻahu (CAN cases), and type of location. Cases were not presented by neighborhood/district, due to confidentiality and privacy given the sample size. County data is presented by frequency as well as shown as a rate by population. Population breakdowns were different for IPV and CAN cases given the population demographics for each type of abuse. Population adjustments for EMS attended IPV cases were done with U.S Census Bureau estimates for 2015 of women ages 14 to 64. Population adjustments for EMS attended CAN cases were done with U.S. Census Bureau estimates for 2015 of children, both sexes, ages 0 – 13 years. Age ranges could not be found to fit perfectly with the study age ranges and the data obtained from the U.S. Census Bureau was the closest to the studies inclusion criteria for both IPV and CAN cases. Very little change occurred between 2013 and 2015, and estimates were not given in the three-year group, therefore the most recent population data (2015) was used for the adjustment. Rates by population were given only to understand the frequencies with population as a factor between the EMS attended cases. This information does not imply more committed abuse in any one county and comparison can only be made within the data presented. County specific rates are not reported for CAN cases, rather neighbor island vs Oʻahu due to sample size and privacy concerns. Type of location was categorized as health care facility, home/residence, public building, and other. Other categories were originally given, however, due to the small sample size, categories with <5% reporting were moved to the "other" category. Incident location was obtained from the narrative based on EMS or patient report. This data was categorized as residence (patient, perpetrator, and unknown), public building, street/roadway/highway, and other.

The amount of time between the incident and dispatch of EMS activation were originally entered manually by the researcher based on the narrative in a text field. These times were given in different units (e.g. less than a day, 3 hours, and one week). Therefore, to simplify results for analysis and presentation, these times were coded to less than 1 hour, ≤ 1 day, and > 1 day. There was no overlap between cases. For example, those cases recoded as "less than 1 hour" were not coded as "less than 1 day." Furthermore, those cases recoded as "less than 1 day" were times which exist between over an hour and under 24 hours. This type of coding justification was used for all categories.

Abuse details. Abuse type was coded based on CDC definitions for each type (Table 6 & 7). Abuse type and mechanism were obtained from the EMS narrative and allowed multiple

input to occur. Therefore, the n size for these variables might sum to a greater number of cases present. Combinations are not provided given the small sample size.

Table 6. Definitions: IPV Type of Abuse*

Physical Abuse	"the intentional use of physical force with the potential for causing death, disability, injury, or harm"
Sexual Abuse	"a sexual act that is committed or attempted by another person without freely given consent of the victim or against someone who is unable to consent or refuse"
Psychological Aggression	"use of verbal and non-verbal communication with the intent to: a) harm another person mentally or emotionally, and/or b) exert control over another person"

* Source: Breiding, Basile, Smith, Black, & Mahendra, 2015, p. 11

Table 7. Definitions: CAN Type of Abuse*

Physical Abuse	• intentional use of physical force against a child that results in, or has the potential to result in, physical injury. • includes physical acts ranging from those which do not leave a physical mark on the child to physical acts which cause permanent disability, disfigurement, or death. • can result from discipline or physical punishment.
Sexual Abuse	• any completed or attempted (non-completed) sexual act, sexual contact with, or exploitation (i.e., noncontact sexual interaction) of a child by a caregiver
Psychological Abuse	• intentional caregiver behavior (i.e., act of commission) that conveys to a child that he/she is worthless, flawed, unloved, unwanted, endangered, or valued only in meeting another's needs. • can be continual (e.g., chronic and pervasive) or episodic (e.g., triggered by a specific context or situation: caregiver substance use/abuse)
Failure to Provide	• failure by a caregiver to meet a child's basic physical, emotional, medical/dental, or educational needs • physical neglect • emotional neglect • medical/dental neglect • educational neglect
Failure to Supervise	• failure by the caregiver to ensure a child's safety within and outside the home given the child's emotional and developmental needs • inadequate supervision • exposure to violent environments

* Source: Leeb, Paulozzi, Melanson, Simon, & Arias, 2008, p. 11

Chief complaint anatomic was obtained from the existing EMS fields. Inputs were combined to produce frequencies of >5% or reported as <5% to protect privacy of patients.

Information regarding the reason for abuse was also obtained through reports in the EMS narrative text. Categories based on "common reasons" such as (for IPV) jealousy, drug/alcohol related, and child-related were established. CAN reasons were categorized into groups such as punishment or involved in IPV. All other reasons were presented as other. If reason was not given, data was recorded as missing. Relationship of victim to caller was obtained from the EMS narrative text. This data is based on self-report from bystanders or the victim and is not based on 9-1-1 dispatch records. History of previous incidents were only recorded when victim or law enforcement informed EMS that this was true. If no information was provided or this status was unknown, cases were coded as no/unknown. Mutual violence was entered as "yes" when EMS personnel identified the patient as a victim and a perpetrator. An input was only given for this variable when it was true, therefore all unrecorded information represents an unknown or no status.

Response outcomes. Patient treatment and transport variables were originally one variable since the data comes from the EMS existing fields. For analysis and presentation, these variables were separated and frequencies are presented for each variable. Diagnoses for IPV victims were provided for all available linked data for 2013. Additionally, hospitalizations are presented by frequency, and costs are presented by central tendency measures.

Other agencies responding are presented in combinations. For example, fire and police, police alone, or fire alone. If the police were noted to be on scene first, this was also reported. If there was no information, it is treated as "missing." Legal outcome was entered based on the identification from EMS personnel. Therefore, this information cannot completely confirm legal action. Cases which indicate "other" include perpetrator being detained but not identified as being arrested.

Evaluation. Evaluation of the data source was done by using the CDC guidelines for surveillance titled, "Updated Guidelines for Evaluating Public Health Surveillance Systems" (German et al., 2001). This guideline suggests first identifying the purpose of the surveillance system in order to properly evaluate the surveillance method as effective for monitoring a specific health-related event, in this case IPV and CAN. Following this identification, the CDC

suggests evaluating the surveillance system by 10 standards. These standards are as follows: (1) Level of Usefulness, (2) Simplicity, (3) Flexibility, (4) Data Quality, (5) Acceptability, (6) Predictive Value Positive, (7) Sensitivity, (8) Representativeness, (9) Timeliness, and (10) Stability. Some criteria could not be used to evaluate this data source due to the capacity of the study therefore criteria were loosely followed for evaluation.

Level of usefulness. The EMS narrative text and existing fields were investigated to determine if the data sources provide adequate information regarding at least one of these concerns (a) detect injuries or in a timely manner to allow accurate identification, prevention, or treatment, (b) estimates of morbidity and mortality, (c) detects trends or changes, (d) assessment of the effect of prevention and control programs, (e) leads to improved clinical, behavioral, social, policy, or environmental practices, (f) stimulates research intended to lead to prevention or control. Explanations were given regarding how adequately the data source addresses each concern.

Simplicity. Simplicity was evaluated by assessing factors such as amount and type of data necessary to identify cases, level of integration with other systems, method of data collection, amount of follow-up necessary, method of managing data, methods for analyzing and disseminating data, staff training requirements, (time spend on maintaining the system. The CDC explains a case that is defined as "simple" is one in which standard case definitions are given and easy to determine. A "simple" case is also defined by one in which collection, analysis, and use of information is done by few or one person.

Flexibility. Flexibility measures were not applicable to this study due to the time constraints and limitations of the study. This standard required testing with new information and needs which would need to be done over time as community needs change. However, future research could assess the flexibility of this data source as changes occur.

Data quality. Data quality was evaluated by simply assessing the number of missing data for all variables. More than 10% missing is considered incomplete.

Acceptability. Community acceptability was evaluated by assessing how many victims (a) activated 911 themselves and (b) were not forthcoming with information. We also assessed EMS personnel acceptability by measuring adequate participation with how many cases could be identified as "definite" rather than "probable" and "possible."

Predictive Value Positive (PPV). PPV could not be evaluated since there is no confident way for the researchers to determine "truly positive" cases. If EMS cases were linked to court records, this may be measured.

Sensitivity & representativeness. Representativeness was evaluated by comparing the demographics of the patient and incident such as age, sex, location with reported demographics with other surveillance systems such as BRFSS, and YRBSS.

Timeliness. Timeliness was evaluated by assessing the amount of time the project took from start to finish, including organization approval, data collection, and dissemination to public. This time period will be compared to other data sources/reports used to identify and prevent abuse.

Stability. Stability was evaluated by assessing: (a) time the system is fully operating, (b) time required to collect data, (c) time required to manage data, (d) time required to release data.

CHAPTER 4. RESULTS

Descriptive Statistics

Incident classification. Including both IPV and CAN cases, 1,222 cases were reviewed (Table 8). Of those cases, 664 cases (59.2%, 95% CI: 56.3 – 62.1) were "positive cases" classified as definite, probable, or possible and 458 (40.8%, 95% CI: 37.9 – 43.7) cases were "negative cases" classified as "not a case." Cases classified as "not a case" were further evaluated by reasons: 25.6% (95% CI: 21.3 – 29.3) not violence, 72.1% (95% CI: 67.9 – 76.2) other violence, and <5% other. Other cases included those with sampling/coding errors where the patient did not meet inclusion criteria, duplicate cases, or no patient was found/observed by EMS. When EMS data was linked to the HHIC ED data from 2013, a total of 218 records matched (188 IPV; 30 CAN). Among these 218 cases, we identified 115 positive cases which were further classified as: definite – 63.2%, probable – 9.6%, and possible – 27.2%.

IPV cases. A total of 855 IPV cases were reviewed. Of these cases, 510 (59.6%) were classified as definite (64.1%, 95% CI: 60 – 68.3), probable (7.6%, 95% CI: 5.3 - 10), or possible (28.2%, 95% CI: 24.3 – 32.1) and 345 (40.4%) were classified as "not a case." Reasons for the "not a case" classification were: 22.9% not violence, 74.8 other violence, and <5% other. Among the HHIC data linked for 2013 (n=100), 60.6% were classified as definite, 9.0% as probable, and 30.0% as possible.

CAN cases. A total of 267 CAN cases were reviewed. Of these cases, 154 (57.7%, 95% CI: 51.8 – 63.6) were classified as definite (65.6%, 95% CI: 58.1 – 73.1), probable (13.6%, 95% CI: 8.2 – 19.1), or possible (20.8%, 95% CI: 14.4 – 27.2) and 113 (42.3%, 95% CI: 36.4 – 48.2) were classified as "not a case." Reasons for the "not a case" classification were: 32.7% not violence, 63.7% other violence, and <5% other. Among the HHIC data linked for 2013 (n=15), 80.0% were classified as definite, 13.3% as probable, and 6.7% as possible.

Table 8. Results: Incident Classification

Positive Cases						
	Definite		Probable		Possible	
Case Type	Count	%	Count	%	Count	%
IPV	327	64.1%	39	7.6%	144	28.2%
CAN	101	65.6%	21	13.2%	32	20.8%
Overall Total	428	64.5%	60	9.0%	176	26.5%

Not a Case						
	Not Violence		Other Violence		Other	
Case Type	Count	%	Count	%	Count	%
IPV	79	22.9%	258	74.8%	n/r	<5%
CAN	37	32.7%	72	63.7%	n/r	<5%
Overall Total	116	25.6%	330	71.2%	n/r	<5%

Patient information.

