

A narrative review of emergency department design strategies to prevent violence against healthcare personnel: an Indian perspective

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Abstract: Workplace violence in hospitals, specifically in emergency departments (ED), has become a growing concern in recent years. This violence can come from patients, their families, or visitors and can take the form of verbal or physical attacks. Preventing violence in EDs can be achieved through design modifications with minimal personnel and infrastructure requirements. Infrastructure design plays a crucial role in reducing the risk of violence. Private lockers should be available at the ED entrance to limit dangerous objects being brought into the department. Furnishings should be fixed to prevent them from being used as weapons, and evacuation should be facilitated through open rows of seating. Positive distractions, such as gardens or natural areas visible through windows, can reduce stress in patients and lower aggression. Ligation points should be eliminated and tamper-resistant items should be provided to reduce dangers in the built environment. The triage desk should be positioned in a secure area with access control and panic buttons available for staff. Hidden exits should be provided in case of violence and emergency exits should open outward and be lockable only from the outside. It seems that preventing violence in EDs requires a combination of management, technology, planning, and physical design. Proper infrastructure design can play a crucial role in reducing the risk of violence, and healthcare professionals, administrators, and architects should be aware of best practices in ED design.

Keywords: Aggression; Architecture; Emergency Department; Hospital Design and Construction; Hospital Planning; Workplace Violence

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1. Introduction

Violence against healthcare personnel is an issue that has gained significant attention in recent years. The risk of physical and verbal abuse from patients, their families, or visitors is a growing concern for healthcare workers. To develop effective strategies to prevent and manage such incidents, it is crucial to understand the prevalence and nature of violence against healthcare personnel. This issue requires collective efforts from healthcare providers, administrators, policymakers, and the wider community.

People react differently to various environmental factors such as noise levels, lighting, color schemes, and overall activity levels. These factors can be controlled or altered to enable the authorities to apply early intervention techniques to diffuse or calm potentially dangerous situations. However, there have been studies that suggest that certain design modifications in high-stress areas can act as distractors and prevent the escalation of the volatile temperament of individuals.

Global estimates suggest that 35% to 80% of medical personnel, particularly those working in emergency departments, have experienced physical violence at least once during their career. Additionally, all medical personnel have experienced verbal violence at some point in their careers (1). Nearly 75% of doctors in India have experienced some type of violence while practicing medicine (2). Incidents involving weapons or words have been increasing in hospitals across the world. There are several causes of violence in the emergency department (ED), including intoxication (3), overcrowding (4), and increased waiting times. Substance abuse and mental health issues can also contribute to violent outbursts in the emergency room. In India, it is more common for patients' families to commit acts of violence than for patients on their own. Poor workplace safety and health have a significant financial impact on people, businesses, and society (5).

The role of design aspects in preventing violence has been well documented in the community setting. Crime Prevention Through Environmental Design (CPTED) seeks to improve the built environment's design to reduce the possibil-

ity of conflicts and violence and to promote better behavior. Communities implementing CPTED programs saw reductions in violent crime, youth homicide, disorderly behavior, and gun violence (6). It has been observed that violence in EDs can be prevented by making simple modifications to the design of the ED with minimal personnel and infrastructure requirements (7). But in the published literature, only a limited number of studies have highlighted the importance of ED design in preventing violence.

The purpose of this review was to summarize and highlight the best ED design practices for guiding clinicians, hospital administrators, and architects that can help prevent violence in the ED.

2. Evidence acquisition

This review was conducted by searching “Violence,” “emergency department design,” “workplace violence,” “prevention,” “conflict,” “architecture,” “behavioral rooms,” and “hospital planning” keywords in these databases: PubMed, Scopus, ScienceDirect, and Google Scholar. Published papers from 1997 to 2022 reviewed. Since this article was conducted as a review, it did not include data obtained from field studies. Therefore, no written consent was needed. Ultimately, 22 studies were used to conduct a review of how ED design can avert violence.

3. Results

3.1. Safety assessment of the workplace

Forward-thinking administrators do not wait for a sentinel incident to begin a conversation about making the department safer. It takes a skillful combination of management, technology, planning, and physical design to establish a secure hospital environment (8).

