AMERICAN PSYCHOLOGICAL ASSOCIATION

Journal of Threat Assessment and Management

ISSN: 2169-4842

https://doi.org/10.1037/tam0000190

Violence in a Place of Healing: Weapons-Based Attacks in Health Care Facilities

Michelle C. Huffman[1] and Molly A. Amman[2]

[1] Department of Psychology, University of Nebraska Omaha

[2] Molly Amman Threat Assessment, West Des Moines, Iowa, United States

We examined 137 incidents of potentially lethal, weapon-enabled, targeted violence at health care facilities between 2008 and 2017 in the U.S. using open-source data. Individually held grievances by the perpetrator were commonly present. Perpetrators most commonly targeted one person, though collateral victimization did occur. Two thirds of cases involved at least one fatality. Firearm use outnumbered other forms of attack, followed distally by stabbing, blunt force trauma, and strangulation. Hospitals and residential care facilities represented the overwhelming majority of venues; patient rooms, main corridors/waiting areas, and parking areas were the most common locations of attack within facilities. Various attack characteristics, including weapon choice, perpetrator and victim relationship to the venue, incident location within a venue, were more frequently observed for certain motivations. Incidents involving an existing/former intimate relationship between the perpetrator and victim represented the largest proportion of cases. Preincident warning behaviors were most likely reported in cases motivated by disgruntlement with a perpetrator's own care or by intimate partner animus (IPA), and least likely in cases motivated by "mercy" or despondence over a loved one's health. These attacks usually continued until concluded by the perpetrator; perpetrator suicide occurred in a minority of cases. Potential mitigation measures are proposed for threat assessment professionals and facility staff.

Public Significance Statement

Our study revealed differences in perpetrator, attack, and victim characteristics based on motive for attack and expanded the current literature body on targeted attacks by including multiple types of health care facilities and weapons. The findings highlight unique vulnerabilities associated with each motive.

Keywords: targeted violence, health care, workplace violence, warning behaviors

Weapons-Based Violence in Health Care Settings

Acts of violence in various health care settings have increased in recent years (Bureau of Labor Statistics, 2020) and are perpetrated by current and former patients, visitors, employees, and those with no direct connection to the facility. Violent incidents take a significant physical and psychological toll on staff (Brophy et al., 2018; Gerberich et al., 2004) and are unsettling for the public. A clear understanding of the motives, vulnerable locations,

Michelle C. Huffman https://orcid.org/0000-0001-7984-7869

The authors wish to acknowledge contributions by Natalie Flora and Peter Molinaro to the coding protocol design. The authors have no known conflicts of interest to disclose.

Molly A. Amman conceived the study and designed the initial protocol. Molly A. Amman and Michelle C. Huffman revised the protocol, identified and coded cases using the developed protocol. Michelle C. Huffman developed the data analysis plan, managed the data, including quality control, and completed all analyses, tables, and figures. Molly A. Amman and Michelle C. Huffman drafted and revised the article. Michelle C. Huffman takes responsibility for the article as a whole.

Correspondence concerning this article should be addressed to Michelle C. Huffman, Department of Psychology, University of Nebraska Omaha, 6001 Dodge Street, Omaha, NE 68182, United States. Email: mhuffman@unomaha.edu

potential victims, and potential actors is critical to mitigate potential violence in health care settings.

Two studies, in particular, have explored the dynamics of shooting attacks in hospitals. In 2012, a team from Johns Hopkins published a study of 154 shootings occurring in hospitals between 2000 and 2011 (Kelen et al., 2012). Another analysis of hospital shootings occurring between 2012 and 2016 was published in 2019 (Wax et al., 2019). To date, no studies have compared instances of violence across the health care facility spectrum (e.g., nursing homes, clinics, dentist offices) and all forms of weapons.

Workplace Violence in Health Care Settings

In terms of health care facilities as workplaces, a commonly cited scheme for classifying workplace violence utilizes the relationship of the offender to the business and the victim: Type I (criminal intent by a stranger to the workplace with no legitimate reason for being there), Type II (aggression or violence from customers, clients, or patients), Type III (violence between coworkers), and Type IV (someone who typically has no relationship with the business but has or previously had a personal relationship with the victim; University of Iowa Injury Prevention Resarch Center [UIIPRC], 2001). Types II and IV are more commonly described in health care settings relative to Types I and III. Type II is said to occur in health care facilities with the greatest frequency, particularly when verbal aggression is included (Hahn et al., 2008; Hodgson et al., 2004; Lanza et al., 2006). Type II could be largely the domain of patient violence; when patient attacks were removed from a 2004 sample of Veteran's Health Administration (VHA) health care workers, they experienced a lower workplace violence rate compared with the general U.S. population (Hodgson et al., 2004).

Of the four categories of workplace violence, Type II is said to occur with the greatest frequency in health care settings (Hahn et al., 2008; Hodgson et al., 2004; Lanza et al., 2006), and several studies support this observation. For example, in a multisite sample of VHA hospital employees, measuring physical assaults against care providers, licensed practical nurses, registered nurses, and nursing assistants represented the highest proportion of employees who had been victims of such violence in the workplace. Departments with the highest rates of attacks included mental health, geriatrics, nursing, and police/security. However, when patient attacks were removed from the sample, VHA health care workers experienced a lower workplace violence rate compared with the general U.S. population (Hodgson et al., 2004). Provider–patient interactions were the most common trigger for patient attacks, whereas violence between coworkers (Type III) was more likely to result from disputes about work. Victims of assault by other coworkers were younger, non-White, and came from lower pay grades, such as nursing aides (Hodgson et al., 2004).

In general hospitals, violence from patients and visitors ranges from verbal aggression to physical attack and most commonly occurs in emergency departments (EDs), patient rooms, surgical areas, and intensive care units (Hahn et al., 2008; Kowalenko et al., 2005). Triggers for patient aggression or violence include dissatisfaction with or not understanding treatment, physical contact from a health care provider that was painful or in an intimate area, and enforced care or treatment (Hahn et al., 2008). Health care employees who had experienced nonphysical violence (e.g., verbal aggression or threats) were more likely to also have experienced physical violence (Lanza et al., 2006).

One unique form of health care violence is that of so-called "mercy killings." These incidents typically involve the murder–suicide of an older couple. Observers of workplace violence tend to consider violence perpetrated by relatives of patients as Type II (Denenberg & Denenberg, 2008). The U.S. Centers for Disease Control and Prevention defines a mercy killing as a scenario in which a "decedent wished to die because of terminal or hopeless disease or condition, and documentation indicates that the decedent wanted to be killed" (Centers for Disease Control & Prevention, 2021). True mercy killings meeting this definition are demonstrated to be rare (Salari & Sillito, 2016). Such killings do not neatly fit into the four-category classification, as discussed infra. Characteristics of "mercy killings" have previously been documented and compared with other forms of spousal homicide (Salari & Sillito, 2016). However, it is less clear how these attacks specifically play out in health care facilities, including locations of attack, warning behaviors, and the presence of grievance. A fuller understanding of mercy killings can be used to develop practical mitigation strategies.

Type IV incidents in health care settings typically involve intimate partner violence (IPV), in which a current or former significant other seeks to harm someone at the business, usually thought of as an employee. Incidents of intimate partner violence in the workplace result in increased health care costs, mental health expenses, Family Medical Leave Act utilization, reduced work performance due to distractibility and exhaustion, and lost productivity (LaVan et al., 2012; Tiesman et al., 2012; Wathen et al., 2015). Victims of intimate partner violence experience harassing phone calls, tests, or emails from their abuser; risk of their abuser appearing at the workplace; stalking while at work; and the abuser contacting coworkers or supervisors about the victim (Wathen et al., 2015). A large proportion of female homicide victims in the workplace are victims of intimate partner violence, particularly for women between the ages of 25 and 44. The majority of IPV homicides at the workplace occur in parking lots and public buildings (Tiesman et al., 2012).

The UIIPRC Types I–IV classification solely considers the relationship between the offender and the facility; it does not necessarily consider the goal or underlying grievance triggering the attack. Although commonly used as a frame of reference, it may not capture the various motivations that propel individuals to commit violent acts in health care settings and therefore its utility may be limited for security planning and threat assessment purposes. For example, an employee engaged in a romantic relationship with another employee might perpetrate an intimate partner homicide at the workplace. Under the UIIPRC classification, this scenario could fall under Type II (partner is a patient), Type III (partner is a coworker), or Type IV (partner is neither) workplace violence, thereby potentially confusing attempts to track intimate partner homicides using the UIIPRC schema. Attacks with arguably different motivations could also be classified in the same group under the UIIPRC as well. For instance, an inmate patient attacking a doctor in an attempt to flee custody would be in the same Type II category as a patient who kills their doctor because they feel their care has been inadequate. Thus, the UIIPRC classification may not be the best approach for classifying workplace violence for the purposes of threat assessment.

To best aid the threat assessment process, a classification system based on motive may serve as the best reference point for describing attack characteristics. In our experience, motive is very often deeply intertwined with grievance, and grievance is where a majority of targeted attacks begin. In threat assessment, assessors often view cases primarily through the lens of motive and grievance.

Warning Signs of Impending Health Care Violence

Preevent indicators are potentially observable signs that can serve as a warning of advancing threat. Identifying individuals on a trajectory toward violence is a major goal of identifying distal risk factors, proximal warning behaviors, and other signs of concern (collectively, "warning signs"). Research regarding warning signs is relatively plentiful for certain venues, such as school attacks (Mohandie & Meloy, 2014; Polanin et al., 2021), higher educational institutions (Deisinger et al., 2014; Drysdale et al., 2013), or workplace generally (Rugala & Isaacs, 2002; White, 2021), but health care settings have received relatively lesser attention. We did not identify any studies to date comprehensively exploring warning signs prior to attacks in health care settings or comparisons between motivations.

Generally, research supports an increasingly common model of assessing distal risk factors and proximal warning behaviors in the effort to determine an appropriate level of violence concern and manage a would-be offender away from a violent decision point (Amman et al., 2017; Meloy et al., 2011, 2014). Some risk factors include violent history of substance abuse or dependence, history of certain mental disorder, history of suicidality, weapons experience and access, problematic behavioral history including menacing behaviors and violation of limits and boundaries, and a variety of negative environmental factors (Amman et al., 2017). These vulnerabilities do not stand alone to forewarn of violence but rather have been aptly compared to dark clouds on the distant horizon that may, or may never, eventually shed rain (Meloy, 2021). Warning behaviors include "pathway to violence" warning behavior (Calhoun & Weston, 2003), fixation warning behavior, identification warning behavior, novel aggression, energy burst warning behavior, "leakage," directly communicated threats, approach behavior, end-of-life planning, and last resort warning behavior (Amman et al., 2017; Meloy et al., 2014). When they are observed, proximal warning behaviors

should be regarded as a pattern of accelerating risk of violence. The clouds are overhead and it looks like rain (Meloy, 2021).

Certain proximal behaviors have emerged of late as strong correlates of planned violence. In the case of school attacks, the most salient risk factor for future violence is leakage (Meloy, Hoffman, Bibeau, & Guldimann, 2021). Leakage occurs when an individual intentionally or unintentionally reveals intent to harm via any expressive means other than a direct threat (Amman et al., 2017). Pathway to violence, identification, and last resort warning behaviors have been shown to discriminate between perpetrators and nonperpetrators in the realm of terrorism (Meloy et al., 2018). Proximal warning behaviors also form a cluster among perpetrators as opposed to nonperpetrators in multidimensional scaling analysis (Goodwill & Meloy, 2019). To our knowledge, distal risk factors and proximal warning behaviors have not been systematically described in the context of health care facility incidents of planned violence.

The Present Study

In addition to a dearth of research on warning signs exhibited prior to attacks in health care facilities, there is little describing the characteristics of attacks conducted for various motivations for attack. It is similarly unclear how well the motivations for attacks in health care settings fit into the four-type classification system of workplace violence. Additionally, much of the research on physical violence in health care settings focuses on hospitals and shooting incidents. Less is known about lethal force incidents in other facilities, such as clinics, nursing or assisted living facilities, psychiatric hospitals, and ambulatory surgical centers. Other forms of attack, such as stabbings, beatings with blunt instruments, or strangulation, have also received little attention. Our study aimed to describe offender, victim, and attack characteristics across various motivations for attacks and across different health care facilities.

Method

Cases of weapons-based attacks against health care facilities were extracted from news articles and videos from television, newspaper, and magazine websites. Articles were located using LexisNexis and public internet search engines (e.g., Google, Bing). For some cases, publicly available collateral materials, in the form of court documents, mental health assessments, and/or police/law enforcement (LE) reports, were also located during the course of open searches and used for this study. Incidents occurring in the 10-year time span between January 1, 2008, and December 31, 2017, were included if they occurred on the grounds of a health care facility, defined as hospitals, standalone medical clinics, nursing/assisted living facilities, psychiatric hospitals, military/VHA hospitals and clinics, rehabilitation facilities, urgent care centers, ambulatory surgery centers, and physician/dental/chiropractic offices. To meet the inclusion threshold, the perpetrator had to employ or attempt to employ lethal force, meaning the nature and degree of force used had the potential to kill. The perpetrator had to use or attempt to use at least one weapon (e.g., firearm, bladed weapon, heavy object) in the course of the attack. If the perpetrator used their fists or feet as part of the attack (e.g., punching, kicking, stomping), this was coded secondary to a primary weapon (e.g., firearm, bladed weapon, heavy object).

The target(s) or class of target(s) had to be selected prior to executing the attack. This requirement is inherent in the understanding of targeted violence but does not necessarily mean that a significant period of time needs to have elapsed between selection and action. In some cases, the temporal space between decision to attack and action was quite short. A key requirement for the authors was whether any intervening action or deliberate inaction occurred between the decision to attack and the attack itself, so as to support the idea that the perpetrator selected a target, and then, as a separate action, carried out the attack. Thus, instances in which the perpetrator acted on impulse or attacked at random were excluded. In attempting to identify cases involving target preselection, we did not attempt to align with, or even discover, legal distinctions of mental state such as between murder in the first degree, which typically requires a legal determination of premeditation, and "lesser" charges of murder, which may not involve premeditation; since premeditation generally carries no temporal requirement, we did not find such distinctions relevant for the purpose of this study.

Incidents were excluded if the violence occurred in the context of crime for financial gain (e.g., robbery, carjacking), gang- or drug-related violence, sexual assaults, serial offenders (e.g., rapes, assaults, killings), murder-for-hire

schemes, and incidents arising from social disorder (e.g., protesting, rioting). Accidental weapon discharges and events in which the sole intention was suicide were excluded, along with incidents of exclusively verbal or nonphysical aggression.

A total of 137 incidents met criteria for inclusion in the study. All cases were coded independently by both authors, with discrepancies resolved through discussion and consensus. Attack location was characterized by facility type, city and state of facility, bed count, and location within the facility where the attack occurred. Perpetrator-related variables included demographics, known (directly stated or reported in materials) or suspected (symptoms of mental illness described in materials), mental health and substance use history, history of aggressive or violent behavior, and perpetrator's relationship to the facility. To determine known or suspected history of mental illness, we adopted the definition of mental disorder found in the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed., Text Revision): "A mental disorder is a syndrome characterized by clinically significant disturbance in an individual's cognition, emotion regulation, or behavior that reflects a dysfunction in the psychological, biological, or developmental processes underlying mental function. Mental disorders are usually associated with significant distress or disability in social, occupational, or other important activities" American Psychiatric Association, 2022, p. 14). Cases for which news articles reported any type of mental illness meeting this definition were coded for the known or suspected presence of mental illness. If a source indicated the offender was formally diagnosed with a specific *DSM* disorder, this was coded as "known history of mental illness." If a source discussed symptoms consistent with our definition, this was coded as "suspected history of mental illness." Separately, we coded psychosis/mental illness as a motivational category where the reporting specified that the mental illness itself appeared to drive the attack.

Each attack was classified by the type of weapon used, number of wounded and killed (excluding perpetrator), number of targeted versus collateral victims, relationship of victim to facility (e.g., physician, nurse, visitor, patient), hostage taking, presence of additional weapons, presence of quantities of ammunition significantly beyond what would ordinarily be necessary to carry out an attack against the chosen target, whether the attack was stopped and by whom, and if a suicide note or communication functioning as a lasting testament of grievance was found (defined as any communication intending to provide a lasting testimonial of grievance or motivation for behavior).