Age. The mean age of IPV victims in this sample (n=510) is 31.2 ± 0.8 (s=9.12) (Figure 1). The mean age of CAN victims in this sample (n=154) is 6.3 ± 0.5 (s=3.6) (Figure 2). Among the HHIC linked data for IPV cases (n=100) and CAN cases (n=15) in 2013, the mean age is 32.6 ± 1.0 (s=9.8) for IPV victims overall and 7.1 ± 0.9 (s=3.6) for CAN victims. However, IPV victims who were hospitalized (n=6) ranged in ages from 22 – 44 unlike those who were not hospitalized (n=94) which ranged from 14 – 50 like the overall sample.

Figure 1. EMS-Attended IPV Case: Victim Age Distribution for 2013 – 2015 (n=510)

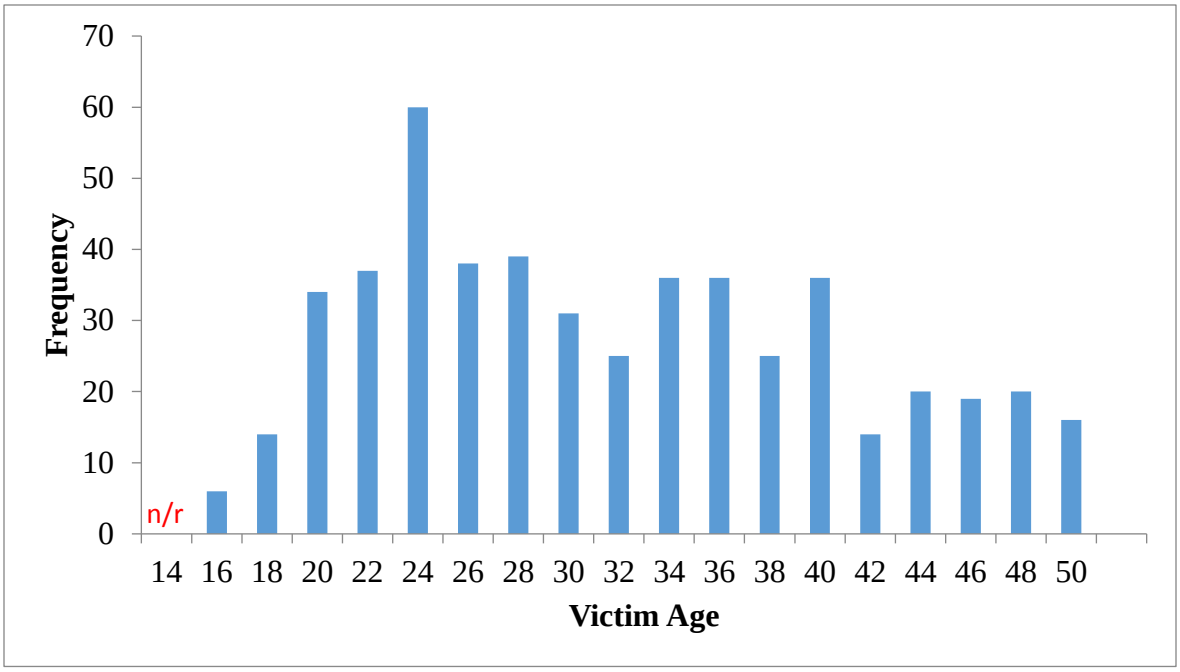
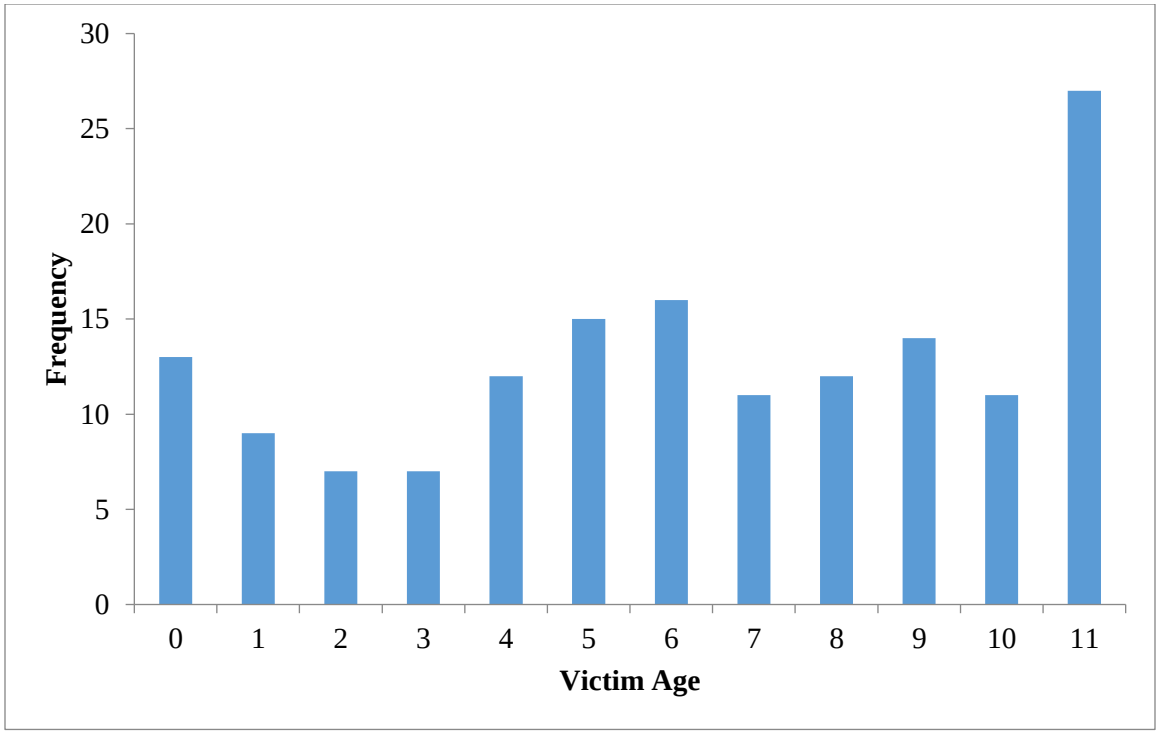


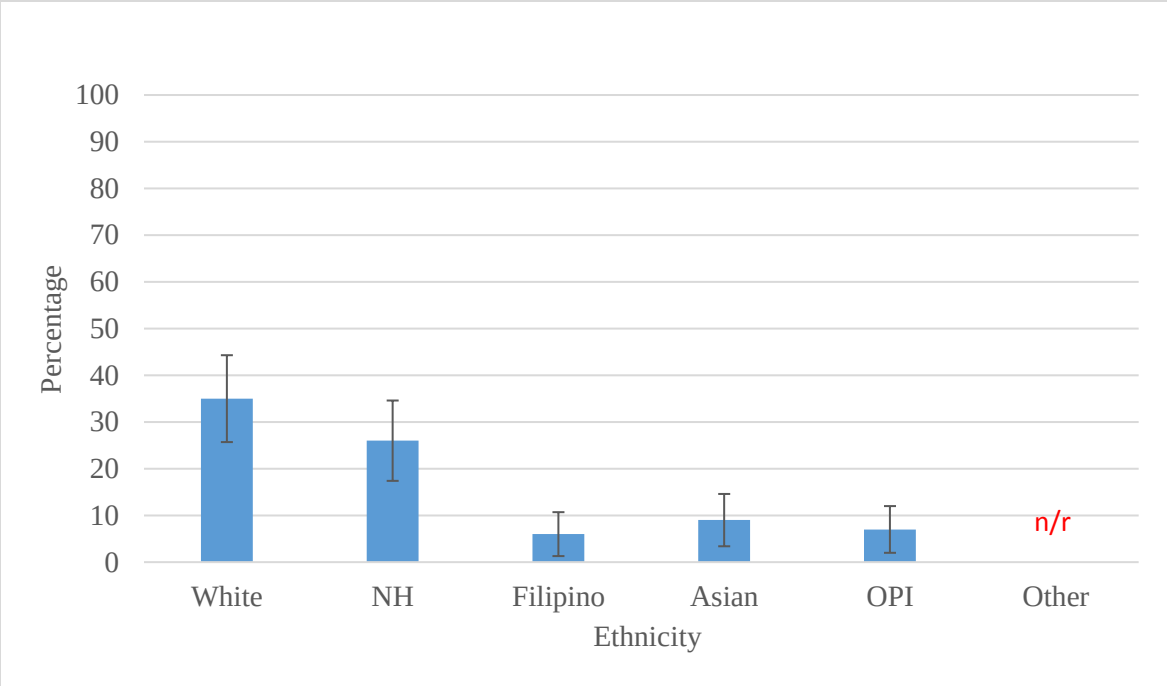
Figure 2. EMS-Attended CAN Case: Victim Age Distribution for 2013 – 2015 (n=154)



Sex. There were no sex differences among the CAN victims in this sample (n=154); 56.5% (95% CI: 46.8 – 66.2) victims were male and 43.5% (95% CI: 33.8 – 53.2) were female. Although the HHIC linked data from 2013 provided sex for victims of CAN, due to the small sample size, this information cannot be reported. Due to inclusion criteria, 100% of IPV cases sampled in this study included female victims.

Ethnicity. Among the HHIC linked data from 2013, victims of IPV (n=100) were 35% (95% CI: 25.7 – 46.3) White/Caucasian, 26% (95% CI: 17.4 – 34.6) Native Hawaiian or Part Native Hawaiian (NH), 13% (95% CI: 6.4 – 19.6) Filipino, 9% (95% CI: 3.4 – 14.6) Other Pacific Islander (OPI), 7% (95% CI: 2.0 – 12.0) other, 6% (95% CI: 1.3 – 10.7) Asian, and <5% refused to answer (Figure 3).

Figure 3. HHIC Linked EMS-Attended IPV Cases in 2013 by Ethnicity (n=100)



Although the HHIC linked data from 2013 provided ethnicity for victims of CAN cases, due to the small sample size, this information cannot be reported.

Alcohol and drug use. A total of 26.0% (95% CI: 20.8 – 31.2) IPV victims in which data was available (n=277) admitted to or were suspected of using alcohol upon EMS arrival. However, most victims (74%, 95% CI: 68.8 – 79.2) were not using or suspected of using alcohol

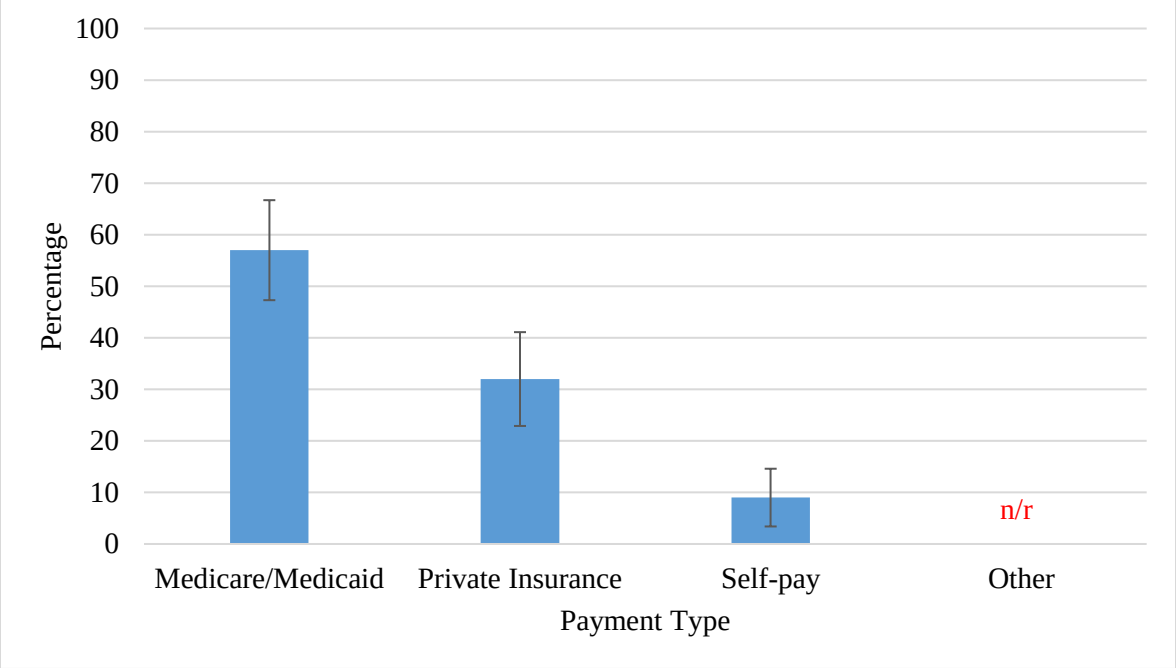
upon arrival of EMS. Additionally, less than 5% of IPV victims in this sample admitted to or were suspected of using drugs upon EMS arrival. CAN alcohol and drug use measures were not analyzed.