3.2. Infrastructure

The ambulatory entrance should be clearly marked and equipped with a method to protect incoming patients from weather. Doorways must operate hands-free, and wheelchairs should be readily available (9). There should be separate entrances for ambulance and ambulatory (walk-in) patients, each with an electronic lock. The ambulance entrance should ideally be placed out of sight from people approaching ED entry. Ambulance drivers and emergency medical personnel are familiar with the route and do not need such directions; thus, the ED's signage and directions should be solely directed toward the ambulatory entrance. With this setup, the patient does not have to decide which entry may be correct (9). Designers should also consider providing private lockers at the ED entrance to patients and their attendants to limit the possibility of dangerous objects being carried to the ED.

Attention should be paid to furnishings. To facilitate evacuation, waiting area seating should be in open rows, rather than U-shaped pockets. To prevent items from being used

as weapons, fixed furnishings should be employed (7). Insufficient space in waiting rooms would cause invasions of personal space, crowding tension, and aggressive situations in shared seating and activity spaces (10).

Stress can be reduced through positive distraction, windows that overlook gardens or other natural areas, and lighting elements like light wells, big windows, and atriums (10). To reduce the stress of lengthy delays, waiting spaces close to the ED should offer entertainment options like TVs, periodicals, and children's play areas. Patients who are less stressed are easier for staff to manage. A stress-free environment lowers aggression and enhances patient care.

To reduce dangers in the built environment, ligature points must be eliminated, tamper-resistant items must be offered, high-quality impact-resistant materials must be used, and the right level of security and visual access must be provided. The wrong choices could put staff or other patients in danger or encourage self-harm (11).

Triage desks are frequently positioned in a common area so that patients and visitors can go entirely around and behind them. This arrangement is referred to as being "on an island." Staff is put at risk as a result, and there is no longer a back door escape option (12). It is advisable to place panic buttons near the triage or reception desks so that staff members can call security immediately. It is essential to be able to control access to the emergency room for patients and visitors (12). There should be a hidden exit in case violence breaks out. There should be two different exits to allow workers to escape if one exit is blocked. The emergency exits must open outward and be lockable only from the outside and not the inside. Locking from the inside should be avoided to prevent harm to patients and staff (12).

3.3. Behavior rooms

EDs offer acute care, which means that they are crucial in providing treatment to patients with emotional, mental, or substance abuse problems. It is imperative that EDs develop effective behavioral health protocols. The obvious response to the growing incidence of aggressive patient conduct in emergency rooms is to try to separate such patients from the general patient population in specially designed areas (12).

The acute psychiatric emergency care space must be properly separated from the surrounding patient care areas; If not carefully supervised, isolated behavioral rooms near the entrance or exit offer a simple route for a patient to escape. Large windows make it possible to see staff-patient interactions from a distance.

3.4. Anti-ligature/ligature resistance

One of the first design elements typically considered in a behavioral health environment is ligature resistance. Facility Guidelines Institute defines ligature resistance as “without points where a cord, rope, bed sheet or other fabric/material can be looped or tied to create a sustainable point of attachment that may result in self-harm or loss of life.”

3.5. Tamper resistance

Gypsum board ceilings or ceilings with acoustic lockouts and tamper-resistant ceiling fixtures offer safety and acoustic privacy. It may be possible to tamper with the acoustic tiles used in a lay-in ceiling, which could result in the use of weapons or self-harm. Small fragments of a product that are easily broken can be used as weapons or self-harm tools (11).

3.6. Security response and interventions

Screening technology maintains the warm environment that patients and visitors need by preventing guns from entering the hospital (9). The ED should have uniformed security personnel stationed at the entrance and strategic points, such as triage areas and treatment rooms, to deter troublemakers (7). Duress alarms should be located in areas that are accessible to the staff. The optimal location for the security office is close to the entrance, with easy access to waiting rooms, triage, and reception areas (7). Access from waiting rooms to treatment locations should be regulated.

The need for separate male and female security guards is vital. Although men dominate the security sector, female bodyguard services are equally important (13). Female security officers have access to female washrooms, and changing rooms, where male counterparts cannot enter. They can also restrain aggressive female patients in sensitive situations.