Perpetrator outcome was described based on whether the perpetrator was known to be deceased or survived. If the perpetrator was known to be deceased, we coded the manner of death (e.g., natural death after the attack, suicide during or after the attack, killed by law enforcement during or after the attack), and whether there was any indication of suicide by cop. Suicide by cop was coded when a perpetrator was killed by law enforcement or armed security after demonstrating behavior consistent with an intent to precipitate the use of such deadly force toward that individual (Mohandie & Meloy, 2000). If the perpetrator was not deceased, we coded whether the perpetrator was nonfatally injured during the attack and the legal outcome (e.g., pled guilty/convicted at trial, found incompetent to stand trial, not guilty by reason of insanity [NGRI]).

Using the motivations identified by Kelen et al. (2012) as an initial framework, we created a classification of the motives substantially present in our sample. Our classification system utilized an operational perspective and was based on common-language definitions describing the primary or overarching reason for attack. Motivations established in the reporting included mercy killing or despondence over the poor health of a spouse or loved one (hereinafter "mercy/despondence"), argument/dispute, intimate partner animus (IPA), pending or recent termination of employment, revenge, inmate escape, patient or loved one disgruntled with care, and psychosis/mental illness. Our classification encompassed many of the same or similarly named categories as Kelen et al. (2012) and Wax et al. (2019), along with other observed motivations in our sample, specifically revenge (grudge), mercy killing or despondence over the health of a loved one (ill relative), escape attempt, and psychosis/mental illness. Based on the motivations described in the articles, documents, and videos for each case, we added the categories of argument/dispute; intimate partner animus; pending or recent termination of employment; and patient, or loved one of a patient, disgruntled with care. Multiple motivations could be selected for an individual case. See Table 1 for descriptions and examples of each motivation.

In describing incident variables including motive, our reporting sources cited to interviews with coworkers, close friends, or family; law

Table 1
Definition and Example of Motivations in Sample

Motivation	Definition	Example
Mercy/despondence	The individual perceives a loved one to be suffering or seriously ill *and* decides to kill the person out of a sense of ending the person's suffering. Or, the individual feels hopeless about the medical status of their loved one, knowing or fearing they will not recover in a meaningful way.	An elderly man shot and killed his wife in her hospital bed before shooting himself. He left a note stating his actions were a mercy killing; his wife suffered a stroke and he feared she would not improve (Spoto, 2008).
Argument/dispute	The individual has recently gotten into an argument or dispute with the victim(s) and decides to attack in response to the argument or dispute.	A man's wife was in the hospital, but decision-making authority over her care rested with his nephew. When the nephew decided the husband could not stay with his wife at the hospital, the husband shot the nephew (Martin, 2012).
Patient disgruntled with care	The individual is dissatisfied or angry about medical care they have received. The medical care could have occurred recently or in the past.	A patient received a double kidney–liver transplant several years prior and believed the transplant was failing. The patient shot and killed the doctor who performed the transplant in the parking lot of the hospital (Nelson & Dolak, 2011).
Disgruntlement of care of loved one	The individual is dissatisfied or angry about medical care their loved one(s) have received. The medical care could have occurred recently or in the past.	A man entered a hospital looking for a nurse who treated his mother, who died 3 years earlier. The man followed the nurse into a room, confronted him stating, "Do you remember me? Do you remember my mother?" and shot and killed the nurse. The man then shot a secretary who emerged to determine what was occurring. The man went to his car and shot another driver before being shot himself by a plain clothes officer (Brumback, 2008).
Inmate escape	Individual is receiving medical care while in custody of law enforcement/prison staff. The individual uses the opportunity to attempt to escape from custody.	An inmate receiving hospital treatment overpowered the guards in his hospital room and took a guard's weapon. He briefly held a guard hostage, ran out of the hospital, carjacked a bystander, and fled. He was later shot and killed by police. The inmate had written letters to his daughter and mother stating he did not want to die in prison (Manning, 2008).
Termination of employment	The individual has recently been terminated or discovered they will be terminated, or perceives they will be terminated in the near future. The attack is in response to the perceived or actual recent or pending termination.	A former employee returned to the hospital from which he was fired the day prior. He went to the office area and shot and killed a former supervisor. He then went to the imaging area and shot another former supervisor. He went to the main hallway and attempted to shoot a third former supervisor. He engaged police in a standoff before shooting himself in the chest (Halpin, 2009).
Revenge	The individual attacks to "get even" at victim(s) they perceive has wronged them. The perceived wrong could be a recent grievance or one that occurred in the distant past.	An employee was given a poor performance review and subsequently denied a raise. His work schedule was changed, which prevented him from working a second job. The employee stabbed his supervisor over 70 times in the boiler room of the hospital. In court, another supervisor testified that the attacker stated, "I was going to get that [expletive]" (Morse, 2011).
Intimate partner animus (IPA)	The individual holds a hostile or malevolent animus toward a current or former intimate. The decision to attack appears to	A gunman entered a nursing home looking for his estranged wife, a nurse at the facility, who had left him 2 weeks prior. Unable to find his

(*table continues*)

Table 1 (*continued*)

Motivation	Definition	Example
	be exclusively and inextricably intertwined with the existence of the current or previous intimate relationship itself.	estranged wife, he began shooting residents at random. He killed seven residents and a nurse. The gunman was shot in the shoulder and chest by a police officer, which stopped the attack. A series of notes and unsent letters articulating despair over being left by his estranged wife and a desire to "end it" were found after the attack (Breen, 2011).
Psychosis/mental illness	The individual is actively experiencing psychotic symptoms, which directly impacts their cognition and decision-making abilities. The psychosis/altered cognition itself was reported to have been the primary driving factor behind the decisions to attack.	A former patient believed he had a tracking chip implanted in him during an appendectomy. He took a taxi to the hospital and asked for the doctor who completed the surgery. When he could not locate the doctor, he went back to the taxi, went to the discharge area of the hospital, and opened fire, killing one and wounding two before suiciding. He had previously been hospitalized for psychotic symptoms and had stopped taking his antipsychotic medication (Lakin, 2011).

enforcement investigations; court documents; mental health assessments; interviews/statements of the perpetrator; and suicide notes/manifestos located after the attack. The authors used a plain reading of each report to assess the presence of all variables, including motive. In instances when the motivation was unclear, the authors erred on the side of caution and coded the motivation as "unknown," such as when reporting was deemed too scant for confidence in the judgment of the authors, when conflicting information about the motive was present, if a statement about motive appeared to be based upon speculation, or if the source declaring the motivation would not reliably have knowledge as to the motivation (e.g., a bystander or witness, a neighbor who did not know the offender, hearsay from another employee).

In addition to identifying motivations for each case, we also determined whether the perpetrator had an individually held grievance that contributed to the attack. An individually held grievance was defined as a deeply felt sense of having been wronged or the victim of injustice at the hand of another. In cases with a grievance, we also coded for the focus of the grievance to include physicians, nurses, nonmedical staff, visitors, patients, and the institution itself. It should be noted that the grievance did not need to be based on reality; for some cases, the grievance was clearly part of a delusional belief system. We did not make distinctions between grievances that were part of a delusional belief versus those rooted in reality or actual events.

Finally, we ascertained whether warning signs were reportedly observed by others prior to the attack. Pathway to violence behavior was coded when any phase (grievance, violent ideation, research and planning, preparation, or security probing or breaching) was identified. Fixation warning behavior was defined as a pathological preoccupation with a target or a cause. Identification warning behavior occurred when a perpetrator adopted a warrior mentality, identified with previous attacks or perpetrators, adopted a police or military persona, or demonstrated some other indicia of maladaptive psychological identification related to violence. Energy burst warning behavior was coded when a significant increase in activity frequency or intensity, related to a target, was reported prior to the index attack. Leakage warning behavior was defined as any expression of an intent or desire to harm other than a direct threat to the target or authorities. Last resort warning behavior referred to recorded behaviors consistent with increased desperation, a feeling that violence was imperative or justified, or that time was running out. Directly communicated threats, inappropriate emotional affect, novel aggression (experimental or self-testing aggression), end-of-life planning (e.g., updating estate documents, giving away possessions), and previous suicide attempts were also recorded.

Data Analysis

Data were summarized using descriptive statistics, including counts, percentages, and contingency tables. Due to the small sample size and the number of cells within contingency tables with fewer than five cases, chi-squared testing was not possible. The small sample size within cells also warrants caution when interpreting the percentages. It should also be noted that many of the percentages add to more than 100% throughout the results because multiple items could be selected, such as for motivations and locations within facilities.

A one-way analysis of variance (ANOVA) with Tukey HSD post hoc analysis was used to examine age differences based on motivation.

Because the data are publicly available and no interactions with human subjects occurred at any time, the present study was exempt from IRB review.

Results

Motivation

The most commonly identified motive was intimate partner animus ($n = 27$, 19.71%), followed by mercy/despondence attacks ($n = 21$, 15.33%). Psychosis/mental illness and argument/dispute attacks both had 15 (10.95%) cases. Less frequently, attacks were motivated by revenge ($n = 13$, 9.49%), patient disgruntled with care ($n = 8$, 5.84%), inmate escape ($n = 7$, 5.11%), disgruntlement with care of loved one ($n = 5$, 3.65%), and termination or impending termination of employment ($n = 5$, 3.65%). In eight (5.84%) cases, the motive was classified as "other"; within this category, motivations included fear that a victim child would be placed in foster care, financial difficulties, abortion extremism, despondence over own failing health, a victim ignoring the perpetrator's romantic advances, a business deal gone bad, a suicide pact, and a patient attempting to leave alcohol withdrawal treatment. The motive was unknown in about one quarter of the cases ($n = 32$, 23.36%). Nineteen (13.87%) cases had multiple identified motivations; because cases could have multiple motivations, the percentages throughout the results add to more than 100%.

Presence of Individually Held Grievance

Nearly half of attacks ($n = 64$, 46.72%) were fueled by an identifiable individually held grievance. No grievance was present in 38 cases (27.74%), and the presence of a grievance was unknown or unclear in 35 cases (25.55%). In attacks with an identified individually held grievance, nonmedical staff were the most common focus of grievance ($n = 15$, 23.44%), followed by physicians ($n = 13$, 20.31%), visitors, patients, and nurses/certified nursing assistants (CNAs; $n = 10$, 15.63% for each). The medical institution itself was the focus of grievance in three cases (4.69%); a pharmacist was the focus in one case (1.56%). The focus of the primary grievance was unclear in two (3.13%) cases.

Attacks motivated by disgruntlement with care ($n = 8$, 100%), disgruntlement with care of a loved one ($n = 5$, 100%), revenge ($n = 13$, 100%), intimate partner animus ($n = 24$, 88.89%), arguments/disputes ($n = 11$, 73.33%), and termination of employment ($n = 3$, 60.00%) had the highest proportions of perpetrators with an individually held grievance that contributed to the attack. For those disgruntled with their own care or with the care of a loved one, physicians were the most common target ($n = 5$, 62.50% and $n = 3$, 60.00% for each, respectively; it should be noted that in one case, the perpetrator held a grievance against the doctor who performed a procedure several years prior, but targeted any doctors at the facility where the procedure took place; two doctors not directly involved in the perpetrator's care were shot during the attack. The doctor who performed the procedure was not present during the attack.).

The majority of targets of revenge-motivated attacks were patients ($n = 6$, 46.15% of revenge-motivated attacks), followed by nonmedical staff ($n = 3$, 23.08%), physicians ($n = 15.38\%$), nurses/CNA, and visitors ($n = 1$, 7.69% for each, respectively).

Targets of intimate partner animus-motivated attacks included nonmedical staff ($n = 9$, 33.33% of intimate partner animus-motivated attacks), nurses/CNAs ($n = 7$, 25.93%), visitors ($n = 5$, 18.52%), patients ($n = 2$, 7.41%), and physicians ($n = 1$, 3.70%).

The most common targets of argument/dispute attacks were visitors ($n = 5$, 33.33% of argument/dispute attacks), and less often nurses/CNAs, patients ($n = 2$, 13.33% for each, respectively), physicians, and nonmedical staff ($n = 1$, 6.7% for each, respectively).

Nonmedical staff were most commonly targeted for termination of employment-motivated

attacks ($n = 2$, 40.00% of termination-motivated cases), as well as physicians ($n = 1$, 20.00%).

Least likely to harbor a grievance were those motivated by inmate escape ($n = 0$) and mercy/despondence ($n = 1$, 4.76%). In the one mercy/despondence-motivated attack with a grievance, the target of the grievance was a physician.

An individually held grievance was identified in about half of the cases motivated by psychosis ($n = 8$, 53.33%). Targets included the institution itself ($n = 3$, 20.00% of those motivated by psychosis/mental illness), patients, physicians ($n = 2$, 13.33% for each, respectively), and nonmedical staff ($n = 1$, 6.67%). See Table 2 for a breakdown of the presence of individually held grievances by motivation.

Relationship to Facility and Locations of Attack

Offenders with any close or familial relationship to a patient or employee represented the greatest threat, numbering 103 or 75% of total cases. Most frequently, the perpetrator was a loved one ($n = 47$, 34.31%) or acquaintance ($n = 5$, 3.65%) of a current or former patient at the facility. Current or former patients were themselves the perpetrators in 39 (28.47%) cases. Current or former employees were the perpetrators in 16 (11.68%) cases; loved ones or acquaintances of current or former employees of the facility were the perpetrator in 24 (17.52%) cases. In five (3.65%) attacks, the perpetrator had no current or prior relationship to the facility. The relationship between the perpetrator and the facility was unknown or unclear in two (1.46%) cases. In four (2.92%) attacks, the relationship between the perpetrator and facility was classified as "other"; in these instances, the perpetrator had an indirect relationship with the facility, such as an employee of a contracted medical transportation company, a nonpatient seeking pain medication for lupus, an ex-loved one of a visitor, and an ex-loved one of the victim's current romantic partner who worked at the facility.

About half of attacks occurred in hospitals ($n = 72$, 52.55%). Forty-eight (35.04%) attacks occurred in nursing homes/assisted living/hospice facilities. A small number occurred in doctor's offices/clinics ($n = 11$, 8.03%), military/veteran's hospitals ($n = 3$, 2.19%), two (1.46%) at psychiatric hospitals, and one (0.73%) at an ambulatory/surgical center.

Within facilities, patient/exam rooms were the most common location of attack ($n = 60$, 43.80%), followed by main corridors/hallways/waiting areas ($n = 28$, 20.44%), and parking lots/garages ($n = 27$, 19.71%). Less frequently, attacks occurred in emergency departments ($n = 6$, 4.38%), office/administrative areas ($n = 4$, 2.92%), cafeterias/break rooms ($n = 4$, 2.92%), nursing stations ($n = 3$, 2.19%), laboratories/operating rooms/sensitive areas ($n = 3$, 2.19%), other exterior campus areas ($n = 2$, 1.46%), and pharmacies ($n = 1$,0.73%). Eleven (8.03%) attacks involved other locations (e.g., maintenance building, boiler room, surgery wing, outside of door to emergency department, and off-site locations as part of spree attacks). The location of attack was unknown or unclear in 11 (8.03%) cases. It should be noted that 21 attacks (15.33%) involved multiple locations; thus, the total percentage of locations within facilities adds to more than 100%. Additionally, five attacks (3.65%) were described as spree attacks, or having other locations of attack off facility grounds (e.g., in one case, the perpetrator killed his wife at home before going to a nursing facility to kill his sister); a spree was identified when two more attacks were conducted at separate locations with almost no time in between them beyond what was required for transit.

Attacker Relationship to Facility and Location of Attack by Motivation

Mercy/despondence attacks were all committed by loved ones of current/former patients and occurred in hospitals ($n = 13$, 61.90% of mercy/despondence attacks) and nursing/assisted living facilities ($n = 8$, 38.10%). All mercy/despondence attacks occurred in patient rooms. Two (9.52%) mercy/despondence attacks included additional off-site locations (e.g., perpetrator's house) as part of spree offenses. One (4.76%) also had a secondary location of main corridors/waiting areas.