Uncooperative. EMS personnel recorded uncooperative patients with 5.3% of IPV cases and less than 5% of CAN cases.

Medical condition. The majority of IPV victims (n=509, missing data=1) were in minor condition (88.2%, 95% CI: 85.2 – 90.9) upon EMS contact as opposed to serious (11.6%, 95% CI: 8.8 - 14.3) and critical (<5%) condition. Likewise, CAN victims (n=154) were mostly in minor condition (92.2%, 95% CI: 88 – 96.4) rather than serious (7.8%, 95% CI: 3.6 – 12) condition upon EMS arrival.

Insurance. The majority of IPV victims had Medicaid/Medicare (57.0%, 95% CI: 47.3 – 66.7), followed by private insurance (32.0%, 95% CI: 22.9 – 41.) (Figure 4).

Figure 4. HHIC Linked EMS-Attended IPV Cases in 2013 by Payment Type (n=100)



Pregnancy. Less than 5% of IPV victims were recorded as pregnant or possibly pregnant. These pregnancies ranged from 1st to 3rd trimester.

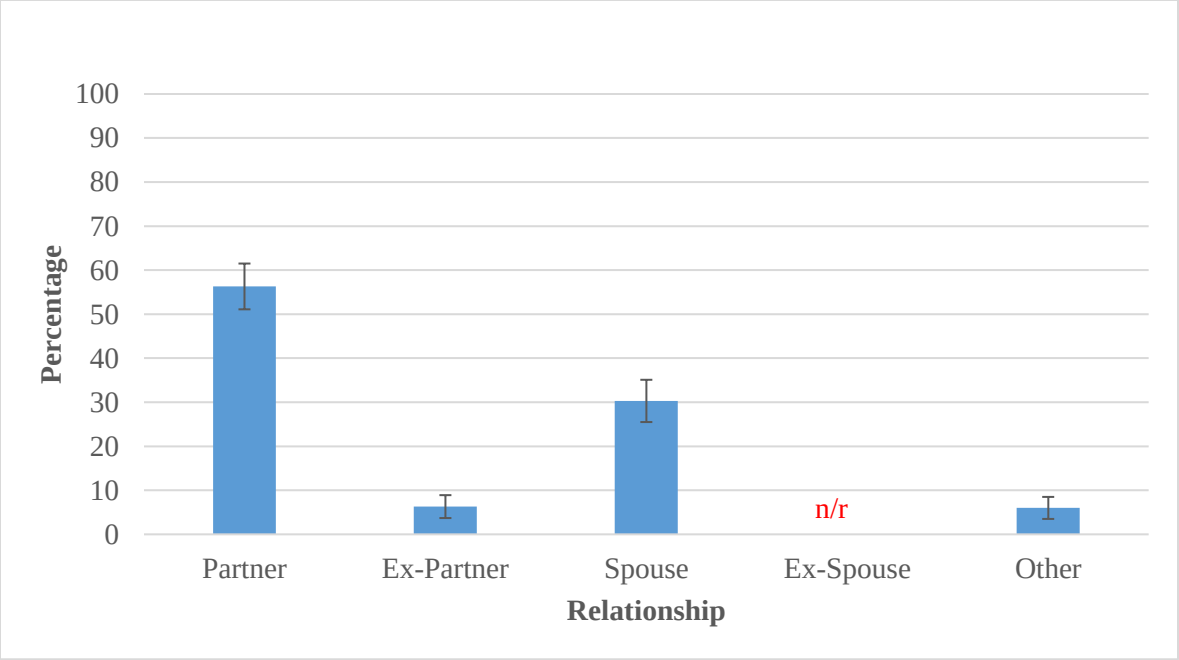
Military status. 6.5% (95% CI: 2.6 – 10.4) of CAN victims were identified as being affiliated with the military.

Perpetrator information.

Gender. Among IPV cases in this sample which provided the gender of the perpetrator (n=433, missing data=77), the majority of perpetrators were identified as male (92.6%, 95% CI: 90.1 – 95.1), whereas 7.4% (95% CI: 4.9 – 9.9) were identified as female. However, there were no gender differences among perpetrators within CAN cases (n=128, missing data=26) as 57.0% (95% CI: 48.3 – 65.7) of perpetrators were identified as male and 43.0% (95% CI: 34.3 - 51.7) female.

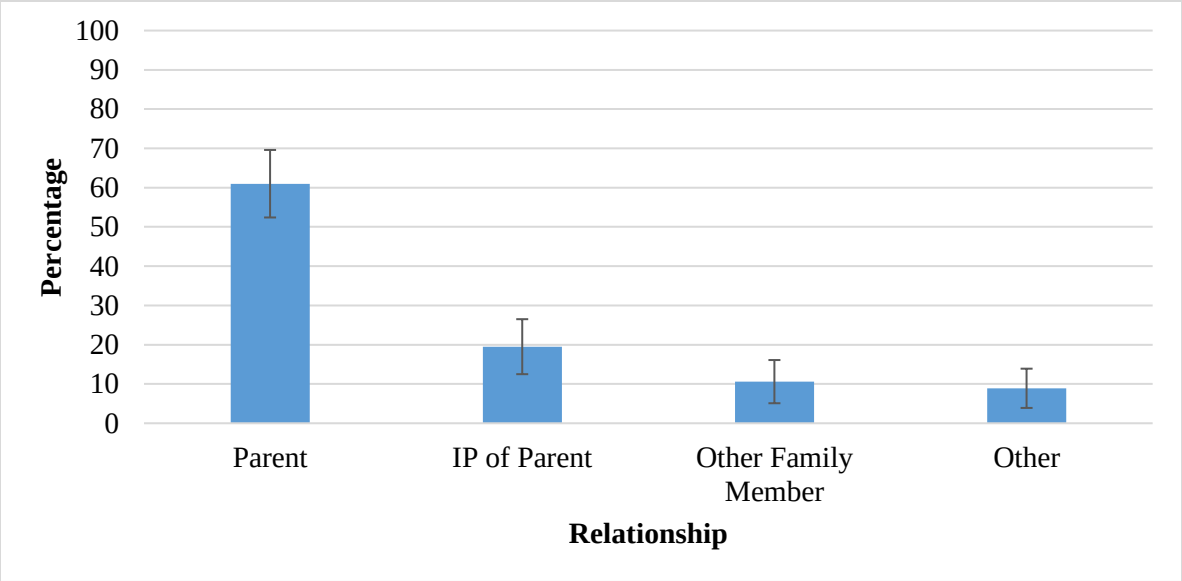
Relationship. The majority of IPV cases (n=350, missing data=160) involved unwed partners (56.3%, 95% CI: 51.1 – 61.5); followed closely by wed partners (30.3%, 95% CI: 25.5 – 35.1). When categorized by relationship status (current or past), more victims were currently in a relationship with their perpetrator (38.6%, 95% CI: 34.4 – 42.9) than having an encounter with a past intimate partner (5.1%, 95% CI: 3.2 – 7.0). However, relationship status could not be determined for majority of cases (56.3%, 95% CI: 52 – 60.6).

Figure 5. EMS-Attended IPV Cases for 2013 - 2015 by Relationship



Majority of CAN cases (n=124, missing data=31) involved a parent as the perpetrator (61.1%, 95% CI: 52.4 – 69.6) followed by the intimate partner (IP) of the parent (19.5%, 95% CI: 12.5 – 26.5). Other relationships included teacher, coaches, school staff, or other person known to victim.

Figure 6. EMS-Attended CAN Cases for 2013 - 2015 by Relationship



Incident details.

Incident orientation. Nearly half the EMS-attended IPV cases occurred in 2013 (48.0%, 95% CI: 43.4 – 52.4) and the other half occurred in 2014 (28.4%, 95% CI: 24.5 – 32.3) and 2015 (23.5%, 95% CI: 19.8 – 27.2) (Table 9). Differing from IPV cases, EMS-attended CAN cases occurred evenly between 2013, 2014, and 2015 (2013 – 32.5%, 95% CI: 25.1 – 39.9; 2014 – 28.6%, 95% CI: 21.4 – 35.7; 2015 – 39%, 95% CI: 31.3 – 46.7) (Table 10).

Day of week for emergency services (9-1-1) among IPV cases (Table 9) were relatively even throughout the week, only presenting statistically significant differences between Tuesday (10.8%, 95% CI: 8.1 – 13.5), Thursday (11.6%, 95% CI: 8.8 – 14.3), and Saturday (19.2%, 95% CI: 15.8 – 22.6) with significantly more activations occurring on Saturday. However, when weekend (Friday - Sunday) and weekday (Monday – Thursday) comparisons were made, there were no significant differences (Weekday – 50.4%, 95% CI: 46.1 – 54.7; Weekend – 49.6%, 95% CI: 45.3 – 53.9). Overall, activation for IPV cases increased throughout the day (Morning –

16.5%, 95% CI: 13.3 – 19.7; Afternoon – 23.5%, 95% CI: 19.8 – 27.2) with significantly more activations occurring in the Evening/Night (60%, 95% CI: 55.7 – 64.3). Even when time of activation was compared in twelve hour splits (Day = 6:00 am – 5:59 pm; Night = 6:00 pm – 5:59 am) significantly more activations occurred over night (60%, 95% CI: 55.7 – 64.3) than day (40%, 95% CI: 35.7 – 44.3).

Alternatively, CAN case activation had no significant differences between days of the week (Table 10). However, significantly more activation occurring among weekdays than weekends (Weekday – 64.9%, 95% CI: 57.4 – 72.5; Weekend – 35.1%, 95% CI: 27.5 – 42.6). Furthermore, there were no significant differences between morning, afternoon, and evening/night (Table 10) and there were differences when simply comparing day and night with significantly more activations occurring during the day (Day – 63.6%, 95% CI: 56 – 71.2; Night – 36.4%, 95% CI: 28.8 – 44).