Argument/dispute attacks were committed by loved ones/acquaintances of current/former patients ($n = 5$, 33.33% of argument/dispute attacks), current/former patients ($n = 3$, 20.00%), and by current/former employees ($n = 4$, 26.67%). The majority of argument/dispute attacks occurred at hospitals ($n = 7$, 46.67%) and nursing/assisted living facilities ($n = 6$, 40.00%), followed by clinics/doctor's offices ($n = 2$,

Table 2
Presence of Individually Held Grievance by Motivation

	Motivation											
Individually held grievance	Mercy/ despondence $N = 21$ (15.3%)	Argument/ dispute $N = 15$ (11.0%)	Disgruntled with care $N = 8$ (5.8%)	Disgruntled w/care of loved one $N = 5$ (3.6%)	Inmate escape $N = 7$ (5.1%)	Termination of employment $N = 5$ (3.6%)	Revenge $N = 13$ (9.5%)	IPA $N = 27$ (19.7%)	Psychosis/ mental illness $N = 15$ (10.9%)	Other $N = 8$ (8.5%)	Unknown $N = 32$ (23.4%)	Total% $N = 137$
Yes	1 (4.8%)	11 (73.3%)	8 (100%)	5 (100%)	0	3 (60.0%)	13 (100%)	24 (88.9%)	8 (53.3%)	3 (37.5%)	1 (3.1%)	64 (46.7%)
1. Physician	1 (4.8%)	1 (6.7%)	5 (62.5%)	3 (60.0%)	0	1 (20.0%)	2 (15.4%)	1 (3.7%)	2 (13.3%)	1 (12.5%)	0	13 (9.5%)
2. Pharmacist	0	0	0	0	0	0	0	0	0	1 (12.5%)	0	1 (0.7%)
3. Nurse/CNA	0	2 (13.3%)	0	1 (20.0%)	0	0	1 (7.7%)	7 (25.9%)	0	0	0	10 (7.3%)
4. Nonmedical staff	0	1 (6.7%)	0	0	0	2 (40.0%)	3 (23.1%)	9 (33.3%)	1 (6.7%)	0	0	15 (10.9%)
5. Patient	0	2 (13.3%)	0	0	0	0	6 (46.2%)	2 (7.4%)	2 (13.3%)	0	1 (3.1%)	10 (7.3%)
6. Visitor	0	5 (33.3%)	0	0	0	0	1 (7.7%)	5 (18.5%)	0	0	0	10 (7.3%)
7. Institution	0	0	2 (25.0%)	0	0	0	0	0	3 (20.0%)	1 (12.5%)	0	3 (2.2%)
8. Unknown/unclear	0	0	1 (12.5%)	1 (20.0%)	0	0	0	0	0	0	0	2 (1.5%)
No	20 (95.2%)	2 (13.3%)	0	0	7 (100%)	1 (20.0%)	0	0	3 (20.0%)	5 (62.5%)	4 (12.5%)	38 (27.7%)
Unknown	0	2 (13.3%)	0	0	0	1 (20.0%)	0	3 (11.1%)	4 (26.7%)	0	27 (84.4%)	35 (25.5%)

Note. Percentages for motivations add to more than 100%, as some cases have multiple motivations. IPA = intimate partner animus; CNA = certified nursing assistants.

13.33%). Argument/dispute attacks occurred in a variety of locations within facilities, including parking garages ($n = 5$, 33.33%), patient/exam rooms ($n = 4$, 26.67%), main corridors/hallways ($n = 2$, 13.33%), emergency department, cafeteria, and office/administrative areas ($n = 1$, 6.67% for each). One (6.67%) attack had a secondary location of a relative's house and was classified as a spree attack.

Patients who were disgruntled with their care were current or former patients ($n = 7$, 87.50% of cases of disgruntlement with one's own care), with one (12.50%) who was also a former employee. In one case, the perpetrator was both a current patient and the spouse of a former employee. Most attacks by patients disgruntled with their care occurred at hospitals ($n = 5$, 62.50%), with the remaining cases taking place at clinics/doctor's offices, psychiatric hospitals, and military/veteran's hospital ($n = 1$, 12.50% for each). Within the facilities, such attacks occurred in patient/exam rooms, main corridors/hallways, emergency departments ($n = 2$, 25.00%), parking lots/garages, and office/administrative areas ($n = 1$, 12.50% each).

Loved ones of current/former patients perpetrated all attacks motivated by disgruntlement with the care of a loved one, with the large majority occurring at hospitals ($n = 4$, 80.00%) and one (20.00%) at a clinic/doctor's office. Within the facilities, such attacks took place in patient/exam rooms, main corridors/hallways ($n = 3$, 60.0% each), and parking lots/garages ($n = 2$, 40.00%).

Inmate escape attacks were all committed by current patients at hospitals. Most inmate escapes started in patient rooms ($n = 4$, 57.14% of inmate escapes) and moved into a secondary location, including main corridors/hallways ($n = 1$, 14.29%), parking lots/garages ($n = 1$, 14.29%), or other locations within the facility ($n = 2$, 28.57%; a surgery wing and a bathroom in a patient wing). One inmate escape attack occurred in the emergency department.

All attacks resulting from termination from employment were perpetrated by current/former employees and occurred at hospitals. Within the facilities, areas of attack included main corridors/hallways ($n = 2$, 40.00%), emergency department, cafeteria, office/administrative area, a general clinic area in a hospital, and a maintenance building ($n = 1$, 20.00% for each).

Revenge attacks were committed by current/former patients ($n = 5$, 38.46% of revenge attacks), loved ones of current/former patients ($n = 5$, 38.46%), and current/former employees ($n = 3$, 23.08%), and occurred primarily at hospitals ($n = 7$, 53.85%) and nursing/assisted living facilities ($n = 5$, 38.46%). One revenge attack (7.69%) occurred at a military/veteran's facility. Within facilities, revenge attacks took place in patient/exam rooms ($n = 3$, 23.08%), main corridors/hallways, office/administrative areas ($n = 2$, 15.38% for each), parking lots/garages, emergency departments, labs/operating areas/sensitive areas, and a boiler room ($n = 1$, 7.69% for each). One (7.69%) revenge attack was classified as a spree attack, with the perpetrator going to the home of two victims immediately after killing another victim at the hospital.

Intimate partner animus-motivated attacks were committed predominately by loved ones of current or former employees ($n = 17$, 62.96% of intimate partner animus-motivated attacks), followed by loved ones of current/former patients, acquaintances of current/former patients, and current/former employees ($n = 3$, 11.11% for each). Hospitals were the most common venue ($n = 17$, 62.96%) for intimate partner animus-motivated attacks, followed by nursing/assisted living facilities ($n = 7$, 25.93%), and clinics/doctor's offices ($n = 3$, 11.11%). Attacks motivated by intimate partner animus most commonly occurred in parking lots/garages ($n = 13$, 48.15%), followed by main corridors/hallways ($n = 8$, 29.63%), and patient rooms ($n = 5$, 18.52%). Less commonly, attacks occurred in other locations of the facility, to include nurse's station ($n = 2$, 7.41%), an outdoor smoking area, and a presurgical area ($n = 1$, 3.70% for each, respectively). One intimate partner animus-motivated attack was a spree attack; after shooting one victim at the hospital, the perpetrator went to a relative's house, shot two additional victims, and took a third victim hostage.

Psychosis/mental illness-motivated attacks were primarily perpetrated by current/former patients ($n = 9$, 60.00% of psychosis/mental illness-motivated attacks). Two (13.33%) were committed by acquaintances of current employees, one (6.67%) by a former employee, and one (6.67%) by a loved one of a current patient. Two (13.33%) perpetrators motivated by psychosis/mental illness had no current or prior relationship to the facility. Psychosis/mental illness-motivated attacks occurred at hospitals ($n = 7$, 46.67%), nursing/assisted living facilities ($n = 4$, 26.67%),

clinics/doctor's offices ($n = 2$, 13.33%), psychiatric hospitals, and military/veteran's facilities ($n = 1$, 6.67% for each); such attacks occurred in various areas of the facility, but most frequently occurred in patient rooms ($n = 5$, 33.33%) and main corridors/hallways ($n = 4$, 26.67%). See Table 3 for breakdown of facility and location of attack by motivation.

Demographics of Perpetrator

Age

The large majority of attacks were committed by males ($n = 125$, 91.24%; females: $n = 12$, 8.76%). The median age for perpetrators was 50 years, with an average of 52.70 ± 18.38 (95% CI [49.59, 55.81]). Perpetrators who committed a mercy/despondence attack were significantly older (71.19 ± 16.38 years, 95% CI [64.19, 78.19]) than those who attacked due to psychosis/mental illness (43.27 ± 11.58 years, 95% CI [37.40, 49.13]), intimate partner animus (43.78 ± 10.40 years, 95% CI [39.86, 47.70]), inmate escape (39.83 ± 10.01 years, 95% CI [31.82, 47.84]), and for unknown motivation (49.63 ± 20.33 years, 95% CI [42.39, 56.88]). There were no differences in age between attackers motivated by an argument/dispute (57.13 ± 19.57 years, 95% CI [47.23, 67.03]), disgruntlement with one's care (51.88 ± 19.28 years, 95% CI [38.51, 65.24]), disgruntlement with care of loved one (50.80 ± 9.20 years, 95% CI [42.73, 58.87]), termination of employment (49.40 ± 9.66 years, 95% CI [40.93, 57.87]), revenge (53.92 ± 20.08 years, 95% CI [43.01, 64.84]), and other motivations, 54.75 ± 12.02 years, 95% CI [46.42, 63.08]; omnibus: $F(10, 142) = 4.49$, $p < .001$.

History of Mental Illness

The perpetrator had a reported/known or suspected history of mental illness in about one third of cases ($n = 44$, 32.12%), although mental health history was unknown in nearly half of cases ($n = 62$, 45.26%). Attacks motivated by psychosis and disgruntlement with care had the highest proportion of perpetrators with a reported/known or suspected history of mental illness (100% and 62.50% of each, respectively). Mercy/despondence attacks and those motivated by disgruntlement with the care of a loved one had the lowest proportion of perpetrators with a reported/known or suspected history of mental illness (9.52% and 0%, respectively; see Table 4).

History of Substance Use

Substance use history was unknown for a majority of the perpetrators ($n = 82$, 59.85%). Twenty-one (15.33%) perpetrators had a known history of substance use and were most likely to be associated with attacks motivated by inmate escapes ($n = 3$, 42.86%), termination of employment ($n = 2$, 40.00%), and disgruntlement with care ($n = 3$, 37.50%). Perpetrators were known to be under the influence of drugs or alcohol at the time of attack in seven (5.11%) cases. However, this was unknown in a majority of cases ($n = 93$, 67.88%; see Table 4).

History of Violent, Aggressive, or Abusive Behavior

Perpetrators had a known history of violence/aggression/abusive behavior in less than one third of cases ($n = 40$, 29.20%). Perpetrators motivated by intimate partner animus, psychosis, and inmate escape were the most likely to have a history of violence/aggression/abusive behavior (59.26%, 46.67%, and 71.43% within each motivation, respectively). The perpetrator's history of violence/aggression/abusive behavior was unknown in 43.07% of attacks. See Table 4 for demographic characteristics of perpetrators by motivation.

Attack Characteristics

Shooting attacks represented nearly three quarters of attacks ($n = 102$, 74.45%), with handguns serving as the most commonly used weapon ($n = 94$, 68.61%). Shotguns ($n = 6$, 4.38%) and rifles ($n = 5$, 3.65%) were used in a small number of cases. Stabbing attacks represented about one fifth of the total cases ($n = 29$, 21.17%). Of stabbing attacks, knives or bladed weapons were used most commonly ($n = 25$, 18.25% of total cases), with other objects (e.g., screwdrivers, knife sharpeners) being utilized in four (2.92%) attacks. Blunt force attacks made up less than 10% of total cases ($n = 12$, 8.76%); heavy weapons, such as weights, screwdrivers, and wheelchair parts, were used in five (3.65%) attacks. As a secondary weapon, perpetrators also used their fists and legs (e.g., punching, kicking, stomping) against victims in seven ($n = 5.11\%$) attacks.

Table 3
Location of Attack by Motivation

	Motivation											
Location of attack	Mercy/ despon. $N = 21$ (15.3%)	Argument/ dispute $N = 15$ (11.0%)	Disgruntled with care $N = 8$ (5.8%)	Disgruntled w/care of loved one $N = 5$ (3.6%)	Inmate escape $N = 7$ (5.1%)	Termination of employment $N = 5$ (3.6%)	Revenge $N = 13$ (9.5%)	IPA $N = 27$ (19.7%)	Psychosis/mental illness $N = 15$ (10.9%)	Other $N = 8$ (5.8%)	Unknown $N = 32$ (23.4%)	Total% $N = 137$
Facility												
1. Hospital	13 (61.9%)	7 (46.7%)	5 (62.5%)	4 (80.0%)	7 (100%)	5 (100%)	7 (53.8%)	17 (63.0%)	7 (46.7%)	5 (62.5%)	7 (21.9%)	72 (52.6%)
2. Clinic/doctor office[a]	0	2 (13.3%)	1 (12.5%)	1 (20.0%)	0	0	0	3 (11.1%)	2 (13.3%)	2 (25.0%)	2 (6.3%)	11 (8.0%)
3. Psychiatric hospital	0	0	1 (12.5%)	0	0	0	0	0	1 (6.7%)	0	1 (3.1%)	2 (1.5%)
4. Nursing home/ assisted living	8 (38.1%)	6 (40.0%)	0	0	0	0	5 (38.5%)	7 (25.9%)	4 (26.7%)	1 (12.5%)	20 (62.5%)	48 (35.0%)
5. Military/VHA	0	0	1 (12.5%)	0	0	0	1 (7.7%)	0	1 (6.7%)	0	1 (3.1%)	3 (2.2%)
6. Ambulatory surgical center	0	0	0	0	0	0	0	0	0	0	1 (3.1%)	1 (0.7%)
Location within facility												
1. Patient/exam room	21 (100%)	4 (26.7%)	2 (25.0%)	3 (60.0%)	4 (57.1%)	0	3 (23.1%)	5 (18.5%)	5 (33.3%)	6 (75.0%)	12 (37.5%)	60 (43.8%)
2. Main corridors/ waiting areas	1 (4.8%)	2 (13.3%)	2 (25.0%)	3 (60.0%)	1 (14.3%)	2 (40.0%)	2 (15.4%)	8 (29.6%)	4 (26.7%)	1 (12.5%)	8 (25.0%)	28 (20.4%)
3. Parking lots/garages	0	5 (33.3%)	1 (12.5%)	2 (40.0%)	1 (14.3%)	0	1 (7.7%)	13 (48.1%)	1 (6.7%)	1 (12.5%)	5 (15.6%)	27 (19.7%)
4. Emergency Department	0	1 (6.7%)	2 (25.0%)	0	1 (14.3%)	1 (20.0%)	1 (7.7%)	0	1 (6.7%)	0	1 (3.1%)	6 (4.4%)
5. Cafeteria	0	1 (6.7%)	0	0	0	1 (20.0%)	0	0	1 (6.7%)	0	1 (3.1%)	4 (2.9%)
6. Pharmacy	0	0	0	0	0	0	0	0	0	1 (12.5%)	0	1 (0.7%)
7. Other exterior campus area	0	0	0	0	0	0	0	1 (3.7%)	0	0	1	2 (1.5%)
8. Labs/*OR*	0	0	0	0	0	0	1 (7.7%)	1 (3.7%)	1 (6.7%)	0	1	3 (2.2%)
9. Office/admin	0	1 (6.7%)	1 (12.5%)	0	0	1 (20.0%)	2 (15.4%)	0	1 (6.7%)	2 (25.0%)	0	4 (2.9%)
10. Nurse's station	0	0	1 (12.5%)	0	0	0	0	2 (7.4%)	0	1 (12.5%)	0	3 (2.2%)
11. Other within facility	1 (4.8%)	0	0	0	2 (28.6%)	2 (40.0%)	2 (15.4%)	0	1 (6.7%)	0	1 (3.1%)	6 (4.4%)
12. Off-site[b]	1 (4.8%)	1 (6.7%)	0	0	0	0	1 (7.7%)	1 (3.7%)	0	1 (12.5%)	1 (3.1%)	5 (3.6%)
13. Unclear	0	1 (6.7%)	0	0	0	0	1 (7.7%)	1 (3.7%)	1 (6.7%)	1 (12.5%)	6 (18.8%)	11 (8.0%)
If multiple locations, spree attack												
Yes	2 (9.5%)	1 (6.7%)	0	0	0	0	1 (7.7%)	1 (3.7%)	0	1 (12.5%)	1 (3.1%)	5 (3.6%)
No	1 (4.8%)	0	1 (12.5%)	2 (40.0%)	1 (14.3%)	2 (40.0%)	0	3 (11.1%)	2 (13.3%)	2 (25.0%)	5 (15.6%)	16 (11.7%)
N/A	18 (85.7%)	14 (93.3%)	7 (87.5%)	3 (60.0%)	6 (85.7%)	3 (60.0%)	12 (92.3%)	23 (85.2%)	13 (86.7%)	5 (62.5%)	26 (81.3%)	116 (84.7%)

Note. Percentages for rows and columns add to more than 100%, as multiple motivations and locations within facilities were possible. VHA = Veteran's Health Administration; IPA = intimate partner animus.
[a] Includes dental and chiropractic offices. [b] Off-site locations as part of a spree attack.