Table 9. Results: Incident Orientation for EMS-Attended IPV Cases for 2013 - 2015

	%	Lower 95% CI	Upper 95% CI
Year			
2013	48.0%	43.4	52.4
2014	28.4%	24.5	32.3
2015	23.5%	19.8	27.2
Time			
Day (6:00 am – 5:59 pm)	40.0%	35.7	44.3
Night (6:00 pm – 5:59 am)	60.0%	55.7	64.3
Day			
Weekday	50.4%	46.1	54.7
Monday	13.1%	10.2	16.1
Tuesday	10.8%	8.1	13.5
Wednesday	14.9%	11.8	18
Thursday	11.6%	8.8	14.3
Weekend	49.6%	45.3	53.9
Friday	15.7%	12.5	18.8
Saturday	19.2%	15.8	22.6
Sunday	14.7%	11.6	17.8

Table 10. Results: Incident Orientation for EMS-Attended CAN Cases for 2013 - 2015

	%	Lower 95% CI	Upper 95% CI
Year			
2013	32.5%	25.1	39.9
2014	28.6%	21.4	35.7
2015	39.0%	31.3	46.7
Time			
Day (6:00 am – 5:59 pm)	63.6%	56	71.2
Night (6:00 pm – 5:59 am)	36.4%	28.8	44
Day			
Weekday	64.9%	57.4	72.5
Monday	15.6%	9.9	21.3
Tuesday	18.8%	12.7	25
Wednesday	12.3%	7.1	17.5
Thursday	18.2%	12.1	24.3
Weekend	35.1%	27.5	42.6
Friday	13.0%	7.7	18.3
Saturday	8.4%	4.1	12.8
Sunday	13.6%	8.2	19.1

Dispatch locations (n=510) for IPV cases (Table 11) were mostly to a home or residence (80.2%, 95% CI: 76.7 – 83.7) which is also true for reported incident location (n=174, missing data=336; 78.2%, 95% CI: 72 – 84.3). All other types of locations involved less than 15% of cases for dispatch location and less than 10% of cases for incident location.

Table 11. Results: Dispatch Location for EMS-Attended IPV Cases for 2013 - 2015

	Dispatch Location			Incident Location		
Location Type	%	Lower 95% CI	Upper 95% CI	%	Lower 95% CI	Upper 95% CI
Home/Residence	80.2%	76.7	83.7	78.2%	72	84.3
Public Building	7.8%	5.5	10.2	9.2%	4.9	13.5
Street	n/r	n/r	n/r	7.5%	3.6	11.4
Other	12.0%	9.1	14.8	5.2%	1.9	8.5

Distribution of EMS-attended IPV cases by county (n=510) were as follows: Honolulu County 74.3% (95% CI: 70.5 – 78.1), Hawai‘i County 12.2% (95% CI: 9.3 – 15), Maui 10.6% (95% CI: 7.9 – 13.3), and Kaua‘i <5%. Adjustments for populations were made resulting in rates per 10,000 females aged 14 – 64 years. Rates for EMS attended IPV cases per 10,000 females aged 14 – 64 years for 2013 – 2015 are as follows: Hawai‘i County – 9.8, Honolulu County – 12.0, Kaua‘i – 6.6, Maui – 10.0. The overall state rate for EMS attended IPV cases for 2013 - 2015 was 11.2 per 10,000 females aged 14 – 64 years.

Table 12. Results: Dispatch Location Percentages and Rates by County for EMS-Attended IPV Cases for 2013 - 2015

County	%	Lower 95% CI	Upper 95% CI	Rate per 10,000 females aged 14 - 64
Hawai‘i	12.2%	9.3	15	9.8
Honolulu	74.3%	70.5	78.1	12
Kaua‘i	<5%	n/r	n/r	6.6
Maui	10.6%	7.9	13.3	10
Overall State	100%			11.2

Dispatch locations (n=154) for CAN cases were equally common to a residence (50%, 95% CI: 42.1 – 57.9) and a public building such as a school (39%, 95% CI: 31.3 – 46.7). However, reported incident locations (n=45) were primarily reported to be at home (75.6%, 95% CI: 63 – 88.1) rather than other places (24.4%, 95% CI: 9.3 – 20.6). This could suggest that incidents may have taken place at home but reported outside the home such as at school.

Table 13. Results: Dispatch Location for EMS-Attended CAN Cases for 2013 - 2015

	Dispatch Location			Incident Location		
	%	Lower 95% CI	Upper 95% CI	%	Lower 95% CI	Upper 95% CI
Home/Residence	50.0%	42.1	57.9	75.6%	63	88.1
Public Building	39.0%	31.3	46.7	n/r	n/r	n/r
Other	11.0%	6.1	16	24.4%	11.9	37

Due to the small sample size and concerns for privacy, by county comparisons could not be made. However, comparisons made between Oʻahu and the neighbor islands combined resulted with: Oʻahu 85.1% (95% CI: 79.4 – 90.7) and neighbor islands 14.9% (95% CI: 9.3 – 20.6). Adjustments for populations were made resulting in rates per 10,000 children 0 – 13 years. Rates for EMS attended CAN cases per 10,000 children aged 0 – 13 years for 2013 – 2015 are as follows: Oʻahu – 7.7 and neighbor islands – 3.1 per 10,000 children aged 0 – 13. Overall state rate for EMS attended CAN cases for 2013 – 2015 was 6.3 per 10,000 children aged 0 – 13 years.

Table 14. Results: Dispatch Location Percentages and Rates by Oʻahu and Neighbor Islands for EMS-Attended CAN Cases for 2013 - 2015

Island	%	Lower 95% CI	Upper 95% CI	Rate per 10,000 children aged 0 - 13
Oʻahu	85.1%	79.4	90.7	7.7
Neighbor Island	14.9%	9.3	20.6	3.1
Overall State	100%			6.3

Data regarding time between incident and 9-1-1 activation was sparsely documented (IPV – n=29 cases, CAN – n=12 cases). Therefore, information could not be provided regarding CAN cases. However, more than half (55.2%, 95% CI: 37.1 – 73.3) of cases reporting time differences, activation occurred within one hour of the incident followed by 24.1% (95% CI: 8.6 – 39.7) activating 9-1-1 ≤1 day, and 20.7% (95% CI: 5.9 – 35.4) >1 day.

Abuse details. Majority of IPV reported (n=520, missing data=5) was physical abuse (95.8%, 95% CI: 94 – 97.5) with <5% of cases including psychological and sexual abuse. The most common mechanisms of abuse reported (n=766, missing data=17) were punched (32%, 95% CI: 28.7 – 35.3), pushed/thrown (15.4%, 95% CI: 12.8 – 18), strangled/suffocated (9.0%, 95% CI: 6.9 – 11), slapped (6.6%, 95% CI: 4.8 – 8.4), struck with object (5.8%, 95% CI: 4.1 – 7.5), and other (20.3%, 95% CI: 17.4 – 23.2). "Other" mechanisms of abuse included acts such as striking (where there was no clear indication if it was punched, slapped, or struck with an object), pulling hair, head-butting, bit, burned, breaking objects, shook and elbowing. Other mechanisms of abuse that are notable but represented <5% of reported abuse were

stabbed/cut/scratched, kidnapped/held hostage, and rape/other sexual abuse. The most common chief complaints anatomic for IPV victims (n=510) were head (47%, 95% CI: 42.6 – 51.3), general/global (25.1%, 95% CI: 21.4 – 28.9), extremities (13%, 95% CI: 10 – 15.9), and neck/back (10.2%, 95% CI: 7.6 – 12.8). All other complaints (abdomen, chest, and genitalia) involved less than 5% of cases. (Table 15)

Table 15. Results: Abuse Details for EMS-Attended IPV Cases for 2013 - 2015

	%	Lower 95% CI	Upper 95% CI
Mechanism of Abuse			
Punched	32.0%	28.7	35.3
Kicked	5.0%	3.5	6.6
Pushed/Thrown	15.4%	12.8	18
Strangled/Suffocated	9.0%	6.9	11
Slapped	6.6%	4.8	8.4
Struck with Object	5.8%	4.1	7.5
Stabbed/Cut/Scratched	<5%	n/r	n/r
Kidnapped/Hostage	<5%	n/r	n/r
Rape/Other Sexual Assault	<5%	n/r	n/r
Other	20.3%	17.4	23.2
Chief Complaint Anatomic			
Head	47.0%	42.6	51.3
General/Global	25.1%	21.4	28.9
Extremities (Upper & Lower)	13.0%	10	15.9
Neck/Back	10.2%	7.6	12.8
Abdomen	<5%	n/r	n/r
Chest	<5%	n/r	n/r
Genitalia	<5%	n/r	n/r

Like IPV cases, abuse reported among CAN cases (n=186, no missing data) involved mostly physical abuse (75.3%, 95% CI: 69.1 – 81.5). However, 8.6% (95% CI: 4.6 – 12.6) of reported abuse was psychological and 11.8% (95% CI: 7.2 – 16.5) neglect. Sexual abuse represented <5% of reported abuse. The most common mechanisms of abuse reported (n=196, missing data=8) were failure to supervise (10.2%, 95% CI: 6 0 – 14.4), punched (14.8%, 95% CI: 9.8 – 19.8), pushed/thrown (9.7%, 95% CI: 5.6 – 13.8), struck with object (13.3%, 95% CI: 8.5 – 18), slapped (15.3%, 95% CI: 10.3 – 20.3) and other (21.4%, 95% CI: 15.7 – 27.2). Like

IPV cases, other mechanisms of abuse include acts such as striking, pulling hair, head-butting, bit, burned, threats, shook and elbowing. Other mechanisms of abuse that are notable but represented <5% of reported abuse were stabbed/cut/scratched, strangled, kicked, and rape/other sexual abuse. The most common chief complaints anatomic for CAN victims (n=154) were head (41.6%, 95% CI: 33.8 – 49.3), general/global (25.3%, 95% CI: 18.5 – 32.2), upper extremities (10.4%, 95% CI: 5.6 – 15.2), neck/back (8.4%, 95% CI: 4.1 – 12.8), and lower extremities (6.5%, 95% CI: 2.6 – 10.4). All other complaints (abdomen, chest, and genitalia) involved less than 5% of cases. (Table 16)

Table 16. Results: Abuse Details for EMS-Attended CAN Cases for 2013 - 2015

	%	Lower 95% CI	Upper 95% CI
Type of Abuse			
Physical	75.3%	69.1	81.5
Psychological	8.6%	4.6	12.6
Neglect	11.8%	7.2	16.5
Sexual	<5%	n/r	n/r
Mechanism of Abuse			
Punched	14.8%	9.8	19.8
Failure to Supervise	10.2%	6	14.4
Pushed/Thrown	9.7%	5.6	13.8
Strangled/Suffocated	<5%	n/r	n/r
Slapped	15.3%	10.3	20.3
Struck with Object	13.3%	8.5	18
Kicked	<5%	n/r	n/r
Stabbed/Cut/Scratched	<5%	n/r	n/r
Rape/Other Sexual Assault	<5%	n/r	n/r
Other	21.4%	15.7	27.2
Chief Complaint Anatomic			
Head	41.6%	33.8	49.3
General/Global	25.3%	18.5	32.2
Extremities - Lower	6.5%	2.6	10.4
Extremities - Upper	10.4%	5.6	15.2
Neck/Back	8.4%	4.1	12.8
Abdomen	<5%	n/r	n/r
Chest	<5%	n/r	n/r
Genitalia	<5%	n/r	n/r

Over half of IPV cases (63.4%, 95% CI: 55.3 – 71.6), in which caller information was given (n=134, missing data=376), were self-callers in which the victim activated 9-1-1. Unlike IPV cases, CAN cases (n=61, missing data=93) reported the most common callers were parents (36.1%, 95% CI: 24 – 48.1) and school staff (29.5%, 95% CI: 18.1 – 41). Less than 5% of IPV and CAN cases reported a history of abuse. Additionally, less 5% of IPV and CAN cases were reported to have involved mutual violence between the victim and the perpetrator.