Table 4
Demographics of Perpetrator by Motivation

	Motivation											
Perpetrator characteristics	Mercy/ despondence $N = 21$ (15.3%)	Argument/ dispute $N = 15$ (11.0%)	Disgruntled with care $N = 8$ (5.8%)	Disgruntled w/care of loved one $N = 5$ (3.6%)	Inmate escape $N = 7$ (5.1%)	Termination of employment $N = 5$ (3.6%)	Revenge $N = 13$ (9.5%)	IPA $N = 27$ (19.7%)	Psychosis/ mental illness $N = 15$ (10.9%)	Other $N = 8$ (5.8%)	Unknown $N = 32$ (23.4%)	Total% $N = 137$
Gender												
1. Male	19 (90.5%)	13 (86.7%)	8 (100%)	5 (100%)	7 (100%)	5 (100%)	11 (84.6%)	24 (88.9%)	13 (86.7%)	7 (87.5%)	28 (87.5%)	125 (91.2%)
2. Female	2 (9.5%)	2 (13.3%)	0	0	0	0	2 (15.4%)	3 (11.1%)	2 (13.3%)	1 (12.5%)	4 (12.5%)	12 (8.8%)
Race												
1. Asian	1 (4.8%)	0	1 (12.5%)	0	0	0	1 (7.7%)	0	0	2 (25.0%)	1 (3.1%)	6 (4.4%)
2. Black	0	7 (46.7%)	0	1 (20.0%)	1 (14.3%)	1 (20.0%)	3 (23.1%)	14 (51.9%)	5 (33.3%)	0	8 (25.0%)	35 (25.5%)
3. Hispanic	0	0	1 (12.5%)	0	0	2 (40.0%)	3 (23.1%)	3 (11.1%)	1 (6.7%)	0	3 (9.4%)	12 (8.8%)
4. Native Am.	0	1	0	0	0	0	0	0	1 (6.7%)	0	0	1 (0.7%)
5. White	16 (76.2%)	3 (20.0%)	6 (75.0%)	1 (20.0%)	5 (71.4%)	2 (40.0%)	2 (15.4%)	8 (29.6%)	7 (46.7%)	4 (50.0%)	10 (31.3%)	55 (40.1%)
6. Unknown	4 (19.0%)	4 (26.7%)	0	3 (60.0%)	1 (14.3%)	0	4 (30.8%)	2 (7.4%)	1 (6.7%)	2 (25.0%)	10 (31.3%)	28 (20.4%)
Age												
Median	77.0	49.0	52.0	50.0	40.5	48.0	49.0	43.0	44.0	57.5	48.0	50.0
M (*SD*)	71.2 (16.4)	57.1 (19.6)	51.8 (19.3)	50.8 (9.2)	39.8 (10.0)	49.4 (9.7)	53.9 (20.1)	43.8 (10.4)	43.3 (11.6)	54.8 (12.0)	49.6 (20.3)	52.7 (18.4)
95% CI	[64.2, 78.2]	[47.2, 67.0]	[38.5, 65.2]	[42.7, 58.9]	[31.8, 47.8]	[40.9, 57.9]	[43.0, 64.8]	[39.9, 47.7]	[37.4, 49.1]	[46.4, 63.1]	[42.4, 56.9]	[49.6, 55.8]
Marital status												
1. Single	1 (4.8%)	0	2 (25.0%)	1 (20.0%)	0	0	0	0	2 (13.3%)	0	0	4 (2.9%)
2. Married/partnered	19 (90.5%)	3 (20.0%)	2 (25.0%)	3 (60.0%)	1 (14.3%)	2 (40.0%)	1 (7.7%)	6 (22.2%)	2 (13.3%)	4 (50.0%)	13 (40.6%)	53 (38.7%)
3. Divorced/ex-partnered	0	5 (33.3%)	1 (12.5%)	0	0	0	0	11 (40.7%)	3 (26.6%)	1 (12.5%)	0	17 (12.4%)
4. Separated/estranged	0	0	1 (12.5%)	0	0	0	1 (7.7%)	10 (37.0%)	0	0	0	12 (8.8%)
5. Widowed	0	1 (6.7%)	0	0	0	0	1 (7.7%)	0	0	0	0	1 (0.7%)
6. Unknown	1 (4.8%)	6 (40.0%)	2 (25.0%)	1 (20.0%)	6 (85.7%)	3 (60.0%)	10 (76.9%)	0	7 (46.7%)	3 (37.5%)	19 (59.4%)	50 (36.5%)
History of mental illness												
1. Yes[a]	2 (9.5%)	5 (33.3%)	5 (62.5%)	0	2 (28.6%)	1 (20.0%)	3 (23.1%)	5 (18.5%)	15 (100%)	3 (37.5%)	12 (37.5%)	44 (32.1%)
2. None	12 (57.1%)	3 (20.0%)	1 (12.5%)	3 (60.0%)	1 (14.3%)	1 (20.0%)	2 (15.4%)	9 (33.3%)	0	2 (25.0%)	0	31 (22.6%)
3. Unknown	7 (33.3%)	7 (46.7%)	2 (25.0%)	2 (40.0%)	4 (57.1%)	3 (60.0%)	8 (61.5%)	13 (48.1%)	0	3 (37.5%)	20 (54.1%)	62 (45.3%)
History of substance use												
1. Yes	0	2 (13.3%)	3 (37.5%)	0	3 (42.9%)	2 (40.0%)	2 (15.4%)	4 (14.8%)	5 (33.3%)	2 (25.0%)	4 (12.5%)	21 (15.3%)
2. No	13 (61.9%)	5 (33.3%)	0	2 (40.0%)	1 (14.3%)	2 (40.0%)	3 (23.1%)	7 (25.9%)	2 (13.3%)	3 (37.5%)	1 (3.1%)	34 (24.8%)
3. Unknown	8 (38.1%)	8 (53.3%)	5 (62.5%)	3 (60.0%)	3 (42.9%)	1 (20.0%)	8 (61.5%)	16 (59.3%)	8 (53.3%)	3 (37.5%)	27 (84.4%)	82 (59.9%)
History of violent, aggressive, abusive behavior												
1. Yes	0	3 (20.0%)	1 (12.5%)	1 (20.0%)	5 (71.4%)	1 (20.0%)	4 (30.8%)	16 (59.3%)	7 (46.7%)	1 (12.5%)	7 (21.9%)	40 (29.2%)
2. No	19 (90.5%)	3 (20.0%)	4 (50.0%)	2 (40.0%)	0	1 (20.0%)	3 (23.1%)	2 (7.4%)	1 (6.7%)	5 (62.5%)	5 (15.6%)	38 (27.7%)
3. Unknown	2 (9.5%)	9 (60.0%)	3 (37.5%)	2 (40.0%)	2 (28.6%)	3 (60.0%)	6 (46.2%)	9 (33.3%)	7 (46.7%)	2 (25.0%)	20 (62.5%)	59 (43.1%)

Note. Percentages for motivations add to more than 100%, as some cases have multiple motivations. CI = confidence interval; IPA = intimate partner animus.
[a] Documented or suspected mental illness, as reported.

Multiple types of weapons were used in eight (5.84%) attacks. See Table 5 for a breakdown of the type of weapon by motivation.

The perpetrator brought additional weapons that were ultimately not used during the attack in 10 (7.30%) cases; motivations included intimate partner animus ($n = 3$, 11.11% of intimate partner animus-motivated attacks), psychosis ($n = 2$, 13.33%), mercy/despondence ($n = 1$, 4.76%), disgruntlement with one's care ($n = 1$, 12.50%), disgruntlement with care of a loved one ($n = 1$, 20.00%), other ($n = 1$, 12.50%), and unknown motivation ($n = 3$, 9.38%).

Unnecessarily large quantities of ammunition were brought to the scene in five (3.65%) cases; two of these were motivated by termination of employment, two by intimate partner violence, one by an argument/dispute, and one by revenge (note: this adds to more than 100% due to multiple motivations).

Perpetrators attempted to disguise or alter their appearance in three (2.19%) cases; such attacks were motivated by a former patient disgruntled with care, revenge, and intimate partner violence.

Victims and Lethality

Number of Targets

In the majority of cases, the perpetrator had one primary target ($n = 101$, 73.72%). The perpetrator had more than one primary target in a small proportion of cases ($n = 15$, 10.95%), and the number of primary targets was unknown or unclear in 15 (10.95%) cases. Multiple targets were associated with cases motivated by intimate partner animus ($n = 4$, 14.81% of intimate partner animus-motivated cases), mercy killing/despondence ($n = 3$, 14.29%), termination of employment ($n = 3$, 60.00%), psychosis/mental illness ($n = 3$, 20.00%), arguments/disputes ($n = 3$, 20.00%), patients disgruntled with own care ($n = 1$, 12.50%), disgruntlement with care of a loved one ($n = 1$, 20.00%), and revenge ($n = 1$, 7.69%).

Hostage Taking

The perpetrator took victims hostage in nine (6.57%) cases. Four attacks involving hostage taking were motivated by intimate partner animus (14.81% of intimate partner animus-motivated cases), two by inmate escape (40.00%), one by revenge (7.69%), one (12.50%) by a patient disgruntled with their care, one (12.50%) by an argument/dispute, and one (3.12%) with an unknown motivation (note: the percentages add to more than 100% due to multiple motivations). When hostages were taken, the perpetrator willingly released the hostages about half of the time ($n = 5$, 55.56% of cases in which hostages were taken). Hostages were released following law enforcement intervention in two cases (22.22%), and the hostage was able to flee in one instance (11.11%). In one case, it was unclear whether the hostages were released by the perpetrator. There were no cases in which hostages were killed.

Nonfatal Injuries

A total of 82 victims were nonfatally injured. Such injuries occurred in about one third (35.77%) of cases, with a range of one ($n = 34$, 24.82% of total cases) to nine ($n = 1$, 0.73%) victims. As the number of nonfatally injured victims increased, the number of represented cases became smaller. Incidents with five or more nonfatally injured victims were associated with termination of employment (one case with 6 nonfatally injured victims; total of 9 victims across cases, $M = 1.80 \pm 2.49$ victims per case), revenge (one case with 6 nonfatally injured victims; total of 11 victims across cases, $M = 0.85 \pm 1.63$ victims per case), psychosis (one case with 9 nonfatally injured victims; total of 20 victims across cases, $M = 1.33 \pm 2.38$ victims per case), and other (one case with 9 nonfatally injured victims involving antiabortion extremism; total of 10 victims across cases, $M = 1.25 \pm 3.15$ victims per case). Mercy/despondence attacks had the fewest nonfatally injured victims (total of 3 victims across cases, $M = 0.14 \pm 0.36$ victims per case).

Fatalities

A total of 120 victims were killed across the 137 cases, exclusive of perpetrators. Less than one third of cases (30.66%) had zero fatalities. The number of fatalities ranged between one ($n = 81$ cases, 59.12% of total cases) and eight ($n = 1$ case, 0.73%) victims. As with nonfatal injuries, the number of represented cases decreased as the death toll increased. Incidents with four or more fatalities were motivated by revenge (one case with 4 fatalities; total of 12 fatalities across cases,

Table 5
Type of Attack and Weapon Used by Motivation

	Motivation											
Type of attack and weapon used	Mercy/ despondence $N = 21$ (15.3%)	Argument/ dispute $N = 15$ (11.0%)	Disgruntled with care $N = 8$ (5.8%)	Disgruntled w/care of loved one $N = 5$ (3.6%)	Inmate escape $N = 7$ (5.1%)	Termination of employment $N = 5$ (3.6%)	Revenge $N = 13$ (9.5%)	IPA $N = 27$ (19.7%)	Psychosis/ mental illness $N = 15$ (10.9%)	Other $N = 8$ (5.8%)	Unknown $N = 32$ (23.4%)	Total% $N = 137$
Shooting	20 (95.2%)	12 (80.0%)	7 (87.5%)	5 (100%)	6 (85.7%)	5 (100%)	7 (53.8%)	23 (85.2%)	9 (60.0%)	6 (75.0%)	18 (56.3%)	102 (74.5%)
1. Handgun	19 (90.5%)	12 (80.0%)	7 (87.5%)	5 (100%)	6 (85.7%)	4 (80.0%)	6 (46.2%)	21 (77.8%)	7 (46.7%)	5 (62.5%)	15 (46.9%)	94 (68.6%)
2. Rifle	0	0	0	0	0	2 (40.0%)	1 (7.7%)	1 (3.7%)	2 (13.3%)	1 (12.5%)	1 (3.1%)	5 (3.6%)
3. Shotgun	0	0	1 (12.5%)	0	0	0	0	3 (11.1%)	0	0	2 (6.3%)	6 (4.4%)
4. Other	1 (4.8%)	0	0	0	0	0	0	0	0	0	1 (3.1%)	2 (1.5%)
Stabbing	0	2 (13.3%)	1 (12.5%)	0	1 (14.3%)	0	5 (38.5%)	4 (14.8%)	4 (26.6%)	1 (12.5%)	13 (40.6%)	29 (21.2%)
1. Knife/ bladed weapon	0	2 (13.3%)	1 (12.5%)	0	1 (14.3%)	0	5 (38.5%)	3 (11.1%)	3 (20.0%)	1 (12.5%)	11 (34.3%)	25 (18.2%)
2. Other	0	0	0	0	0	0	0	1 (3.7%)	1 (6.7%)	0	2 (6.3%)	4 (2.9%)
Blunt force	0	2 (13.3%)	1 (12.5%)	0	2 (28.6%)	0	2 (15.4%)	0	3 (20.0%)	0	3 (9.4%)	12 (8.8%)
1. Heavy object	0	1 (6.7%)	0	0	0	0	1 (7.7%)	0	2 (13.3%)	0	1 (3.1%)	5 (3.6%)
2. Fists/feet[a]	0	1 (6.7%)	1 (12.5%)	0	2 (28.6%)	0	1 (7.7%)	0	1 (6.7%)	0	2 (6.3%)	7 (5.1%)
Strangulation[b]	1 (4.8%)	0	0	0	0	0	0	0	1 (6.7%)	1 (12.5%)	0	2 (1.5%)
Other[c]	0	0	0	0	0	0	0	0	1 (6.7%)	1 (12.5%)	0	1 (0.7%)

Note. Percentages for rows and columns add to more than 100%, as multiple motivations, types of attack, and weapons possible in individual cases. IPA = intimate partner animus.
[a] Secondary form of attack only in addition to other weapon. [b] Strangulation using an object, such as rope or oxygen tubing. [c] Perpetrator brought propane tanks and shot at them with rifle in attempt to detonate.

$M = 0.92 \pm 1.04$) and intimate partner animus (one case with 11 fatalities; total of 35 fatalities across cases, $M = 1.30 \pm 1.49$ victims per case). Inmate escapes had the fewest fatalities (total of 1 fatality, $M = 0.14 \pm 0.38$ victims per case).

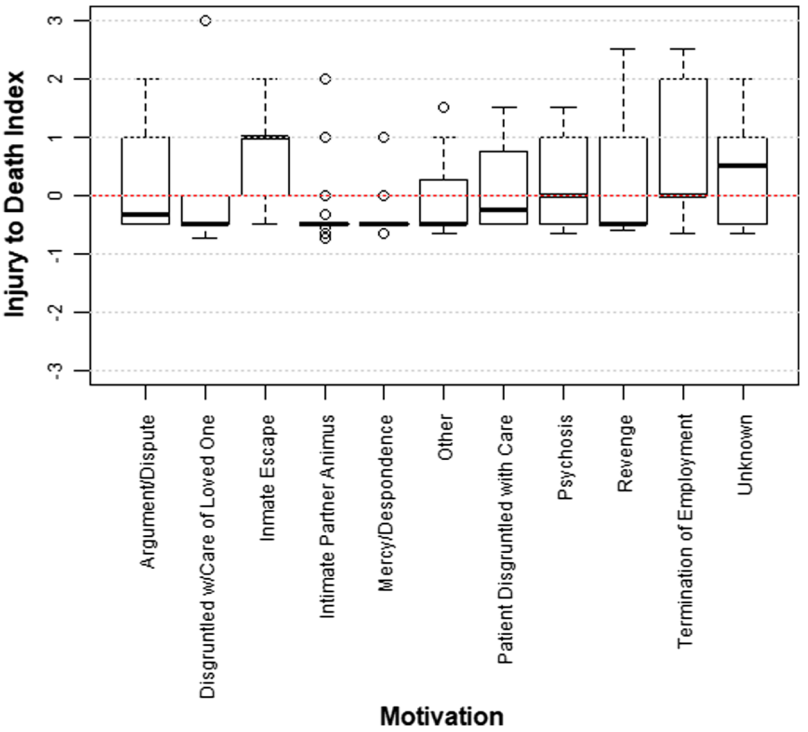
Ratio of Victim Deaths to Injuries

To examine which motivations were more likely to result in victim injuries versus deaths, a lethality index was created by dividing the number of injuries by the number of deaths for each case. A lethality index of zero indicates that the number of injuries and deaths in a case were equal. Values greater than zero represent a higher number of injuries relative to deaths in a given case, and values below zero represent a higher number of deaths relative to injuries in a given case. Inmate escapes were the only motivation with a median lethality index above zero, indicating victims were more likely to be injured than killed. The median lethality index was zero for attacks motivated by psychosis and termination of employment. Attacks motivated by arguments/disputes, disgruntlement with care of self or a loved one, intimate partner animus, mercy/despondence, and revenge had lethality indexes below zero, indicating victims were more likely to die than be nonfatally injured. Mercy/despondence attacks had the least variability in the lethality index (see Figure 1).

Collateral Victims

The large majority of cases ($n = 116$ cases, 84.67%) did not involve injuries or fatalities to incidental or collateral victims (victims who were not the primary target of the attack). A total of 38 known collateral victims were injured or killed across all incidents and ranged from one ($n = 8$

Figure 1
Lethality Index by Motive



Note. A lethality index of 0 indicates an equal number of injuries and deaths. A lethality index greater than 0 represents nonfatal injuries are more likely than deaths, and a lethality index less than 0 represents deaths are more likely than nonfatal injuries. See the online article for the color version of this figure.

cases, 5.84% of total cases) to 11 (n = 1 case, 0.73% of total cases) collateral victims. It should be noted that the number of victims that were collateral (vs. a primary target) was unknown in 10 (7.30%) cases. Mercy/despondence attacks did not have any known collateral victims. Attacks motivated by termination of employment (one case with 7 collateral victims, M = 1.40 ± 3.13 victims per case), revenge (one case with 7 collateral victims; total of 9 victims across cases, M = 0.69 ± 1.97 victims per case), intimate partner animus (one case with 3 collateral victims and one case with 11 collateral victims; total of 18 victims across cases, M = 0.67 ± 2.18 victims per case), and psychosis (one case with 3 collateral victims; total of 4 victims, M = 0.33 ± 0.89 victims per case) all had at least one case involving three or more collateral victims.

See Table 6 for the distribution of nonfatally injured, fatalities, and collateral victims, and for a breakdown of the victim's relationship to the facility.

Warning Signs

Warning signs were identified in 55 (40.14%) of cases. In cases in which warning signs could be identified, fixation was the most common (n = 26, 18.98% of total cases), followed by leakage (n = 22, 16.06%) and pathway to violence (n = 21, 15.33%). Mercy/despondence attacks (M = 0.24 ± 0.44, 95% CI [0.05, 0.42] warning signs per case) and inmate escapes (M = 0.43 ± 0.79, 95% CI [−0.15, 1.01] warning signs per case) had the fewest identified warning signs per case. When warning signs were identified, those who perpetrated mercy/despondence attacks showed end-of-life planning (n = 3, 14.29% of mercy/despondence attacks) and leakage (n = 2, 9.52%). Argument/dispute attacks were associated with fixation (n = 3, 20.00% of argument/dispute-motivated attacks), pathway to violence, leakage, last resort (n = 2, 13.33% for each), and energy burst (n = 1, 6.67% for each). Warning signs for inmate escapes included pathway to violence, leakage, and last resort (n = 1, 14.29% of inmate escapes for each).

Individuals motivated by disgruntlement with their own care (M = 3.00 ± 2.73, 95% CI [1.11, 4.89] warning signs per case) and intimate partner animus (M = 1.59 ± 1.45, 95% CI [1.05, 2.14] warning signs per case) displayed the most identified warning signs. Those who were disgruntled with their care displayed leakage (n = 5, 62.50% of cases motivated by disgruntlement with care), pathway to violence, fixation (n = 4, 50.00% for each), identification, energy burst, last resort, end-of-life planning (n = 2, 20.00% for each), inappropriate affect, novel aggression, and previous suicidal ideation (n = 1, 14.29% for each). Warning signs for intimate partner animus-motivated attacks included fixation (n = 12, 44.44% of intimate partner animus-motivated attacks), directly communicated threats (n = 9, 33.33%) leakage, pathway to violence (n = 5, 18.52% for each), last resort, energy burst (n = 3, 11.11% for each), end-of-life planning (n = 2, 7.14%), and novel aggression (n = 1, 3.57%). Three cases of intimate partner animus-motivated perpetrators had warning signs classified as "other," which included a previous suicide attempt, a previous attempt to kill the victim, and recent psychological decompensation.

Attacks motivated by psychosis had an average of 1.20 ± 1.74 warning signs per case (95% CI [0.32, 2.08]), and included pathway to violence (n = 4, 26.67% of psychosis-motivated attacks), fixation, leakage (n = 3, 20.00% for each), identification, last resort (n = 2, 13.33% for each), inappropriate affect, and novel aggression (n = 1, 6.67% for each).

Revenge-motivated perpetrators displayed an average of 1.15 ± 1.46 identified warning signs (95% CI [0.36, 1.95]), which included leakage (n = 5, 38.46% of revenge attacks), pathway to violence (n = 4, 30.77%), fixation (n = 3, 23.08%), and directly communicated threat (n = 1, 7.69%).

Termination of employment-motivated attacks was anteceded by an average of 1.00 ± 1.73 warning signs (95% CI [−0.52, 2.52]), to include pathway to violence, leakage, directly communicated threats, and end-of-life planning (n = 1, 20.00% of each, respectively, for termination of employment-motivated attacks).

Perpetrators disgruntled with the care of a loved one showed an average of0.80 ± 0.84 warning signs (95% CI [0.07, 1.53]), which included fixation (n = 2, 40.00% of attacks motivated by disgruntlement with care of loved one), leakage, and inappropriate affect (n = 1, 20.00% for each, respectively). See Table 7 for breakdown of warning behaviors by motivation for attack.

Suicide Note or Testament of Grievance

Perpetrators left a suicide note or communication functioning as a lasting testament of

Table 6
Number of Victims and Relationship to Facility by Motivation

	Motivation											
Victims	Mercy/ despondence *N* = 21 (15.3%)	Argument/ Dispute *N* = 15 (11.0%)	Disgruntled with care *N* = 8 (5.8%)	Disgruntled w/care of loved one *N* = 5 (3.6%)	Inmate escape *N* = 7 (5.1%)	Termination of employment *N* = 5 (3.6%)	Revenge *N* = 13 (9.5%)	IPA *N* = 27 (19.7%)	Psychosis/ mental illness *N* = 15 (10.9%)	Other *N* = 8 (5.8%)	Unknown *N* = 32 (23.4%)	Total% *N* = 137
Nonfatal injuries												
0	18 (85.7%)	7 (46.7%)	5 (62.5%)	3 (60.0%)	3 (42.9%)	2 (40.0%)	7 (53.8%)	21 (77.8%)	7 (46.7%)	6 (75.0%)	16 (50.0%)	88 (64.2%)
1	3 (14.3%)	7 (46.7%)	1 (12.5%)	1 (20.0%)	3 (42.9%)	1 (20.0%)	5 (38.5%)	2 (7.4%)	5 (33.3%)	1 (12.5%)	13 (40.1%)	34 (24.8%)
2	0	1 (6.7%)	1 (12.5%)	0	1 (14.3%)	1 (20.0%)	0	2 (7.4%)	1 (6.7%)	0	2 (6.3%)	8 (5.8%)
3–4	0	0	1 (12.5%)	1 (20.0%)	0	0	0	2 (7.4%)	1 (6.7%)	0	1 (3.1%)	5 (3.6%)
5+	0	0	0	0	0	1 (20.0%)	1 (7.7%)	0	1 (6.7%)	1 (12.5%)	0	2 (1.5%)
Total victims	3	9	7	4	5	9	11	12	20	10	21	82
M (*SD*) per case	0.14 (0.36)	0.60 (0.63)	0.88 (1.46)	0.80 (1.30)	0.71 (0.76)	1.80 (2.49)	0.85 (1.63)	0.44 (0.93)	1.33 (2.38)	1.25 (3.15)	0.66 (0.87)	0.60 (1.19)
Fatalities												
0	2 (9.5%)	5 (33.3%)	2 (25.0%)	1 (20.0%)	6 (85.7%)	2 (40.0%)	4 (30.8%)	4 (14.8%)	5 (33.3%)	1 (12.5%)	17 (53.1%)	42 (30.7%)
1	17 (81.0%)	9 (60.0%)	6 (75.0%)	3 (60.0%)	1 (14.3%)	2 (40.0%)	8 (61.5%)	18 (66.7%)	8 (53.3%)	5 (62.5%)	12 (37.5%)	81 (59.1%)
2	2 (9.5%)	1 (6.7%)	0	0	0	1 (20.0%)	0	3 (11.1%)	1 (6.7%)	1 (12.5%)	3 (9.4%)	9 (6.6%)
3	0	0	0	1 (20.0%)	0	0	0	1 (3.7%)	1 (6.7%)	1 (12.5%)	0	3 (2.2%)
4+	0	0	0	0	0	0	1 (7.7%)	1 (3.7%)	0	0	0	2 (1.5%)
Total victims	21	11	6	6	1	4	12	35	13	10	18	120
M (*SD*) per case	1.00 (0.45)	0.73 (0.59)	0.75 (0.46)	1.20 (1.10)	0.14 (0.38)	0.80 (0.84)	0.92 (1.04)	1.30 (1.49)	0.87 (0.83)	1.25 (0.89)	0.56 (0.67)	0.88 (0.93)
Collateral victims[a]												
0	21 (100%)	13 (86.7%)	5 (62.5%)	3 (60.0%)	4 (57.1%)	4 (80.0%)	11 (84.6%)	22 (81.5%)	10 (66.7%)	7 (87.5%)	28 (87.5%)	115 (83.9%)
1	0	1 (6.7%)	2 (25.0%)	1 (20.0%)	3 (42.9%)	0	0	2 (7.4%)	1 (6.7%)	0	1 (3.1%)	8 (5.8%)
2	0	0	0	1 (20.0%)	0	0	1 (7.7%)	1 (3.7%)	0	0	0	3 (2.2%)
3+	0	0	0	0	0	1 (20.0%)	1 (7.7%)	2 (7.4%)	1 (6.7%)	0	0	5 (3.6%)
Unknown	0	1 (6.7%)	1 (12.5%)	0	0	0	0	0	3 (20.0%)	1 (12.5%)	3 (9.4%)	10 (7.3%)
Total victims	0	1	2	3	3	7	9	18	4	0	1	38
M (*SD*) per case	0.00 (0.00)	0.07 (0.27)	0.29 (0.49)	0.60 (0.89)	0.43 (0.53)	1.40 (3.13)	0.69 (1.97)	0.67 (2.18)	0.33 (0.89)	0.00 (0.00)	0.03 (0.19)	0.29 (1.24)[b]
Vict. rel. to facility	*N* = 24	*N* = 17	*N* = 13	*N* = 10	*N* = 6	*N* = 13	*N* = 23	*N* = 47	*N* = 33	*N* = 23	*N* = 39	*N* = 202
Staff (total)	1	6	12	7	0	12	12	24	14	3	12	82
1. Physician	1	2	6	3	0	6	7	1	2	1	3	22
2. Pharmacist	0	0	0	0	0	0	0	0	0	1	2	3
3. Nurse	0	2	1	1	0	0	1	4	1	0	3	12
4. Other staff	0	2	5	3	0	6	4	19	11	1	4	45
Nonstaff (total)	21	10	1	2	1	1	8	17	9	6	23	88
1. Patient	21	5	1	1	0	1	7	9	7	3	18	65
2. Visitor	0	5	0	1	1	0	1	8	2	3	5	23

(*table continues*)

Table 6 (*continued*)

Victims	Motivation											
	Mercy/ despondence $N = 21$ (15.3%)	Argument/ Dispute $N = 15$ (11.0%)	Disgruntled with care $N = 8$ (5.8%)	Disgruntled w/care of loved one $N = 5$ (3.6%)	Inmate escape $N = 7$ (5.1%)	Termination of employment $N = 5$ (3.6%)	Revenge $N = 13$ (9.5%)	IPA $N = 27$ (19.7%)	Psychosis/ mental illness $N = 15$ (10.9%)	Other $N = 8$ (5.8%)	Unknown $N = 32$ (23.4%)	Total% $N = 137$
Law enforcement	0	0	0	1	5	0	0	2	5	5	3	16
No relationship	2	3	0	0	0	0	3	3	0	2	1	10
Unknown	0	0	0	0	0	0	0	1	5	5	0	6

Note. IPA = intimate partner animus.
[a] Confirmed collateral victims; some cases are unclear as to whether the victim was a target or collateral victim. Cases in which it was unclear as to whether the victim was an intended target or collateral are not included in the number of collateral victims. [b] $N = 130$ (unknown cases removed).

grievance in 17 (12.41%) attacks. No such communication was left in a majority of cases ($n = 101$, 73.72%). It was unclear if any were present in 19 cases (13.87%). Suicide notes/testaments of grievance were most common for mercy/despondence attacks ($n = 7$, 33.33% of mercy/despondence attacks) and termination of employment ($n = 2$, 40.00%). Less commonly, a suicide note or testament of grievance was found for attacks motivated by psychosis/mental illness ($n = 3$, 20.00% of psychosis/mental illness-motivated attacks), argument/dispute ($n = 2$, 13.33%), disgruntlement with care ($n = 2$, 25.00%), disgruntlement with care of a loved one ($n = 1$, 20.00%), revenge ($n = 1$, 7.69%), and intimate partner animus ($n = 3.70\%$). No attacks motivated by inmate escapes had a known suicide note/testament of grievance (see Table 7).

Outcome

Stopped or Interrupted Attacks

Twenty-six (18.98%) attacks were stopped or interrupted, usually by law enforcement ($n = 17$, 62.96% of stopped attacks) or facility staff ($n = 11$, 40.74% of stopped attacks). Two attacks (7.41% of stopped attacks) were stopped by the victim. It should be noted that some attacks were stopped by multiple individuals; thus, the percentage adds to more than 100%. Most inmate escapes ($n = 6$, 85.71% of inmate escapes) were stopped, primarily by law enforcement ($n = 5$, 71.43%). One (14.29%) inmate escape was stopped by facility security. Attacks motivated by psychosis were the second most commonly stopped or interrupted ($n = 6$, 40.00% of psychosis-motivated attacks), three (20.00%) by law enforcement, two (13.33%) by the victim, and one (6.67%) by facility staff.