Many cases omitted a reason for the abuse, which is what specifically led to the abuse other than an argument. Less than 5% of IPV cases reported reasons for abuse including child-related issues, drugs/alcohol, and jealousy. CAN cases had higher report rates with about 27% of cases (n=42, missing data=112) reporting a reason for the abuse including 59.5% (95% CI: 44.7 – 74.4) involved in IPV incident between parents and 40.5% (95% CI: 25.6 – 55.3) punishment.

Response outcomes. Among IPV cases (n=510), 78.8% (95% CI: 75.3 – 82.4) of patients were treated, the remaining 21.2% (95% CI: 17.6 – 24.7) refused treatment (Table 17). Additionally, over half of the IPV cases (n=402, missing data=108) refused transport (55.5%, 95% CI: 50.1 – 59.8) with others being transported by EMS (41.3%, 95% CI: 36.5 – 46.1), law enforcement (<5%), personal vehicle (<5%), and other (<5%) (Table 17). Majority of IPV cases reporting other agency presence (n=416, missing data=94) had police attending alone (95.4%, 95% CI: 93.4 – 97.4). A total of 347 cases reported police being on scene before EMS arrival. Information regarding legal outcome was only reported for <5% of cases with the most common outcome being arrest of perpetrator.

Among CAN cases (n=154), 86.4% (95% CI: 80.9 – 91.8) of patients were treated, the remaining 13.6% (95% CI: 8.2 – 19.1) were cases in which the child's guardian refused treatment for the child. Majority of CAN victims (n=133, missing data=21) were either transported by EMS (47.4%, 95% CI: 38.9 – 55.9) or refused transport (47.4%, 95% CI: 35.9 – 55.9). All other transport methods, by law enforcement, personal vehicle, and other involved <5% of cases. Majority of CAN cases reporting other agency presence (n=121, missing data=31) had police attending alone (89.3%, 95% CI: 83.7 – 94.8). A total of 102 cases reported police being on scene before EMS arrival. Legal outcomes for CAN cases were only reported for <10% cases. These outcomes included CPS activation, patient removal, and arrest of perpetrator.

Table 17. Results: Treatment and Transport Status for EMS-Attended IPV and CAN Cases for 2013 - 2015

		%	Lower 95% CI	Upper 95% CI
Treated				
	IPV	78.8%	75.3	82.4
	CAN	86.4%	80.9	91.8
Transport by EMS				
	IPV	41.3%	36.5	46.1
	CAN	47.4%	38.9	55.9
Refused Transport				
	IPV	55.5%	50.1	59.8
	CAN	47.4%	35.9	55.9

Among the HHIC linked data from 2013, nearly half the diagnoses provided to the victims of IPV were contusion/superficial (45.5%, 95% CI: 38.7 – 52.4), followed by other/unspecified (22.8%, 95% CI: 17 – 28.6), sprains/strains (10.9%, 95% CI: 6.6 – 15.2), open wounds (9.4%, 95% CI: 5.4 – 13.4), fractures (5.4%, 95% CI: 2.3 – 8.6), internal (5.0%, 95% CI: 2.0 – 7.9), burns and poisonings which were both <5% of diagnosis. Multiple diagnosis may have been given to a patient therefore n=202. Due to small sample size, CAN diagnoses are not reported.

Table 18. Results: HHIC Linked IPV Case by Diagnosis for 2013 (n=100)

	%	Lower 95% CI	Upper 95% CI
Diagnosis			
Contusion/Superficial	45.5%	38.7	52.4
Sprains/Strains	10.9%	6.6	15.2
Open Wounds	9.4%	5.4	13.4
Fractures	5.4%	2.3	8.6
Internal	5.0%	2	7.9
Burns	<5%	n/r	n/r
Poisonings	<5%	n/r	n/r
Other	22.8%	17	28.6

Among the HHIC linked data from 2013 (n=100), 94% (95% CI: 89.3 – 98.7) of victims were not hospitalized while 6% (95% CI: 1.3 – 10.7) were hospitalized. The mean charge for

IPV victims was $3639 ± 363.9 (s=3639). Specifically, the mean charge was $3,264 ± 283.4 (s=2748) for patients who were not hospitalized (n=94) and $9,513 (s=2750) for patients who were hospitalized (n=6). Standard error is not provided for the hospitalized patients due to small sample size. No CAN patients were hospitalized.

Table 19. Results: HHIC Linked IPV Cases by Cost and Hospitalization for 2013 (n=100)

	%	$\bar{x}$	s	Lower 95% CI	Upper 95% CI
Not Hospitalized	94%	$3,264	$2,748	$2,981	$3,547
Hospitalized	6%	$9,513	$2,750	n/r	n/r
Overall	100%	$3,639	$3,407	$3,298	$3,980

Evaluation

Level of Usefulness. The data source was evaluated regarding whether it could be used to adequately address at least one of the six concerns. It was found to adequately address one concern, by detecting injuries in a timely manner to allow accurate identification. These patient care records are recorded upon completion of care and can be accessed per year at any time, upon HIPAA and department approval. All other concerns were not addressed adequately due to limitations of the data. Explanations for each concern are presented.

Given that the EMS narrative and existing EMS fields are not a traditional method of gathering data for epidemiological issues, this data source cannot necessarily contribute to treatment. Record of EMS-attended abuse cases have no bearing on treatment as the treatment is provided upon EMS dispatch. However, this data source can be used to identify how many and the characteristics of EMS-attended cases occurring in Hawai‘i at a given time. Additionally, with further investigation, the information provided by this data could bring light to possible at risk populations based on age, ethnicity, marital status, etc. This data source determined to adequately address this concern.

Although inferences can be made about population estimates regarding EMS-attended IPV and CAN cases, actual occurrence of abuse cannot be suggested given the fact that in some

cases, EMS may not be called (personal transportation to ED, not reported, homicide, etc.). Therefore, actual morbidity and mortality estimates cannot be made using this data source.

As explained regarding morbidity and mortality rates, this data source can detect trends of EMS activation for IPV and CAN cases, however it cannot detect trends about overall IPV and CAN cases. Furthermore, trends regarding how many cases were detected via EMS activation may still be useful to determine usage of resources. The EMS narrative and existing EMS fields could address this concern depending on the level of information desired.

This data source cannot provide an assessment of the effect of prevention and control programs.

Although it has not been applied as of yet, the highlight of missing data can be applied to provide better training among EMS personnel regarding documentation of IPV and CAN cases. This data source can also contribute to better prevention efforts by stimulating research. Since this has not yet occurred however, this use of the data cannot necessarily be considered adequate.

Simplicity. Information that is necessary to determine if the case definition has been met is perpetrator and victim relationship and abuse details to determine if abuse in fact has occurred. Data is collected originally by EMS personnel at the time of the incident. Data abstraction, coding done by researcher, took a total of three months (average 4 hours per week) to review 1,222 cases. No follow-up is necessary since this data source is being used for a cross-sectional analysis. Data is managed by NEMSIS originally and coded data is then managed by the researcher. There is no necessary constant communication required between the NEMSIS manager and the researcher. Data is analyzed using SPSS and Excel in relatively simple methods; presenting frequencies and proportions. The researcher must complete HIPAA and security training to have access to patient medical records as well as be provided an informal training with an epidemiologist to insure coding consistency. The system is maintained by NEMSIS and does not require management by researcher or associated department.

The CDC ultimately defines a simple surveillance system as one in which standard case definitions are given and easy to determine. Therefore, given the clear case definitions for IPV and CAN based on CDC definitions of respective abuse types, this surveillance system is relatively simple in nature. Additionally, the CDC explains a simple surveillance system as one

in which collection, analysis, and use of information is done by few or one person (German, et al., 2001). Since data is collected by numerous EMS professionals, this data source could be slightly complex. This multiple source of data collection could result in inconsistency. However, coding based on the narratives provided, analysis, and dissemination in this project have all be done by one person. This may strengthen the simplicity of the data source since the cases are identified by the researcher, not the EMS professionals themselves.

Data Quality. All variables which provided or expected documentation were evaluated for the amount of missing data (Table 20). Variables which provide less than 10% missing data are: incident classification, age, sex, condition, year, time, day of week, county, dispatch location, mechanism of abuse, type of abuse (for CAN only), and treatment. Most of these variables are obtained from the existing EMS data fields, not the narrative text portion of the patient care record.

Table 20. Evaluation: Data Quality Assessment: Percent of Missing Data per Variable

Variable	IPV (% of missing data)	CAN (% of missing data)
Incident classification	0*	0*
Patient Information		
Age	0*	0*
Sex	0*	0*
Condition	0.2*	0*
Alcohol use	45.7	n/a
Drug use	45.7	
Perpetrator Information		
Gender	15.1	16.9
Relationship to victim	31.4	20.1
Incident Details		
Orientation – year	0*	0*
Orientation – time	0*	0*
Orientation – day of week	0*	0*
Orientation – county	0*	0*
Orientation – incident location	65.9	70.8
Orientation – dispatch location	0*	0*
Orientation – time between incident and EMS activation	94.3	92.2
Abuse details – mechanism of abuse	3.3*	5.2*
Abuse details – type of abuse	10.0	0*
Abuse details – caller relationship	18.2	73.7
Abuse details – reason	97.1	72.7
Response outcome – treatment	0*	0*
Response outcome – transport	21.2	21.4
Response outcome – agency	18.4	21.4
Response outcome – legal outcome	97.6	90.3

* less than 10% missing data

Acceptability. Only 5.3% of IPV victims were reported as uncooperative or not forthcoming with information upon contact with EMS. Furthermore, less than 5% of CAN victims were uncooperative or not forthcoming with information upon contact with EMS. Excluding missing data, 63.4% of callers in the IPV cases were identified as the victim themselves.

Regarding IPV cases, there was enough information given in the narrative to classify the case as "definite" in 64.1% of "positive" cases. Within CAN cases, there was enough information given in the narrative to classify the case as "definite" in 65.6% of "positive cases."

Sensitivity and Representativeness. Since majority of IPV cases were determined to be physical, comparison is made based on physical abuse. The only information available from the EMS PCRs regarding demographics and IPV are prevalence statistics for youth and adults. Youth data is presented by lifetime and 12-month prevalence. Adult data however is presented by lifetime prevalence. Ultimately, the comparison will be made on who is reporting IPV and who is EMS attending to. This comparison is a broad in nature due to the lack of data on this subject and the differences in purpose of surveillance for these two data sources.

The YRBS reports that 9.8% (95% CI: 7.8 – 11.8) of youth (ages 12 – 17) were physical abused by their partner in the past 12 months in 2013 (HHDW, 2016). Furthermore, there were no difference between females (10.7%: 7.9 – 13.4) and males (8.1%: 6.5 – 9.8) in the same year. Regarding violence among females and males, there are no county differences. Excluding males, there are still no differences between counties.

Table 21. YRBS 2015 Youth Abused by a Date, Past 12 Months

	%	Lower 95% CI	Upper 95% CI
State			
Male	8.1%	6.5	9.8
Female	10.7%	7.9	13.4
Total	9.8%	7.8	11.8
Hawai‘i County			
Male	11.0%	7.2	14.9
Female	11.7%	8.2	15.2
Honolulu County			
Male	6.9%	4.7	9.1
Female	10.3%	6.3	14.4
Kaua‘i County			
Male	11.4%	6.9	15.8
Female	11.6%	7.3	15.8
Maui County			
Male	10.2%	6.1	14.3
Female	10.8%	7.5	14.1

The BRFSS reports lifetime prevalence of adult (18+) physical abuse by a partner to be 9.5% of males and females. However, there is a difference between genders with more females (12.2%, 95% CI: 10.7 – 13.8) reporting violence than males (6.8%, 95% CI: 5.5 – 8.0). There are also no statistically significant age differences when separated by age groups (18 to 24, 25 to 34, 35 to 44, and 45 to 54). However, there is an almost statistically significant difference between age groups 25 – 34 (13.9%, 95% CI: 10.4 – 17.3) and 45 – 54 (8.8%, 95% CI: 6.8 – 10.8). It is necessary to note that the statistics by age group however are not separated by gender.