Three (14.29%) mercy/despondence attacks were stopped or interrupted, one (4.76%) by a staff member and two (9.52%) by both staff and law enforcement. Argument/dispute attacks were stopped in two (13.33%) cases, one by law enforcement and one by a staff member. Two (16.67%) attacks motivated by disgruntlement with one's care and one motivated by disgruntlement with care of a loved one were stopped by law enforcement. Two (7.14%) intimate partner animus-motivated attacks were stopped or interrupted by law enforcement. One (8.33%) revenge attack was stopped by a staff member. No attacks

Table 7
Warning Signs and Presence of Suicide Note/Testament of Grievance by Motivation

	Motivation											
Warning signs	Mercy/ despondence $N = 21$ (15.3%)	Argument/ dispute $N = 15$ (11.0%)	Disgruntled with care $N = 8$ (5.8%)	Disgruntled w/care of loved one $N = 5$ (3.6%)	Inmate escape $N = 7$ (5.1%)	Termination of employment $N = 5$ (3.6%)	Revenge $N = 13$ (9.5%)	IPA $N = 27$ (19.7%)	Psychosis/ mental illness $N = 15$ (10.9%)	Other $N = 8$ (8.5%)	Unknown $N = 32$ (23.4%)	Total% $N = 137$
Pathway	0	2 (13.3%)	4 (50.0%)	0	1 (14.3%)	1 (20.0%)	4 (30.8%)	5 (18.5%)	4 (26.7%)	3 (37.5%)	2 (6.3%)	21 (15.3%)
Fixation	0	3 (20.0%)	4 (50.0%)	2 (40.0%)	0	0	3 (23.1%)	12 (44.4%)	3 (20.0%)	2 (25.0%)	1 (3.1%)	26 (19.0%)
Identification	0	0	2 (25.0%)	0	0	0	0	0	2 (13.3%)	1 (12.5%)	0	3 (2.2%)
Energy burst	0	1 (6.7%)	2 (25.0%)	0	0	0	0	3 (11.1%)	0	1 (12.5%)	0	7 (5.1%)
Leakage	2 (9.5%)	2 (13.3%)	5 (62.5%)	1 (20.0%)	1 (14.3%)	1 (20.0%)	5 (38.5%)	5 (18.5%)	3 (20.0%)	1 (12.5%)	2 (6.3%)	22 (16.1%)
Last resort	0	2 (13.3%)	2 (25.0%)	0	1 (14.3%)	0	0	3 (11.1%)	2 (13.3%)	0	2 (6.3%)	10 (7.3%)
Directly comm. threat	0	0	0	0	0	1 (20.0%)	1 (7.7%)	9 (33.3%)	0	0	1 (3.1%)	11 (8.0%)
Inappropriate affect	0	0	1 (12.5%)	1 (20.0%)	0	0	0	0	1 (6.7%)	0	2 (6.3%)	4 (2.9%)
Novel aggression	0	0	1 (12.5%)	0	0	0	0	1 (3.7%)	1 (6.7%)	0	1 (3.1%)	3 (2.2%)
End-of-life planning	3 (14.3%)	0	2 (25.0%)	0	0	1 (20.0%)	0	2 (7.4%)	0	0	0	8 (5.8%)
Other	0	1 (6.7%)	1 (12.5%)	0	0	1 (20.0%)	2 (15.4%)	3 (11.1%)	2 (13.3%)	0	3 (9.4%)	10 (7.3%)
None	3 (14.3%)	1 (6.7%)	0	0	2 (28.6%)	2 (40.0%)	0	0	1 (6.7%)	1 (12.5%)	2 (6.3%)	11 (8.0%)
Unknown	13 (61.9%)	10 (66.7%)	2 (25.0%)	2 (40.0%)	3 (42.9%)	1 (20.0%)	6 (46.2%)	11 (40.7%)	8 (53.3%)	3 (37.5%)	22 (68.8%)	72 (52.6%)
M (*SD*) Warning Signs	0.24 (0.44)	0.73 (1.22)	3.00 (2.73)	0.80 (0.84)	0.43 (0.79)	1.00 (1.73)	1.15 (1.46)	1.59 (1.45)	1.20 (1.74)	1.00 (1.41)	0.44 (1.01)	0.91 (1.43)
Suicide note/testament of grievance												
Yes	7 (33.3%)	2 (13.3%)	2 (25.0%)	1 (20.0%)	0	2 (40.0%)	1 (7.7%)	1 (3.7%)	3 (20.0%)	1 (12.5%)	0	17 (12.4%)
No	11 (52.4%)	12 (80.0%)	6 (75.0%)	3 (60.0%)	7 (100%)	3 (60.0%)	10 (76.9%)	23 (85.2%)	11 (73.3%)	6 (75.0%)	23 (71.9%)	101 (73.7%)
Unknown	3 (14.3%)	1 (6.7%)	0	1 (20.0%)	0	0	2 (15.4%)	3 (11.1%)	1 (6.7%)	1 (12.5%)	9 (28.1%)	19 (13.9%)

Note. Percentages for motivations and warning signs add to more than 100%, as some cases have multiple motivations and warning behaviors. IPA = intimate partner animus.

motivated by termination of employment were stopped or interrupted. See Table 8 for breakdown of stopped or interrupted attacks by motivation.

Nonfatal Injuries of Perpetrator

Perpetrators were nonfatally wounded in a small number of cases (n = 13, 9.49% of total cases). Three cases were motivated by arguments/disputes, three by inmate escapes, three by intimate partner animus, three by psychosis/mental illness, one by mercy/despondence, and one by disgruntlement over care of loved one. When nonfatal injuries to the offender occurred, over one third were injured by law enforcement (n = 5, 38.46%), about one third injured themselves (n = 5, 38.46%), and two were injured by facility staff (15.38%). In one (7.69%) case, it is unclear who injured the perpetrator.

Death of Perpetrator

The perpetrator was reported deceased in about half of the cases (n = 67, 48.91%). Attacks motivated by mercy/despondence (n = 17, 80.95% of mercy/despondence attacks), disgruntlement with care of a loved one (n = 4, 80.00%), termination of employment (n = 4, 80.00%), and disgruntlement with own care (n = 6, 75.00%) had the highest proportion of deceased perpetrators, whereas intimate partner animus- (n = 9, 33.33%) and psychosis-motivated attacks (n = 2, 13.33%) had the lowest proportion of deceased perpetrators. Perpetrators were deceased in approximately half of attacks motivated by arguments/disputes (n = 6, 40.00%), inmate escapes (n = 4, 57.14%), and revenge (n = 6, 46.15%).

For deceased perpetrators, the most common manner of death was suicide by the perpetrator's own hand (as opposed to suicide by cop) either at the culmination of (n = 44, 65.67% of cases in which the perpetrator was deceased) or at some point after (n = 5, 7.46%) the attack. Suicide at the culmination of or at some point following the index attack was the most common outcome for attacks motivated by mercy/despondence (n = 15, 88.24% of mercy/despondence cases with a deceased offender), termination of employment, disgruntlement of care of a loved one (n = 3, 60.00% for each, respectively), and patients disgruntled with care (n = 4, 66.67%). Suicide by a perpetrator's own hand was less common for attacks motivated by psychosis (n = 1, 6.67% of attacks motivated by psychosis/mental illness), inmate escape (n = 1, 14.29%), intimate partner animus (n = 6, 22.22%), revenge (n = 3, 23.08%), and argument/dispute (n = 4, 26.67%).

Perpetrators unsuccessfully attempted to die by suicide in five cases (3.65% of total cases). In the 54 cases in which the perpetrator either attempted or completed suicide, four (7.41%) committed suicide by their own hand in response to law enforcement or other intervention during the attack.

Law enforcement killed the perpetrator to end the attack in five (7.46%) instances, and after the attack, in a subsequent confrontation, in four (5.97%) cases. Of the perpetrators killed by law enforcement, two were coded as suicide by cop (one motivated by termination of employment and another with an unknown motivation), with a third possible/unknown case of suicide by cop (motivated by intimate partner animus). The perpetrator died of natural causes at some point after the attack in six cases (7.46% of cases in which the perpetrator was deceased). One perpetrator died from cardiac arrest after being tased by hospital security during the attack. Another was murdered by the victim's son months after the attack.

Legal Outcome

For perpetrators who did not die at the culmination of or after the attack (n = 67, 48.91% of total cases), most either pled guilty (n = 23, 34.33% of cases in which the perpetrator survived) or were convicted at trial (n = 19, 28.36%). It should be noted that one case had two trial outcomes; in the first trial, the perpetrator was convicted. Upon retrial, the perpetrator pled guilty. Thus, this case is represented twice in the legal outcomes data. In another case, the perpetrator was convicted and died of natural causes shortly thereafter. This perpetrator is represented in both numbers for perpetrator survived (convicted at trial) and perpetrator deceased (natural causes).

Six (8.96% of perpetrators who survived) were found and remained, as of the writing of this article, incompetent to stand trial (two motivated by psychosis, one motivated by psychosis and disgruntlement with own care, one motivated by psychosis/mental illness and antiabortion extremism, and two with unknown motivations).

Table 8
Perpetrator and Attack Outcome by Motivation

	Motivation											
Outcome	Mercy/ despondence $N = 21$ (15.3%)	Argument/ dispute $N = 15$ (11.0%)	Disgruntled with care $N = 8$ (5.8%)	Disgruntled w/care of loved one $N = 5$ (3.6%)	Inmate escape $N = 7$ (5.1%)	Termination of employment $N = 5$ (3.6%)	Revenge $N = 13$ (9.5%)	IPA $N = 27$ (19.7%)	Psychosis/ mental illness $N = 15$ (10.9%)	Other $N = 8$ (5.8%)	Unknown $N = 32$ (23.4%)	Total% $N = 137$
Deceased	17 (81.0%)	6 (40.0%)	6 (75.0%)	4 (80.0%)	4 (57.1%)	4 (80.0%)	6 (46.2%)	9 (33.3%)	2 (13.3%)	5 (62.5%)	12 (37.5%)	67 (48.9%)
1. Medical/natural	2 (9.5%)[a]	1 (6.7%)	0	0	1 (14.3%)	0	2 (15.4%)	0	0	0	0	6 (4.4%)[a]
2. Suicide culm. of attack	14 (66.7%)	4 (26.7%)	4 (50.0%)	2 (40.0%)	1 (14.3%)	3 (60.0%)	3 (23.1%)	3 (11.1%)	1 (6.7%)	5 (62.5%)	10 (31.3%)	44 (32.1%)
3. Suicide after attack	1 (4.8%)	0	0	1 (20.0%)	0	0	0	3 (11.1%)	0	0	0	5 (3.6%)
4. Killed by LE to end attack	0	0	2 (25.0%)	1 (20.0%)	0	0	0	1 (3.7%)	1 (6.7%)	0	1 (3.1%)	5 (3.6%)
5. Killed by LE after attack	0	0	0	0	1 (14.3%)	1 (20.0%)	0	2 (7.4%)	0	0	0	4 (2.9%)
6. Other	0	1 (6.7%)	0	0	1 (14.3%)	0	1 (7.7%)	0	0	0	1 (3.1%)	3 (2.2%)
Survived	4 (19.0%)	8 (53.3%)	2 (25.0%)	1 (20.0%)	2 (28.6%)	1 (20.0%)	7 (53.8%)	18 (66.7%)	13 (86.7%)	3 (37.5%)	19 (59.4%)	67 (48.9%)
1. Pled guilty	0	4 (26.7%)	0	0	0	1 (20.0%)	2 (15.4%)[b]	7 (25.9%)[b]	4 (26.7%)	0	9 (28.1%)	23 (16.8%)[b]
2. Convicted trial	2 (9.5%)[a]	3 (20.0%)	1 (12.5%)	1 (20.0%)	1 (14.3%)	0	3 (23.1%)[b]	11 (40.7%)[b]	0	0	0	19 (13.9%)[a,b]
3. Incompetent to stand trial	0	0	1 (12.5%)	0	0	0	0	0	4 (26.7%)	1 (12.5%)	2 (6.3%)	6 (4.4%)
4. Not Guilty by Reason of Insanity	0	0	0	0	0	0	0	0	1 (6.7%)	0	0	1 (0.7%)
5. Other	1 (4.8%)	0	0	0	0	0	1 (7.7%)	0	2 (13.3%)	1 (12.5%)	2 (6.3%)	5 (3.6%)
6. Unknown	2 (9.5%)	1 (6.7%)	0	0	1 (14.3%)	0	2 (15.4%)	1 (3.7%)	2 (13.3%)	1 (12.5%)	6 (18.8%)	15 (10.9%)
Unknown outcome	0	1 (6.7%)	0	0	1 (14.3%)	0	0	0	0	0	1 (3.1%)	3 (2.2%)
Attack stopped												
Yes	3 (14.3%)	2 (13.3%)	2 (25.0%)	1 (20.0%)	6 (85.7%)	0	1 (7.7%)	2 (7.4%)	6 (40.0%)	2 (25.0%)	7 (21.9%)	27 (19.7%)
1. Law enforcement	2 (9.5%)	0	2 (25.0%)	1 (20.0%)	5 (71.4%)	0	0	2 (7.4%)	3 (20.0%)	1 (12.5%)	4 (12.5%)	17 (12.4%)
2. Victim	0	1 (6.7%)	0	0	0	0	0	0	2 (13.3%)	0	0	2 (1.5%)
3. Staff	3 (14.3%)	1 (6.7%)	0	0	1 (14.3%)	0	1 (7.7%)	0	1 (6.7%)	1 (12.5%)	4 (12.5%)	11 (8.0%)
No	18 (85.7%)	13 (86.7%)	6 (75.0%)	4 (80.0%)	1 (14.3%)	5 (100%)	11 (84.6%)	25 (92.6%)	8 (53.3%)	6 (75.0%)	23 (71.9%)	107 (78.1%)
Unknown	0	0	0	0	0	0	1 (7.7%)	0	1 (6.7%)	0	2 (6.3%)	3 (2.2%)

Note. Percentages for motivations add to more than 100%. Some cases had multiple outcomes. Some attacks were also stopped by multiple individuals (e.g., law enforcement and facility staff). LE = Law enforcement. IPA = intimate partner animus.

[a] In one case, the perpetrator was convicted at trial and died of natural causes shortly thereafter. As a result, the case is represented in both the "deceased" and "survived" categories. [b] One case had two outcomes (the perpetrator was found guilty; the conviction was overturned and the perpetrator then pled guilty).

In one psychosis/mental illness case, the perpetrator was found not guilty by reason of insanity. One mercy/despondence case had the charges dismissed. No charges were brought forth in an attack motivated by emotional distress related to alcohol withdrawal ("other" motive category) and for another case motivated by revenge and psychosis/mental illness. One perpetrator motivated by psychosis was waiting for psychological evaluations to support a plea of not guilty by reason of insanity at the time this article was written. The final legal outcome was unknown in about one quarter of the cases in which the perpetrator was not deceased ($n = 15$, 22.39% of cases in which the perpetrator survived). See Table 8 for breakdown of offender outcomes by motivation.

See Table 9 for a summary of characteristics of attacks by motivation.

Discussion

Our study is the first to describe and compare the characteristics of weapons-based attacks in health care facilities broken down by motivation. We observed several notable differences between motivations for attack in offender traits, location of attack, victim characteristics, lethality, and warning signs—information vital to identifying individuals at heightened risk or on the verge of violent attack.

Workplace Violence Typology and Motive

Attempting to sort our cases into the workplace violence Types I–IV and engage in meaningful analysis for threat assessment purposes at the same time proved challenging. Our findings emphasize that offender motive, the understanding of which is imperative in behavioral analysis, will not always line up cleanly with the four categories. For example, in health care settings, Type II violence is perpetrated by patients, visitors, vendors, pharmacy customers, etc. Behaviorally, these perpetrators could be motivated by any number of factors, including intimate partner animus, potentially resulting in a lack of clarity about the proper designation. No "rule" mandates that a Type IV designation must trump a Type II designation when both are applicable. For example, one case in our sample involved a spousal homicide committed by a patient visitor against a patient visitor. Under the workplace violence classification scheme, this could be called Type II violence. However, the Type II label alone would be of uncertain utility for security planning and threat assessment purposes because it does not provoke immediate consideration of intimate partner animus and all of the warning behaviors and specific risks associated with it. Likewise, in attempting to quantify the incidence of intimate partner animus by only counting violence against employees, an often traditional reading of Type IV, security planners may miss intimate partner animus against the patient visitor in our example above. If we took that approach in the present study, a total of 17 cases (representing approximately 12% of the sample) would fit. Another perspective, and the approach we took, is that all offenders motivated by a hostile and malevolent animus toward the current or former intimate, as long as it was directly intertwined with the existence of the current or former intimate relationship, were coded as "intimate partner animus." In our sample, this would result in a total of 27 intimate partner animus-motivated attacks occurred, representing approximately 20% of the total sample. A third option is that all spousal/intimate/ex-partner attacks, to include mercy/despondence cases, could constitute intimate partner animus in a widely inclusive reading of the Type IV designation. This third definition would result in a total of 48 cases, or 35% of our sample. This, again, could be misleading from a behavioral assessment standpoint, as the threat of a mercy/despondence attack would probably not be assessed and managed in the same way and with the same resources.

Dangerousness

Overall, health care facility attacks proved dangerous. First, they usually continued until concluded by the perpetrator, as is often the case with targeted violence in other venue types. The attacks were stopped in a relatively small number of cases (27 known cases, representing less than 20% of the sample). Additionally, more than two thirds of the cases involved at least one victim fatality. In particular, intimate partner animus-motivated attacks represented the most cases with a fatality in the sample and were the most likely motivation to involve multiple fatalities in a single case. This is a reminder of the very real risk of collateral victimization in these (and other) cases. In situations of suspected intimate

Table 9
Characteristics of Attack and Offender by Motivation

Motivation	Characteristic					
	Location of attack	Type of attack/weapons	Demographics of perpetrator	Victims	Offender outcome	Warning signs
Mercy/despondence	• Hospitals and nursing/assisted living • Patient rooms • Multiple locations within facility possible, but rare • Spree attacks also possible	• Shooting • Handgun • Attack rarely stopped • If stopped, by facility staff	• Married • Median age 77, relatively moderate age variability (*SD* = 16.4 years) • Unlikely to have history of mental illness, substance use, or violence/aggression	• One victim usually killed • Victim is current patient • No grievance against targeted victim • No hostages or collateral victims	• Usually died by suicide at culmination of/after attack • Greater likelihood of leaving suicide note	• Few identified warning signs (*M* = 0.24 per case) • End of life planning, leakage
Argument/dispute	• Primarily nursing homes and hospitals • Primarily patient rooms and parking lots/garages; other locations within facility possible based on perpetrator's relationship to facility (e.g., employee, visitor, patient)	• Shooting, stabbing, blunt force attack • Handgun, knife or bladed weapon • Attack rarely stopped	• Median age 57.5, relatively high age variability (*SD* = 19.6 years) • Increased rate of history of mental illness • Unlikely to have history of substance use	• Usually only one victim • Victim can be employee, visitor, or patient • Victims equally likely to be killed or nonfatally injured • Hostages and collateral victims rare	• Split between perpetrators who are deceased and not • If deceased, usually by suicide at culmination of attack • If survived, usually convicted • Unlikely to leave suicide note/testament of grievance	• Fewer warning signs (*M* = 0.73 per case) • Fixation, pathway to violence, last resort behaviors, energy burst, leakage
Patient disgruntled with care	• Primarily at hospitals • Can also occur at clinics/doctor's offices, psychiatric hospitals, and VHA facilities • Varied locations within facility	• Shooting • Handgun • Attack rarely stopped	• Not married/partnered • Median age 52, relatively high age variability (*SD* = 19.3 years) • More likely to have history of mental illness • Not likely to have history of violence/aggression	• One victim usually killed; nonfatal injuries possible • Victim/target usually physician or institution • Grievance against targeted victim • Can have collateral victims and nonfatal injuries • No hostages	• Most died by suicide at culmination of attack • Suicide note/testament of grievance rare	• Highest number of warning signs (*M* = 3.0 per case) • Leakage, pathway to violence, fixation, identification, energy burst, last resort, end of life planning

(*table continues*)

Table 9 (*continued*)

Motivation	Characteristic					
	Location of attack	Type of attack/weapons	Demographics of perpetrator	Victims	Offender outcome	Warning signs
Disgruntled with care of loved one	• Primarily at hospitals • Can also occur at clinics/doctor's offices • Patient rooms, main corridors/ hallways/waiting areas, Parking lots/ garages	• Shooting • Handgun • Attack rarely stopped	• More likely to be married • Median age 50, relatively low age variability (*SD* = 9.2 years) • Not likely to have history of mental illness, substance use or violence/ aggression	• One victim usually killed, but multiple deaths possible • Nonfatal injuries possible • Targeted victim is physician or nurse • Grievance against targeted victim • Can have collateral victims • No hostages	• Most died by suicide at culmination of/after attack • Suicide note/testament rare	• Average of 1 identified warning sign per case • Fixation, leakage, inappropriate affect
Inmate escape	• Hospitals • Started in treatment area (patient room, surgical wing, emergency department), then moved into other areas of facility	• Shooting, blunt force attack • Handgun taken from law enforcement or security; fists/feet as secondary weapon • Attack usually stopped by law enforcement	• Median age 40.5, relatively low age variability (*SD* = 10.0 years) • More likely to have history of substance use and violence/aggression	• Deaths rare, but can have nonfatal injuries • No grievance against targeted victim • Collateral victims for instrumental purposes (e.g., stealing car) • May take hostages	• Split between perpetrators who are deceased and not • If deceased, cause varies (natural, suicide, killed by law enforcement) • No suicide note/ testament	• Fewer warning signs (*M* = 0.43 per case) • Pathway to violence, leakage, last resort behaviors
Termination of Employment	• Hospitals • Main corridors/ hallways/waiting rooms, emergency dept., cafeteria/ break room, office/ admin area • May involve multiple areas of facility	• Shooting • Handgun, rifle • Attack never stopped	• Median age 48, relatively low age variability (*SD* = 9.7 years) • Split on history of mental illness, substance use, and violence/ aggression	• More likely to have multiple targets • Wider range of victims nonfatally injured and killed • Grievance against targeted victim(s) • Targeted victim usually staff or physician • No hostages • Collateral victims rare	• Suicide at culmination of attack or killed by law enforcement during attack • More than 1/3 leave suicide note/ testament	• Average of 1 identified warning sign per case • Pathway to violence, leakage, directly communicated threat, end of life planning

(*table continues*)

Table 9 (*continued*)

Motivation	Characteristic					
	Location of attack	Type of attack/weapons	Demographics of perpetrator	Victims	Offender outcome	Warning signs
Revenge	• Primarily hospitals and assisted living facilities • Varied locations within facility depending on perpetrator's relationship to faclity (e.g., employee, visitor, patient)	• Shootings, with higher instances of stabbings and blunt force attack • Handgun, knife/bladed weapon • Attack rarely stopped	• Median age 49, relatively high age variability (*SD* = 20.1 years) • Unlikely to have history of substance use • Higher incidence of history of mental illness and violence/aggression	• Usually one target • Grievance against targeted victim(s) • Victims equally likely to be killed or nonfatally injured • Targeted victim is either employee or patient • Hostage taking rare • Collateral victims rare but multiple collateral victims when it did occur	• Split between perpetrators who are deceased and not • Suicide note/testament rare	• Average of 1 identified warning sign per case • Leakage, pathway to violence
Intimate partner animus	• Hospitals, nursing/assisted living, clinics/doctor's offices • Parking lots/garages, main corridors/hallways/waiting areas, patient rooms • May involve multiple locations within facility	• Shooting, stabbing • Handgun, shotgun, knife/bladed weapon • Attack rarely stopped • If stopped, by law enforcement	• Married/partnered or estranged/divorced/ex-partnered • Median age 43, relatively low age variability (*SD* = 10.4 years) • Less likely to have history of mental illness • Likely to have documented or criminalized history of violence/aggression	• Usually only one target, but multiple targets possible (e.g., new significant other, coworkers) • Victim usually employee, sometimes a visitor • Usually one victim killed, but multiple fatalities and injuries possible • May take hostages • Multiple collateral victims possible	• Suicide note/testament rare • Majority of perpetrators not deceased • If deceased, died by suicide or killed by law enforcement • If survived, convicted in court	• Higher number of warning signs (*M* = 1.59 per case) • Fixation, directly communicated threat, leakage, pathway to violence, last resort behaviors, energy burst
Psychosis	• Hospitals most common, followed by nursing/assisted living facilities • May also occur at clinics/doctor's offices, psychiatric hospitals, and VHA facilities	• Shooting, stabbing, blunt force attack • Handgun, rifle, bladed weapon, fists/feet • Attack stopped in about half of cases by law enforcement or facility staff	• Median age 44, relatively low age variability (*SD* = 11.6 years) • Has history of mental illness • Higher rate of history of violence/aggression	• Usually one target, but can have multiple targets, including institution itself • May or may not have identified grievance with targeted victim(s)	• Perpetrator usually survived • Split between pled guilty and being found incompetent to stand trial • Suicide note/testament rare	• Average of 1.2 identified warning signs per case • Pathway to violence, fixation, leakage, identification, last resort behaviors

(*table continues*)

Table 9 (*continued*)

Characteristic						
Motivation	Location of attack	Type of attack/weapons	Demographics of perpetrator	Victims	Offender outcome	Warning signs
	• Patient rooms, main corridors/ hallways/waiting areas; less likely to access restricted or sensitive areas of facility • May involve multiple locations within facility			• Usually at least one victim killed • Greater variability in number of fatalities and nonfatal injuries • Target may be employee, institution, or patient • No hostages • Collateral victims possible, but rare		

Note. VHA = Veteran's Health Administration.

partner violence, it is not just the target who may be at risk of harm. Further, targets of intimate partner violence can include current and former intimates, including distantly past "exes." Intimate relationships may be (or have been) overt—like a spousal relationship—or covert and hidden from others. We are aware of no literature suggesting any difference in risk of intimate partner violence related to covert relationships compared with overt ones. Therefore, when educating a staff or workforce about intimate partner violence, as is becoming more common with employers, it may be wise to offer universal encouragement to disclose concerns about intimate partner violence to human resources or security staff, even in the case of a covert current or a former relationship. Although potentially uncomfortable, such conversations may also save lives by giving security and threat management staff time to assess a concerning situation and develop a plan.

For victims of intimate partner violence employed by a health care facility, ongoing abuse or fear can significantly impact work performance through distraction, fatigue, mental health symptoms, and physical injuries from violence. Victims of intimate partner violence experience harassing phone calls, tests, or emails from their abuser; risk of their abuser appearing at the workplace; stalking while at work; and the abuser contacting coworkers or supervisors about the victim (Wathen et al., 2015). In addition to reducing workplace effectiveness and increasing stress and trauma, these occurrences are cues that should alert health care institutions to potential intimate partner violence.

The open access nature of most medical facilities, ranging in size from large campuses to small offices, presents a significant concern for on-the-spot identification and prevention of a violent attack. In our sample, parking areas represented a significant area of concern for intimate partner animus-motivated attacks, with nearly 20% of such attacks taking place in parking lots or structures. Indeed, other researchers have found that the majority of intimate partner homicides at the workplace occur in parking lots and public buildings (Tiesman et al., 2012). Accordingly, health care facilities should make a standard practice of providing parking lot escorts in particular to employees who may currently be experiencing intimate partner violence, have in the past, or perhaps most particularly if they have recently terminated such a relationship due to the risk for

future targeted violence by the abuser. In fact, serious thought should be given to overriding the wishes of a potential intimate partner violence target who claims such measures are not necessary, as employees may decline an escort for misguided reasons such as fear of adverse employment action, fear of ridicule, not wanting to be singled out, or an inability or unwillingness to grasp the seriousness of the situation. The authors also note that parking escorts for everyone in some form are offered at many health care campuses and suggest this is ideal; our concern for IPV targets declining such assistance is a separate, but equally important, matter. Further, inasmuch as parking lots and structures are known to be a significant vulnerability for violence in health care contexts, other common security measures, including evenly placed lighting meeting security industry standards for brightness, blind-spot mirrors, monitored cameras and gates, on-site attendants and security patrols, and blue-light emergency phones, may reduce the risk of violence in parking structures (Rutledge, 2020).

Contrary to our expectations, the emergency department was not among the most dangerous locations in our sample and was not associated with any particular motivation. Instead, patient and exam rooms were, by far, the most common location of attack. Mercy/despondence-motivated killings, in particular, occurred with a high frequency in patient or exam rooms. The authors offer further observations and recommendations regarding this motivation below. We assume the most frequently traveled and populated areas at any health care facility include parking areas and main corridors/hallways/waiting areas. When combined, these areas represented just under 40% of attack locations, highlighting the challenge posed by a potentially very small timeframe in which to identify a violent offender on the premises. In several cases in our sample, perpetrators penetrated deep into the facility, confirming the problem of stealth and lack of barriers or security defenses against many perpetrators' approaches. Inner areas of the facility, including patient rooms, offices and administrative areas, cafeterias and break rooms, nursing stations, laboratories, preoperative areas, and pharmacies, represented over half of attack locations. Additional security personnel and scrutiny of individuals entering these sensitive areas is warranted in order to ascertain an individual's mental state, presence of weapons, or other warning signs of impending violence.

Firearm violence vastly outnumbered other forms of attack, followed distantly by stabbing, blunt force, and strangulation. Among firearms, handguns were the overwhelming choice, representing another challenge for security staff in the easily concealed nature of small weaponry. The ease with which a weapon can be concealed until a perpetrator has reached his or her intended destination is not a new problem, but it is critical that tactics be identified and/or implemented to begin chipping away at the abilities of offenders to be successful through stealth. Most research on workplace violence, including in health care facilities, has focused on shooting events, excluding other weapons. In our study, although shootings were, by far, the most common form of attack, stabbings proved fatal for 17 victims across 16 cases. Blunt force resulted in six fatalities across five cases. Additional research is needed on weapons-based attacks that do not involve firearms, as well as those occurring in nonhospital medical facilities and involving patient-on-patient violence.

In addition to weapons brought by perpetrators to the facility, opportunistic weapon selection represented a small but significant proportion of cases; this danger must not be overlooked by security planners and floor personnel. Some attacks using opportunistic weapons were fatal—a reminder that a determined assailant, even one with health or mobility challenges, can inflict massive damage with ordinary objects. The issues discussed above are but some of the reasons why behavioral threat assessment and management, as an addition to on-site security response, are critical for the health care industry.

There was also a stark divide in weapon choice based on motivation. Mercy/despondence, disgruntlement with care of self or of a loved one, and termination of employment were almost exclusively shooting incidents. Although shootings still constituted the majority of attacks, stabbings, and blunt force attacks using heavy objects, on the other hand, occurred in attacks motivated by arguments/disputes, revenge, intimate partner violence, and psychosis. The reason for this split in motivations is unknown due to insufficient data. It should also be noted that the motivation for many stabbings and blunt force attacks, particularly patient-on-patient violence at nursing/assisted living and psychiatric

facilities, was unknown or unclear. Such cases are likely far more common than reported in the news media.

Mercy Killings/Despondence Over Loved One's Health: Special Challenges

Perpetrators motivated by "mercy" or despondence over a loved one's health demonstrated relatively few preattack warning behaviors and seemed to "fly under the radar," taking medical staff and loved ones by surprise. Undoubtedly, health care providers engage with loved ones who demonstrate concerning behaviors. Similar to universal screenings for depression and intimate partner violence, perhaps thought should be given to screening the strength of coping skills in those with a loved one experiencing severe or long-term illness. Since most visitors or loved ones do not raise obvious concerns, potential perpetrators can slip through the cracks and never raise alarms with health care providers. Certainly, security planning can be thoughtfully reviewed and updated to close any gaps (Merrens, 2018), but a specific plan of proactive information gathering may help identify those experiencing immediate stress (Emergency Care Research Institute, 2017), as well as broadly failing coping strategies and eroded confidence in a viable future, all of which could stimulate eventual attack. Ideally, professionals could identify those who may be a concern for targeted violence long before violence is attempted rather than immediately before or not at all. Immediate loved ones of patients requiring palliative/hospice care, who are terminally or seriously ill, or whose quality of life is significantly diminished, might be directly asked about their coping mechanisms, their lives beyond a relationship with the patient, and other stabilizers (Simons & Meloy, 2017), which would tend to reduce violence risk. Also referred to as threat mitigators (Amman et al., 2017), protective factors (Scalora et al., 2008), buffers (O'Toole, 2000), or inhibitors (Calhoun & Weston, 2003), these life circumstances with the power to reduce a person's vulnerability to resorting to violence can potentially be (a) anyone or anything of enough value to the person that he or she would want to remain free and available to enjoy it or (b) qualities of self that allow for adaptive coping with stressors (Amman et al., 2017). Health care providers in the position to counsel the patient's spouse or loved one(s) should consider asking about these stabilizers to assess whether and to what extent they exist.