Table 22. BRFSS 2015 Adult Lifetime Prevalence of Physical Abuse by a Partner by Age

Age Group	%	Lower 95% CI	Upper 95% CI
18 – 24	8.3%	5.3	11.2
25 – 34	13.9%	10.4	17.3
35 – 44	12.0%	9.2	14.9
45 – 54	8.8%	6.8	10.8

Table 23. EMS-Attended IPV Cases for 2013 - 2015 by Age

Age Group	%	Lower 95% CI	Upper 95% CI
12 - 17	4.1%	1.6	6.6
18 – 24	27.3%	21.8	32.9
25 – 34	30.2%	24.5	36
35 – 44	24.7%	18.4	29
45 – 50	14.7%	10.3	19.1

The inclusion criteria for IPV cases was limited to females ages 12 – 50. Since there are no gender differences among victims of abuse ages 12 – 17, this study could be under-representing male youth who might be victims to IPV. However, there is a gender difference for lifetime prevalence of IPV among adults. Furthermore, the EMS-attended IPV cases in 2013 are represented by less than 5% of those aged 12 – 17 years. However, since true comparisons cannot be made between the YRBS and BRFSS reports (given the difference in measurement: lifetime vs 12-month prevalence), no inference can be made regarding whether the EMS-attended cases are representative of the population experiencing abuse. Among adults, this study presents less cases among those aged 44 to 50. This is similar to the difference in age groups

seen in the BRFSS statistics. It is important to note these measurements are different regarding time (prevalence vs incidents).

Although true statistical comparisons cannot be made between the counties, even when adjusted by population, rates of EMS-attended IPV cases do not show higher rates for Maui than Honolulu County. However, self-report shows more IPV experienced over a lifetime in 2013 in Maui than Honolulu and the overall state average. Even though these two measurements are different, (prevalence vs specific incidents) the mere fact that victims are reporting more prevalence in Maui County yet, we do not see this same difference in response could indicate a difference in surveillance.

Table 24. BRFSS 2015 Lifetime Physical Abuse by Partner by County

County	%	Lower 95% CI	Upper 95% CI
Hawai‘i	11.5%	9.1	13.9
Honolulu	11.5%	7	9.6
Kaua'i	10.7%	7.8	13.6
Maui	14.3%	11.1	17.4
State	9.5%	8.5	10.6

Table 25. Dispatch Location Percentages and Rates by County for EMS-Attended IPV Cases for 2013 - 2015

County	%	Lower 95% CI	Upper 95% CI	Rate per 10,000 females aged 14 - 64
Hawai‘i	12.2%	9.3	15	9.8
Honolulu	74.3%	70.5	78.1	12
Kaua‘i	<5%	n/r	n/r	6.6
Maui	10.6%	7.9	13.3	10
Overall State				11.2

CAN case representativeness was evaluated using all types of abuse since other sources include this information. Per the Hawai‘i State Department of Health (DHS), there were more cases of CAN among children under 1 than any other age in 2014. This study did not find this

over-representation of children under 1 years of age however, the inclusion of this high-risk population suggests adequate representation.

Table 26. Department of Human Services: Confirmed Cases of CAN in 2014 by Age

Age	%	Lower 95% CI	Upper 95% CI
Under 1	19.6%	17.5%	21.7%
1 Year	6.7%	5.4%	8.1%
2 Years	6.4%	5.1%	7.7%
3 Years	5.7%	4.5%	6.9%
4 Years	5.6%	4.4%	6.9%
5 Years	5.7%	4.5%	6.9%
6 Years	5.6%	4.4%	6.8%
7 Years	5.1%	4.0%	6.3%
8 Years	4.9%	3.8%	6.1%
9 Years	4.8%	3.7%	5.9%
10 Years	4.0%	2.9%	5.0%
11 Years	3.3%	2.4%	4.3%

Regarding geographic location, more CAN cases were reported (62.8%, 95% CI: 61.4 – 64.2) and confirmed (57.9%, 95% CI: 55.4 – 60.4) on Oʻahu compared to neighbor islands with 37.2% (95% CI: 35.8 – 38.6) reported cases and 42.1% (95% CI: 39.6 – 44.6) confirmed cases of CAN. This is consistent with the geographical representation within this study. Majority of CAN cases occurred on Oʻahu, however, population is not taken into consideration for these measures. When considered in this study, regardless of population more cases came from Oʻahu. This information is important since these are confirmed investigations into CAN as opposed to self-report CAN which we see in IPV cases. This information could suggest the difference between island representations in EMS records for CAN has no bearing on access or willingness to access emergency case since the proportion does not change when comparing confirmed cases and EMS-attended cases.

Timeliness. This project has taken a total of 15 months to complete (Table 27). This includes obtaining organizational approval (Department of Health, Institutional Review Board, and University of Hawaiʻi), data collection, and submission to Graduate Education at University of Hawaiʻi at Mānoa.

Table 27. Detail of Timeline for Project

Task	Time
Department Approval	9 months (January – October)
Data Collection	3 months (October – January)
Writing (Submission)	3 months (January – April)

Stability. No unscheduled outages occurred. Repair costs are not applicable to this project. The system is fully operating and accessible during business hours at the Department of Health Monday through Friday between 9:00 am and 5:00 pm excluding holidays. The time required to collected data was three months. Management of the data is still ongoing. The time required to release data from data analysis, based on an April 7th submission date, is three months.

CHAPTER 6. DISCUSSION/CONCLUSION

Incident Classification

Overall significantly more positive IPV and CAN cases were identified than negative cases. Furthermore, among both IPV and CAN, "definite" cases represent majority of positive cases when compared to probable or possible. This may suggest that the inclusion criteria, set in hopes to avoid large amounts of false positive cases, may have been effective in removing interpersonal violence from the sample. This interpersonal violence is clearly seen among the "not cases" with majority of cases, that do not fit criteria for definite, probable, and possible status, involving "other violence." Other violence may represent anything between fights among friends, schoolmates, or even stranger assault. It is interesting, however, that relatively the same proportion of cases in both IPV and CAN represent "other violence" when the sex criteria is different. Inclusion criteria was set for IPV to only include female victims given that current research indicates that although men are involved in more violence than women, they are more often victims of interpersonal violence rather than IPV. This may suggest a difference regarding violence exposure between children (under 12 years) and youth, young adults, and adults (>12 years).

Patient Information

Age of IPV victims seems to be evenly distributed from 14 to 50 years. The age inclusion criteria set for IPV cases was 12 – 50. It is possible the lower age parameter could be raised. However, in Hawai‘i the YRBS reported that females in middle school, experienced physical abuse from a date in the past 12 months at relatively the same rate (middle school – 14.4%, 95% CI: 10.6 – 18.2; high school – 10.7%, 95% CI: 7.9 – 13.4) as high school females in 2015 (HHDW, 2016). Given this information, it is possible a high-risk population is being left out of the sample. Additionally, although there are sex differences among adults regarding IPV in Hawai‘i, females report experiencing significantly more IPV than males, these sex differences do not exist among youth in Hawai‘i, <18 years (HHDW, 2016). In fact, middle school males specifically in Hawai‘i reported significantly more physical abuse by a date in the past 12 months than high school males in 2015. These sex difference, however, do not occur among middle school females. A comprehensive study including all ages and both sexes should be conducted to investigate this complex representation of IPV among youth.

Given that the most common age of CAN cases in this study were victims 11 years of age, could suggest the need to raise the age inclusion criteria. Technically, any minor can suffer from child abuse. These criteria were set to avoid interpersonal violence that is more common as age increases but this inclusion criteria may be excluding a population at risk and could more effectively survey CAN by addressing all minors (0 – 17 years). However, the DHS reports majority of CAN cases were that of victims under 1 year of age. As a matter of fact, children aged 0 – 11 years made up 77.6% of confirmed cases of CAN in Hawai‘i in 2014 as opposed to children 12 – 17 years (22.4%) (DHS, 2014). The representation of children under one in this study could be due to reporting occurring often at school in which children of this age would not be attending school.

The sex distribution in this study for CAN cases, showing no sex difference, are not consistent with local statistics of confirmed CAN cases for 2014 showing more female victims (52.6%, 95% CI: 50 – 55.3) than males (46.8%, 95% CI: 44.2 – 49.4) (DHS, 2014). This discrepancy is interesting since the DHS reports sex of the victim for only confirmed cases. However, they do report a 40% confirm rate for 2014 which could contribute to the difference between sex in confirmed cases but not in EMS cases. Therefore, it is possible there are no sex differences among reported cases, and in this cases that involved EMS, but confirmed cases present sex difference. Another factor could be due to differences in severity of case which would possibly enhance the ability to confirm cases and prosecution to ensue. Most cases in this study were resulted in minor injuries, therefore, it is possible not all presented EMS-attended cases could be confirmed as CAN, even if true abuse did occur.

Although this study presents ethnicity differences, with more White and Native Hawaiian victims, it is important to note that this study represents EMS-attended case rather than actual IPV victimization. Previous studies suggest, culture plays an important role in violence identification and acceptance among intimate relationships (Oneha, Magnussen, & Shoultz, 2009). Specifically, in Hawai‘i, some ethnic groups have different standards as to what constitutes IPV. Therefore, the amount of IPV victims could reflect the willingness to seek help rather than actual incidents of violence. Furthermore, the BRFSS shows similar prevalence rates of IPV among Caucasians (13.1%, 95% CI: 11.3 – 15.0), Native Hawaiians (12.6%, 95% CI: 9.0 – 16.1), Other Pacific Islanders (14.1, 95% CI: 5.6 – 22.5), and other ethnicities (8.1%, 95% CI:

2.3 – 14.0) (HHDW, 2015). However, this study shows Other Pacific Islanders with lower representation within EMS-attended IPV cases. This could suggest some feel comfortable admitting to IPV victimization anonymously, such as through the BRFSS survey, but are less willing to seek help upon violent incidents, such as through EMS. This attitude could also be a result of lack of trust in the justice system due to the disproportionate representation of Natvie Hawaiians in the prison system (OHA, 2010). Further studies could investigate the use of resources among specific ethnic groups to explain this finding.

Previous studies have found drug and alcohol use to be risk factors for IPV victimization and perpetration (Eaton, Davis, Barrios, Brener, & Noonan, 2007). However, the current study found the majority of EMS-attended IPV cases did not involve alcohol or drugs. It is still possible that substance use can increase the risk of IPV but obviously does not have to be a factor in most cases.

The fact that majority of IPV and CAN cases were minor could suggest influential prevention programs. Efforts for primary prevention regarding IPV and CAN seem to be priority for the Department of Health. However, secondary prevention can be a more effective and common approach to preventing violence by halting recurrence. Furthermore, resource use by victims can be a convenient measurement of self-efficacy and attitudes about IPV and CAN. For instance, majority of IPV victims activated EMS themselves, suggesting willingness to seek resources and identification of a problem. Additionally, resource use among CAN cases, can be a useful measurement of school staff detection and report of abuse. We see that majority of people who activated EMS in CAN cases were school staff, suggesting successful detection by mandated reporters.