Relevant Inquiries

Inquiring about risk and protective factors is relevant to all potential motives, as it is always important to understand how or if a person is equipped to cope. In addition, other information may be valuable in preventing violence. In our sample, nonmercy/despondence attacks in patient rooms, patient area waiting rooms, and on medical floors were often related to anger or vengeance pertaining to a personal relationship or connection. Accordingly, we suggest patients be asked three primary questions, which may assist in prevention planning and security efforts:

- Is there anyone you do not want to be able to visit?
- Is there anyone who scares you when they are upset or stressed?
- Is there anyone who might concern the nurses and why?

Offenders with any close or familial relationship to a patient or employee represented the greatest threat, numbering 103 or 75% of total cases. Generally, when interacting with patients, visitors, staff, or others who appear to be experiencing significant dissatisfaction or difficulty coping, staff might attempt to ascertain whether the person's emotional response rises to the level of grievance and if the person may be psychologically brittle (Amman et al., 2017; Hinkle, 1922). A brittle person is often conspicuously lacking emotional resources to withstand life's setbacks and unfairnesses (whether real or perceived), as well as harboring a self-view as an outsider and not part of a larger societal network. Once on a pathway toward planned violence, the brittle personality has been postulated to be a significant concern for targeted violence (Amman et al., 2017), though brittleness is not a requisite for deciding in favor of violent action. Also of note, no perpetrators in this sample who were motivated by disgruntlement with their own care were married or domestically partnered. This may suggest social isolation as a potential factor negatively impacting coping resources. These individuals could be prime candidates for an interaction with social services to assess what unmet support needs they may have.

Warning Signs/Preattack Indicators

The concept of preattack indicators has been continuously in development for some time. Public health investigators began examining the causes and correlates of violence from a multidisciplinary perspective in the 1980s, with an eye toward prevention through understanding (Krug et al., 2002). From the late 1980s onward, the behavioral and psychological sciences have explored which behavioral patterns may warn of an increasing risk of targeted violence (Calhoun & Weston, 2003; Dietz & Martell, 2000; Meloy et al., 2012; Vossekuil et al., 2000). Although planned violence in occupational and educational settings has been subject to much study, to our knowledge, this is the first study to attempt broad examination of risk factors and warning signs exhibited prior to attacks in health care settings. Health care facilities are places for patient care and medical advancement, but they are also workplaces and sometimes institutions of higher or continuing education. We, therefore, used occupational and educational setting-based attack literature as a launching point for exploring risk factors and warning behaviors in health care facility attacks.

We examined several distal risk factors, including violent history, substance use, and history of mental illness, along with several proximal warning behaviors, such as "pathway to violence" (Calhoun & Weston, 2003), fixation, identification, novel aggression, energy burst, leakage, directly communicated threat, last resort (Meloy, Hoffman, Bibeau, & Guldimann, 2021), approach behavior, and end-of-life planning (Amman et al., 2017).

Grievance, part of the pathway to intended violence behavioral model (Calhoun & Weston, 2003), is in actuality "a personal perspective and state of mind" rather than a behavior (Calhoun & Weston, 2021). It represents a deeply held feeling of injustice or humiliation, which drives the individual to perseverate. The sense of grievance is not fleeting or transient. It encompasses four essential components: loss, humiliation, anger, and blame (Meloy et al., 2004). Although not all targeted violence is driven by a grievance over a real or imagined wrong, its poisonous influence often underlies targeted attacks. Grievances are often observed in retrospective analyses of workplace violence perpetrated by current and former employees (White, 2021). Grievance is also commonly present leading up to targeted attacks in the K-12 school context (Vossekuil et al., 2000). In the present study, someone around the perpetrator observed grievance in fewer than half of the cases. Only one mercy/despondence-motivated attack included an individually held grievance against a physician who told the perpetrator that his mother would never recover. When mercy/despondence-motivated cases are removed from consideration, 54% of remaining cases featured a known, identified grievance. Of cases in which the perpetrator held an identified grievance, persons working at the health care venue were the foci of any grievance in a majority (61%) of cases. It should be noted that the presence or absence of a grievance was unknown or could not be identified in a quarter of cases. This could be due to our reliance on open-source media accounts. Alternately, perpetrators in some instances may have been able to conceal their grievance, keeping it closely held up until the time of attack.

Fixation behavior (Meloy, Hoffman, Bibeau, & Guldimann, 2021) is any behavior that reveals an increasing obsession or preoccupation with a person or a cause. It can be accompanied by increasing negativity and anger, reduced willingness to consider other opinions regarding the person or situation, and social or occupational deterioration as the person loses interest or ability to focus on other aspects of his life. As the most readily identified warning behavior in the study, we note that it occurred with the greatest frequency with intimate partner violence and with disgruntlement with one's own care among all motivations. We could speculate that this is reflective of the highly personal and highly prized nature of one's own health and one's intimate relationship, except that one could, and many do, highly prize job status, freedom, and any number of other things lost by perpetrators in this cohort.

Leakage was also among the most prevalent observed warning behaviors, appearing diffusely throughout the sample. At least one case in every motive category exhibited leakage. This was not a surprising finding, inasmuch as leakage seems to also be generally prevalent in workplace and school-setting attacks (Calhoun & Weston, 2021). Leakage was originally conceived as communication to a third party of intent to do physical harm to a target (Meloy & O'Toole, 2011). The communication could be overt (e.g., "I am going to kill my boss tonight") or less direct (e.g., "Don't come to work tomorrow, but watch the

news because I may be famous"; Meloy & O'Toole, 2011). For operational purposes, the Federal Bureau of Investigation's (FBI) Behavioral Analysis Unit has taken a broadened view of leakage to include any "expressions, whether or not they are communicated to others, which seem to convey thoughts, feelings or intentions to do harm" (Amman et al., 2017).

In our data, we observed that, by and large, the examples of leakage tended to hint at an ominous mindset rather than overtly communicate that harm may occur. Specifically, within the 22 instances of leakage, only four involved an overt threatening statement, usually to family or friends. For example, in one attack motivated by intimate partner violence, the perpetrator told friends and family, "I am going to kill her because I can't live without her" (Schremp Hahn, 2011). In another case motivated by revenge, the perpetrator told a nurse that the victim should be killed and mentioned using a gun or his car (King, 2013). Leakage that constituted ominous but vague hints was typically made to the victim, friends or family, coworkers, neighbors, or other acquaintances and was observed in 18 instances of leakage. For example, in a case motivated by intimate partner animus, the perpetrator told the two victims, "You'll be sorry," before retrieving a firearm, returning to the facility, and fatally killing both (Associated Press, 2012). In a case motivated by revenge over being terminated from his job, he told his wife that he loved her and to watch for him on the news (Maslanik, 2009). In many of the instances of less explicit leakage, the meaning of the individual's statements only becomes clear after the attack had occurred. Nevertheless, inasmuch as perpetrators may often give off vaguely ominous hints of a coming harm rather than specific announcements, staff are encouraged to report them so that trained threat assessment professionals can evaluate the totality of circumstances. Uncomfortable gut feelings should not be dismissed out of fear of not being taken seriously, or concern that there is nothing "there," or other anxieties that tend to hold bystanders back from sharing what they know (Amman et al., 2017). In addition, health care workplaces are encouraged to obtain workforce-wide training in workplace violence warning signs. It is unclear whether training for medical staff to identify more covert forms of leakage would be beneficial in preventing attacks. The general public needs to be given the continuous message to report ominous threats or warnings and to consider such statements to be a warning sign of potential violence.

Suicide as a Component of Attack

Suicidality in targeted violence is of interest both in terms of understanding the offender mindset and in more practical terms for security professionals. Suicide attempts or ideations in the personal history of an offender are widely considered a distal threat-enhancing factor in a threat management analysis, suggestive of increased future risk of violent planning (Meloy, 2000). Current suicidal ideation or attempts, as a proximal behavior, could be evidence of an accelerating threat of homicidal violence, depending on the interaction between current suicidality and other circumstances and behaviors (Amman et al., 2017). Additionally, understanding this aspect of a person of concern can help security professionals understand whether perpetrator death by suicide is likely. An intention to survive a violent attack requires different planning than when a perpetrator plans to die or be killed. Survival means an offender must consider and plan for counterattack by a target, bystanders, or security or law enforcement. Evasion and escape routes are likely to be considered. For those engaged in significant preplanning, observable behaviors may occur, as described elsewhere in this article.

In the present study, perpetrator death by suicide as a culminating feature of the attack occurred in just over 32% of cases and was the most common means of perpetrator death. This is consistent with a study of U.S. active shooters in any venue between 2000 and 2013, which revealed that in 33% of cases, perpetrators died suicide at the end of the index offense (Blair & Schweit, 2014). In the present study, nearly three quarters of the mercy/despondence attack perpetrators took their own lives as a culminating feature of the incident or soon afterward, demonstrating the greatest commitment to dying within the sample. The high death by suicide rate in mercy killing/despondence cases is not surprising in light of the fact that we also found that cases reported as mercy killings were committed by older perpetrators. Specifically, most were elderly men, who are generally at a greater risk to die by suicide relative to other age groups (Cattell, 2000; Coren & Hewitt, 1999; Shah et al., 2007). As previously mentioned, perpetrators

of mercy killing/despondence attacks showed the fewest warning signs of impending attack, consistent with the tendency for elderly individuals to show fewer warning signs of suicidal ideation (Dennis & Brown, 2011). One key risk factor for elder death by suicide is recent bereavement (Ajdacic-Gross et al., 2008; Li, 1995). Although the targeted loved ones in our cases were alive at the time of attack, most had a terminal illness or dementia. Thus, it is possible that the perpetrator was experiencing anticipatory grief or bereavement, knowing or believing their loved one would soon die or was in considerable pain. Anticipatory grief is associated with more intense ratings of anger, loss of emotional control, and atypical grief responses compared with grief following the death of a loved one. In particular, individuals with high perceived stress and poor coping abilities are at a greater risk of experiencing despair, somatization, and atypical grief responses (Gilliland & Fleming, 1998). Thus, identifying means of reducing stress and improving coping skills in caregivers and loved ones could reduce the risk of mercy killings/attacks motivated by despondence over an ill or dying spouse.

Although we had no requirement for mass victimization in the present study, we note that adult mass murderers, regardless of location of attack, tend not to survive their attacks because they die by suicide or "suicide by cop" (Fessenden, 2000; Meloy et al., 2004). Studies have found prior suicidality in a majority of mass perpetrators (Mohandie et al., 2009). For example, 53% of North American mass murderers died by suicide (Meloy et al., 2004). Similarly, in a study of German school shooting offenders, a majority were suicidal; 56% died by suicide and an additional 22% attempted to die by suicide immediately following their attacks (Meloy et al., 2014).

It may be that mass perpetrators, generally, tend to die by suicide more than other targeted violence offenders, including perpetrators of intimate partner animus-motivated *mass* attacks. Within our sample, however, perpetrators of intimate partner animus-motivated attacks had a lower suicide rate relative to other motivations, with less than 25% of such offenders dying by suicide at the culmination of or after the attack. Overall, our findings are consistent with previous literature demonstrating that intimate partner violence perpetration is not directly correlated with suicidal ideation. In a German study of intimate partner violence offenders (no mass victimization requirement) who used potentially lethal force against the victim, a minority (21%) attempted to die by suicide and even fewer (5%) succeeded (Glaz-Ocik & Hoffmann, 2011). Instead, suicidal ideation in intimate partner violence perpetrators is associated with traits of borderline personality disorder or depressive symptoms (Wolford-Clevenger et al., 2015). Similarly, when intimate partner homicides are followed by a self-destructive act (e.g., suicide), the perpetrator is more likely to have a history of depressive disorder, previous suicidal threats, emotional dependence on the victim, and fear of abandonment. Those who chose to survive an intimate partner homicide likely had a sole goal of avenging a narcissistic injury (Liem & Roberts, 2009).

Among the most frightening of targeted violence perpetrator types, owing to their tendency toward elaborate attacks involving multiple casualties and assault weapons, is the pseudocommando warrior (Knoll, 2010a, 2010b). Knoll (2010a, 2010b) described in them a tendency toward homicidal revenge followed by suicide, though as highlighted by Mullen (2004), some of this cohort do survive their attacks. We wondered if those in the present study classified by a retaliatory motive (i.e., disgruntled with care of self or a loved one, termination of employment, revenge for a perceived wrong) might also tend toward obliteration of the self. However, fewer than half demonstrated clear suicidality in the form of self-inflicted death (13 of 29 retaliatory perpetrators, or 44.83% of the total sample). Nevertheless, they were the next most likely groups to die by suicide after mercy/despondence offenders.

Limitations

Some limitations should be noted regarding the data set. First, it is possible that some weapons-based attacks occurred at health care facilities between 2008 and 2017 that are either documented in news articles that are no longer accessible, or that were simply missed by the authors. Given the sparse coverage of many attacks, it strikes us as highly likely that some attacks were never reported in the news media and thus are not captured in the current data set. Thus, we assume additional data exist that are unknown to the authors.

Second, the small number of cases impacts our ability to produce actuarial estimates of risk between categories or, more operationally

focused, make assumptions about future behavior. Given the limited sample sizes, caution should be used when interpreting results, particularly for categories with fewer than 10 cases. It should be noted that base rates of targeted violence are recognized to be lower than those of general violence. Although low base rates can be associated with false positive predictions, the overarching goal of behavioral threat assessment is prevention, not prediction. Discerning a false positive error from a successful mitigation can also be challenging (Meloy, Hoffman, Deisinger, & Hart, 2021).

Additionally, open-source coverage lacks depth and breadth of other sources not available to the authors, including investigative files, mental health treatment records, security and human resources department information, and more. To be sure, the details found in those kinds of sources would add greatly to the picture of each case and likely result in a higher density of codable warning behaviors, among other factors. It would also lend confidence as to the actual incidences of, for example, psychosis and mental illness generally; the authors can report what was reported in the news articles but cannot confirm the fact of a diagnosable mental illness.

Finally, sourcing our data from news media has the potential to bias the sample. Larger scale and unique or "shocking" events are more likely to attract media coverage. Attacks occurring in facilities located in urban/major metropolitan areas are also less likely to be covered compared to incidents in suburban or rural areas (Wintemute et al., 2012). News articles often lacked information for relevant variables, as reflected in the percentage of "unknown" selections. High-profile and unusual/rare incidents (e.g., mass shooting at Planned Parenthood in Colorado Springs, Colorado, on November 27, 2015) offered a large amount of coverage, details, and follow-ups on the case. Other types of incidents (e.g., patient violence at mental health facilities) offered little information, if covered at all.

Future Directions

Our study expands the literature on violence in health care settings to include various facility types and a variety of weapons. This study is also unique in the health care context in its focus on targeted violence, meaning the victim(s) or targets were selected in advance. By exploring the characteristics of the attacks from the perspective of motivation, our findings highlight vulnerabilities observed with each motivation, along with opportunities for risk mitigation. However, our sample is relatively small. Our findings should be replicated in a larger or at least more detailed sample, preferably utilizing records beyond media reporting. A larger sample would also allow for more complex analyses. Specifically, modeling of demographic, attack variables, and warning signs could prove beneficial in narrowing down the best predictors of risk.

Our study expanded the literature on attacks in health care facilities to include nonfirearm attacks, such as stabbings and blunt force injuries. Although making up a relatively small percentage of our study, stabbings and blunt force attacks are likely far more common than reported in the media. Additional research is needed to explore how motivation plays into weapon selection and how motivation steers perpetrators toward certain forms of potentially lethal force.

As discussed, mercy/despondence attacks present significant challenges for mitigation. Few warning signs emerged in the cases in our sample. It is conceivable that individuals who perpetrate these attacks display unknown warning signs not observed in other motivations. Targeted investigation regarding preoffense behaviors may yield information or warning behaviors not previously considered by the scholarship. Identifying such warning signs might also help to screen for elderly individuals who are at a greater risk for suicide, in addition to those who are contemplating the murder–suicide. For all motivations and attacks, an examination of potential buffers or protective factors should be included when determining the relative risk posed by an individual.

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Received February 23, 2022
Revision received July 1, 2022
Accepted July 27, 2022 ■