Although over half the IPV victims, from the linked HHIC data in 2013, were reportedly insured by Medicare/Medicaid, only 26.8% of residents in Hawai‘i are insured by Medicare/Medicaid (Sober & Tomczyk, 2013). The most common insurance type among Hawai‘i residents is private employer insurance which was held by significantly less IPV victims in this study sample (Sober & Tomczyk, 2013). This could be interpreted as an SES measurement, congruent with IPV occurring more commonly among those of lower SES. However, this difference among insurance coverage could also be explained by willingness to use resources due to lower health care costs. Some private insurances may have higher co-

payments that could contribute to decision making while contemplating activating EMS and seeking treatment in an ED rather than a primary care doctor, therapist, or even an urgent care facility. It is also important to note that the most current information regarding insurance coverage was from 2010, therefore these estimates could be different as of today.

The representation of pregnant IPV victims is consistent with prevalence in Hawai‘i based on the PRAMS survey in 2013. As it shows, less than 5% of women experienced physical abuse from a partner during pregnancy. A more in-depth analysis of other risk factors (marital status, drug/alcohol use, SES, age, etc.) that are present within these cases could provide a comprehensive understanding of the role pregnancy plays in violence.

Lastly, military affiliation only represented 6.5% of CAN cases. However, this proportion is relatively consistent with other sources of CAN in Hawai‘i involving military in less than 5% of all reported cases in 2014 (DHS, 2014). CAN is an issue that has become a priority among the military population more recently with policy changes to detect CAN early and prevent fatal outcomes (H.R. 3984).

Perpetrator Information

Although research shows, those who have a history of same-sex relationships are more likely to be victims of physical IPV (Messinger, 2011), majority of cases in this study sample involve same-sex relationships. This could be due to the larger number of heterosexual relationships in comparison to same-sex relationships. Additionally, this could be due to differences in coding by EMS professionals, assuming a heterosexual relationship and therefore not identifying the case as IPV when describing details. Furthermore, Messinger (2011) also notes that bisexual individuals are even more likely to be victims of IPV than lesbian women or gay men. This could also be a reason for representation of what seems to be heterosexual relationships in this study. Even though the relationship is comprised of a female and male, we cannot make inferences regarding sexual orientation of the victim or perpetrator. Further studies could be done to assess the attitudes of EMS personnel regarding IPV and same-sex relationships. This could contribute to an understanding of possible gaps in documenting IPV for certain at risk populations.

Unlike IPV cases, CAN cases presented no gender differences among perpetrators. However, DHS presents data contrary to this finding. DHS (2014) found a trend among age and

sex in perpetrators of CAN. Younger perpetrators tend to be females whereas older perpetrators tend to be males. Overall, they found more women (57.9%, 95% CI: 55.7 – 60) were perpetrators of confirmed cases of CAN than men (41.8%, 95% CI: 39.6 – 43.9) in 2014. The differences in the findings between this study and DHS statistics could be explained by factors of investigation. Confirmed cases are not the same as reported cases. DHS notes there is a 40% confirmation rate among their statistics, that is, 40% of reports are confirmed as actual CAN cases. Therefore, female and male perpetrators could be reported at the same rate but found guilty disproportionately, whether that is by true fault or other factors contributing to the investigation. A study investigating these gender difference and factors which lead to prosecution of CAN should be done in the near future to fully understand the details of the trial and prosecution period in CAN cases.

Many studies find that marital or relationship conflict is often a major predictor of IPV (Krug et al., 2002). Additionally, some studies note that marital status can be a risk factor for IPV perpetration for men specifically. In this study, over half of IPV cases involved unwed partners. Furthermore, majority of cases involved current relationships compared to past, or ex-, relationships. However, even if a relatively small number IPV cases involve past relationships, this is not insignificant since previous research suggests this violence can often be more severe when a partner chooses to end the abusive relationship (Fleury, Sullivan, & Bybee, 2000). These cases could be further analyzed, possibly with a larger sample size, to investigate any differences that may occur among IPV cases between current and past relationships.

CAN cases in this study primarily involve parents as the perpetrator. This is expected since physical punishment for children tends to be normalized in the United States. However, the CDC recognizes any action intended to harm a child, regardless of the severity, as child abuse (Leeb, Paulozzi, Melanson, Simon, & Arias, 2008). This can include many common forms of punishment such as smacking a child's head, spanking, and yanking the child by their extremities. Even if the action leaves no visible mark, the intent to harm the child constitutes child abuse. Although gender differences were not present, previous studies suggest male CAN perpetrators tend to cause more severe harm (Eserio-Jenssen, Tai, & Kodsi, 2010).

Incident Details

From 2013 to 2015, there seems to be a decline in EMS-attended IPV cases. However, data along a longer span of time and a larger sample size would be more useful in determining true trends. It is important to note, however, that this study presents proportions of EMS-attended cases and not actual occurrences of IPV. This distinction should be made when evaluating the trends in cases from year to year since many factors could contribute to this decrease. For example, simply less cases could be reported to EMS in 2015 compared to 2013. If this is the case, but the same rates of IPV are occurring, this difference is detrimental to prevention. Unlike IPV cases, EMS-attended CAN cases remained stabled throughout 2013, 2014, and 2015. This could be an indicator of stable CAN incidents; however, it could also indicate a consistent report of CAN incidents which could be a positive outcome for prevention efforts. A comprehensive study comparing rates of EMS-attended cases, self-report rates, and conviction rates could provide an understanding of the use of resources, status of IPV and CAN in Hawai‘i, and outcomes.

IPV emergency activation typically occurred in the evenings and equally across the weekend. This could suggest activation, and possibly incidents, are occurring when people are home from work. This is consistent with other data provided in this study that explains most incidents are occurring at home and EMS is being dispatched to a home as well. Alternatively, CAN cases typically involved activation of EMS during the day and week as opposed to the weekend. This is consistent with the large number of EMS activations by school staff. Furthermore, other data in this study indicates that most incidents occur at home and dispatch location is similarly common between residence and a school. This suggests abuse may take place at home and this abuse is then identified outside the home, at school. This could be an indicator for successful and consistent identification and reporting by mandated reporters such as school staff.

When IPV cases were evaluated by county, naturally more cases occurred in Honolulu County. This is clearly due to the population of Honolulu in comparison to other counties. However, slightly more percent of cases occurred in Honolulu than that of the population Honolulu contributes to the state (Figure 8). This further explains that even though more people reside in Honolulu, more cases do come out of this county. When CAN cases were evaluated by

neighbor island vs O‘ahu, it seems as if the share of population is relatively the same as the share of CAN cases regarding O’ahu. Additionally, the neighbor islands contribute a larger percentage to the population than cases occurring on those islands. However, this does not necessarily suggest more IPV and CAN occurs in Honolulu or on O‘ahu. Many factors could contribute to less EMS activation in other counties such as rural vs urban differences in access to emergency services or attitudes within communities regarding severity of IPV or CAN consequences and whether they require emergency services. However, when proportion of confirmed CAN cases per O‘ahu and neighbor islands (Hawai‘i State, DHS, 2014) are compared to EMS-attended CAN case proportions, there is no difference. This could suggest access to and attitudes toward emergency care for CAN cases is not a factor in over-representation in Hawai‘i. However, further studies could be done to assess these factors and how to contribute to service utilization as well as reporting rates of abuse.

Figure 7. County Share of EMS-Attended IPV Cases for 2013 – 2015 and Overall State Population Share

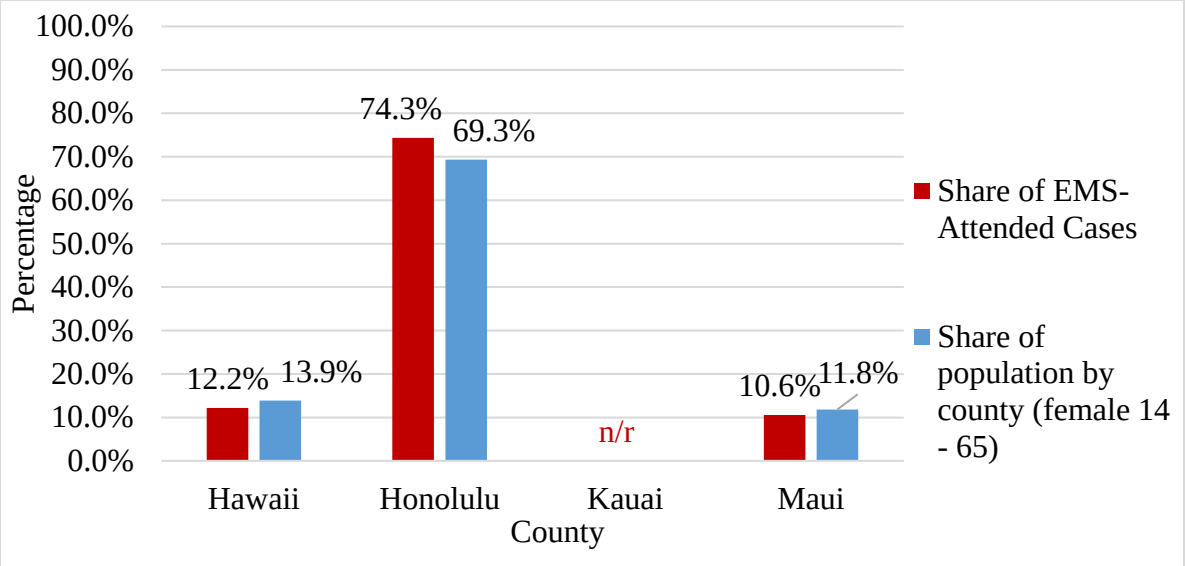
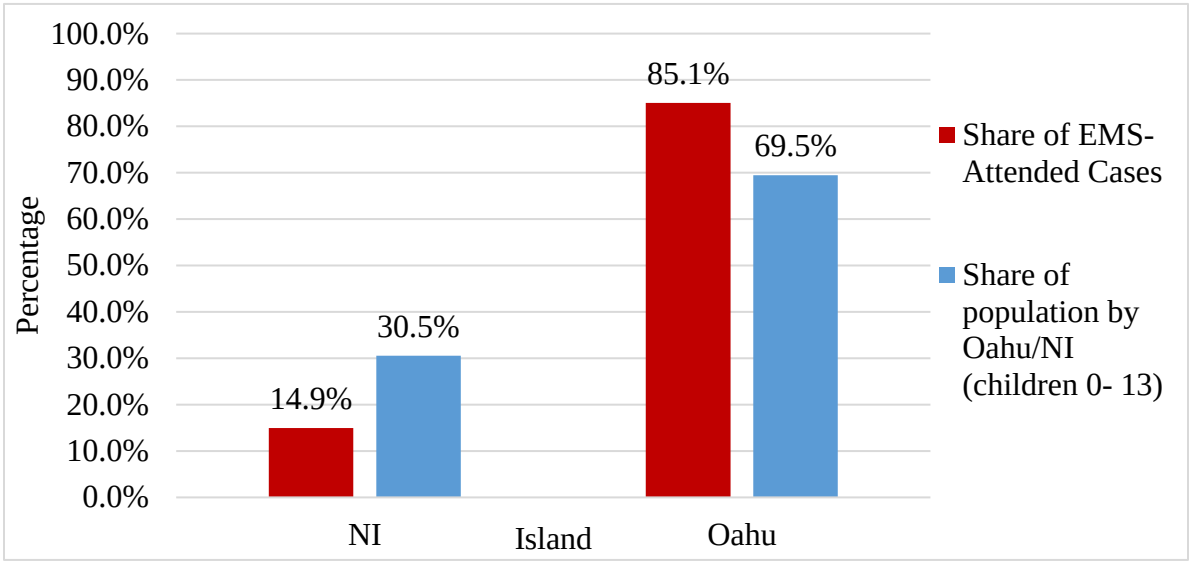


Figure 8. Oahu and Neighbor Island Share of EMS-Attended CAN Cases for 2013 – 2015 and Overall State Population Share



Majority of IPV and CAN reported was physical abuse. This is to be expected since EMS would be called in situations that require medical attention for things such as injuries. Although CAN cases reported more psychological abuse and neglect than IPV, these were typically cases of involvement in IPV. Therefore, EMS would be called to evaluate and treat the victim of IPV and by association evaluate and treat the child involved even if there were no injuries. Neglect includes exposure to violence which would occur when a child is exposed to IPV. It is well known that exposure to violence, especially IPV, as a child can lead to many consequences including being a victim and/or perpetrator of IPV later in life (Widom, Czaja, & Dutton, 2014). IPV exposure can also lead to other mental health issues such as depression and anxiety (Widom, Czaja, & Dutton, 2014).

The most common mechanism of abuse among IPV cases was punched whereas CAN cases presented many common mechanism of abuse including punched, slapped, struck with object, and pushed/thrown. The intent of abuse is also seen in the ultimate outcomes of IPV cases with a total of six patients being hospitalized whereas no CAN cases resulted in hospitalization. However, majority of IPV cases resulted in diagnoses of superficial injuries. These differences can be explained by the reason or intent of abuse. Although reasons were not documented much, most commonly CAN cases were a result of punishment or involvement of IPV whereas reasons

for IPV cases included child-related issues, drugs/alcohol, and jealousy. In IPV cases, perpetrators could be angry and resort to a common fighting mechanism such as punching. Whereas, in CAN case, a parent or caregiver may be attempting to reprimand the child and use any method they feel necessary to accomplish this. Common, although considered child abuse by the CDC, physical punishments for children can be slapping, pushing, and striking with an object such as a slipper, belt, or paddle.

Evaluation

Overall, even though some measurements could not be applied to evaluate the effectiveness of the surveillance system, from what could be applied, the system seems to be effective in surveying specifically EMS-attended cases. It is very important to understand the purpose of the surveillance system as it is not a traditional survey of incidents of IPV and CAN. Common surveillance systems for IPV and CAN measure prevalence rates of actual abuse, or self-reported abuse. This data source, although it can give us characteristics of cases of IPV and CAN, it only applies to measuring EMS-attended cases, rather than actual IPV and CAN events that occur. This could be due to the fact that not all abuse cases result in EMS activation. Cases in which EMS is not activated might be different than cases in which EMS is activated.

Based on the criteria provided by the CDC, this data source seems to be moderately useful by detecting injuries in a timely manner to allow accurate identification. The data sources also seem to be moderately simple with case definitions well defined allowing for accurate identification of cases. However, the data source lacks simplicity when considering narrative information is entered by multiple EMS personnel across the state. This contributes to moderate quality of data as the most important variables to determine case classification (perpetrator relationship and abuse) were provided 90% of the time. This also contributes to the acceptability of the surveillance system by EMS participation being adequate. However, many variables had more than 10% of data missing which suggest improvements could be made such as better training for EMS personnel regarding documentation, or more standard input fields that are required in order to complete the record.

This data sources is moderately sensitive and representative of physical abuse that occurs however does lack surveillance of other abuse types such as psychological and neglect. There seemed to be moderate representation, however, inclusion criteria could be expanded with more

resources to evaluate more cases. This is a suggestion based on the exclusion of male youth under-represented in the sample. Also, since the surveillance system does not evaluate all cases of IPV and CAN rather EMS-attended case, some populations and areas less likely activate or with less access to emergency services may be under-represented in the survey.

This surveillance and assessment took an average amount of time to complete (total of 15 months) when compared to common sources of IPV and CAN data. School and household/telephone surveys such as YRBS and BRFSS report findings every two years. Lastly, stability of the surveillance system primarily relies on access to the database. The database can be accessed during business hours Monday through Friday 9:00 am – 5:00 pm. This provides a reasonable window to collect and analyze information.

Strengths & Limitations

A major strength of this study was a uniform database reaching every county in the state and used by every EMS personnel employed in the state. This allows for better representation of the population. It also provides consistency between geographic areas, counties. Another strength of this study was the multiple data sources available (EMS narrative, existing fields, and HHIC linked records). This allowed for overlapping in data to accommodate for missing fields and comparisons to strengthen certain variables. A final strength of the study was standard definitions provided by the CDC to allow for consistent coding. Whenever a study uses qualitative data, consistency in coding can be a major limitation. However, for major indicators such as case classification and abuse type, these definitions were provided resulting in standardization within the data coding.

Amid the strengths of this study, there were limitations. Since the data source was a new exploration, there was not a clear understanding of what information would be discovered. Due to this, some variables provided little to no information. Another limitation was the inconsistency of EMS personnel with regards to coding. Since numerous EMS personnel complete these PCRs, the narrative text style and contents vary. This resulted in large amounts of missing data and some unclear information. Another limitation is the sample size. Some variables were not reportable due to the sample size. Additionally, most information was based on self-report although given at the scene. This information could include bias from the report of the victim as well as the personal judgment of the scene by law enforcement and EMS personnel. This can

effect variables such as relationship type, mutual violence occurrence, history of incidents, and many others. Also, information such as legal outcome were based on EMS report and were not corroborated with court documents. Furthermore, the mere response bias towards physical injuries could serve as a limitation for documenting all types of abuse including psychological abuse. EMS may not be activated in situations in which psychological abuse is occurring and will be absent from this surveillance method. Lastly, although the linked data from HHIC was useful, there was only available information for 2013. This cut the sample size down to almost unreportable numbers for IPV cases and impossible numbers for CAN cases. The link between EMS-attended field cases and HHIC ED cases was quite remarkable. If there had been available data for 2014 and 2015, the HHIC data would have been a much more valuable data source.

Conclusion

Overall, the data source was valuable and provided a comprehensive look at EMS-attended IPV and CAN cases. Most findings were consistent with other data sources measuring prevalence of abuse in Hawai‘i. Additionally, comparisons and suggestions could be made about factors for differences found between prevalence rates and EMS-attended cases such as access to emergency medical care, willingness to use resources, and identification of an emergency. The data source, although it could only be evaluated loosely, met most criteria for an effective surveillance system. The uniqueness of this data source is the qualitative data, measurement of EMS-attended cases rather than overall incidents, and the linkage of data provided by two other sources. Among strengths of consistency in definitions and state-wide access, limitations such as coding inconsistency among EMS personnel and missing data may have had a substantial impact on the usefulness of the data source. A larger sample size as well as expanded linkage to medical records (HHIC) could possibly improve the outcome of future studies and provide a better understanding of IPV and CAN cases.

Recommendations to streamline future data entry and analysis include training for better identification of cases as well as a checklist system. Training should be provided by a content expert in IPV and CAN to adequately train EMS to code violence consistently and thoroughly. The checklist system can notify EMS personnel when a case is likely to involve IPV or CAN which will prompt personnel to ask key questions desired for effective surveillance. This system can also prompt EMS to investigate abuse cases for more than what is observed (e.g. both IPV

and CAN when only one type of abuse is reported) given the cyclical nature of these types of abuse. Future IPV and CAN prevention should be combined for effective identification, treatment and prevention. Currently, on a funding level it seems as if IPV and CAN are available in a package (U.S. Department of Health and Human Services, 2015, December 3). However locally, these two programs operate separately. There have been efforts with programs in other states that work to prevent what is called "family violence" which is the combination of IPV and CAN such as the "Keeping Kids Safe" program in Tennessee (Tennessee Department of Human Services, 2005). These programs are integrated into school curriculum at a young age. Although this seems ideal, there may be challenges within communities which hold certain attitudes about conflict resolution and child discipline that could be identified as IPV and CAN. Therefore, a needs assessment would be useful to determine community readiness for prevention programs aimed at "family violence" prevention. A needs assessment would also be useful to investigate which communities are being effected by IPV and CAN the most and what factors are contributing to access and use of resources. There was a needs assessment done in 2010 regarding IPV (Sugimoto-Matsuda & Onoye, 2010) but questions regarding use of specifically emergency resources were not asked. This needs assessment could determine which communities are at risk and what changes should be made to motivate individuals to use emergency services for IPV and CAN incidents. Ultimately, the challenge of monitoring and preventing IPV and CAN effectively is ensuring a comprehensive, unbiased, full-reaching method. This study should serve as a foundation to stimulate more research to lead to improved monitoring and prevention for IPV and CAN.

APPENDIX

Table 28. Variables and Origins

Origin	Variable
EMS Narrative Text	Patient Information
	Incident certainty
	Cooperation
	Pregnancy
	Military Dependence
	Perpetrator Information
	Gender
	Relationship
	Alcohol use
	Incident Details
	Incident location
	Time between incident and dispatch
	Type of abuse
	Mechanism of abuse
	Reason
	Caller relationship
	History of abuse
	Mutual violence
	Agency
	Police first
	Legal outcome
Existing EMS Data Fields	Patient Information
	Age
	Sex
	ETOH/Drug use
	Condition
	Incident Details
	Year
	Time of activation
	Dispatch location
	Chief complaint anatomic
	Treatment
	Transport
HHIC Link	Patient Information
	Age
	Sex
	Ethnicity
	Insurance
	Incident Details
	Diagnosis
	Cost
	Hospitalization

GLOSSARY

Child Abuse and Neglect – "any act of series of acts of commission or omission by a parent or other caregiver (e.g. clergy, coach, teacher) that results in harm, potential harm, or threat of harm to a child […] words or overt actions that cause harm, potential harm, or threat of harm to a child. Acts of commission are deliberate and intentional; however, harm to a child may or may not be the intended consequence and acts of omission or child neglect – failure to provide needs or to protect from harm or potential harm" (Leeb, Paulozzi, Melanson, Simon, & Arias, 2008, p. 11)

Physical Abuse – "the intentional use of physical force with the potential for causing death, disability, injury, or harm" (Breiding, Basile, Smith, Black, & Mahendra, 2015, p. 11)

Psychological Abuse - "use of verbal and non-verbal communication with the intent to: a) harm another person mentally or emotionally, and/or b) exert control over another person" (Breiding, Basile, Smith, Black, & Mahendra, 2015, p. 11)

Sexual Abuse - "a sexual act that is committed or attempted by another person without freely given consent of the victim or against someone who is unable to consent or refuse" (Breiding, Basile, Smith, Black, & Mahendra, 2015, p. 11)

Neglect - failure by a caregiver to meet a child's basic physical, emotional, medical/dental, or

failure by the caregiver to ensure a child's safety within and outside the home given the child's emotional and developmental needs. Also, inadequate supervision and exposure to violent environments. (Leeb, Paulozzi, Melanson, Simon, & Arias, 2008, p. 11)

Intimate Partner Violence – " […] physical violence, sexual violence, stalking and psychological aggression (including coercive tactics) by current or former intimate partner (i.e., spouse, boyfriend/girlfriend, dating partner, or ongoing sexual partner)" (Breiding, Basile, Smith, Black, & Mahendra, 2015, p. 11)

Interpersonal Violence – "violence between individuals who are unrelated, and who may or may not know each other, generally taking place outside the home" (Krug et al., 2002, p. 6)

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