3.7. Policies of workflow management

Triage in simple words means 'to sort'. The ED design team can avert violence in the ED based on how they sequence traffic after the triage (14). At the entrance of every emergency room, a triage area has a doctor or nurse who sorts the patients according to priority (i.e., immediate, urgent, or not urgent) and allots a bed to them. The progression of the patient from the entrance to the treatment room and the definitive location (e.g., ICU, ward, or discharge) should be streamlined in a positive sequential order. The "Negative progression" effect (7) is when patients believe they are moving backward rather than ahead in their treatment. This can be perceived as a negative experience. For example, a patient is sent to the lobby to wait after registration and after triage is performed. People tend to feel neglected, which often leads to frustration, followed by workplace violence. Acuity-based patient separation strategies can help prevent negative progression. Sub-waiting areas spare patients from returning to their previous physical sites (7).

3.8. Line-of-sight (security)

The security and safety of personnel, especially women, may be at risk in back rooms along dead-end corridors or any location with a poor line of sight. Crime prevention through environmental design strategies advises making provisions for a clear line of sight, appropriate illumination, minimizing hidden and isolated paths, avoiding entrapment, and reducing isolation (19). It is possible to make hidden or isolated paths safer by adding more activities, maintaining clear lines

of sight, enhancing lighting, establishing emergency phones, and installing electronic surveillance equipment (19). There should be an unhindered view of the ED from the nursing station and as few blind corners as possible. Emergency telephones or panic alarms should be adequately indicated by the signs. Behavioral isolated rooms can be monitored by video cameras and patrolling guards (15).

3.9. Staffing

The nursing station is the central area in the treatment room of the ED and is akin to a vantage point. Strategic positioning of the nursing station to obtain the best possible line of sight for doctors and nursing staff is of utmost importance for both patient and staff safety. There should be no islands, that is, nursing stations should be designed such that the staff is not surrounded on all sides. Counters around centralized desks should be of sufficient height to act as barriers against hostile persons.

4. Discussion

This review focuses on the design of EDs to minimize the risks of workplace violence, as defined by the world health organization (WHO) framework guidelines (16). The study highlights the importance of infrastructure, security response, policy response, staffing, case review, and interventions as part of workplace violence hazard analysis. Lenaghan et.al suggested that hospitals should include the following risks as part of their workplace violence hazard analysis: infrastructure, security response, policy response, staffing, case review, and interventions (7).

Tunde Agbola's book (17), "*Architecture of Fear*", identifies four elements that contribute to creating a defensible space: territorial ownership, natural surveillance, image and milieu, and functional location of buildings. The differential association theory formulated by Edwin H. Sutherland argues that crime is a product of socialization. Contextual influences rather than personal preferences cause people to become deviant (17). Oscar Newman in his book "*Defensible Space: Crime prevention through urban design*" (1973) drew attention to a similar strategy (18). These concepts can be extrapolated to the ED to prevent violence, such as clearly marked entrances, hands-free doors, electronic locks, and private lockers. Additionally, open seating arrangements, fixed furnishings, and adequate space in waiting rooms can reduce stress and prevent aggressive situations.

The study also emphasizes the importance of behavioral rooms for patients with emotional, mental, or substance abuse problems. The number of behavioral health cases in the ED has been increasing. In the young and middle-aged group, ED psychiatric visit rates have gradually increased both before and during the COVID-19 pandemic (19). It is challenging to anticipate the types of patients that will be seen daily. Specialized areas should be designed to separate such patients from the general patient population, with staff members monitoring them from outside the room.

Most people experience anxiety when they are alone, especially if they believe that others will not notice or hear them or exhibit other symptoms of discomfort. Behavioral rooms should be designed so that staff members can always monitor the patient from outside the room. Poor design in healthcare settings can exacerbate stress and violence, but implementing design approaches such as calming distractions and better acoustics can reduce stress, lower the risk of aggressive behavior, and even cut healthcare costs.

The review also identifies the importance of anti-ligature/ligature resistance design elements in behavioral rooms to ensure patients' safety. Tamper-resistant ceiling fixtures and screening technology prevent weapons from entering the hospital. The environment should not be overly stimulating or too bland, striking a balance between the two. The use of red colors is suitable only for simple designs lacking in complexity. A combination of red with high visual complexity, particularly when hard and reflective surfaces dominate, may induce aggression by increasing arousal levels.

Blind corners should be minimized for continuous supervision and staff security. Troublemakers may suddenly emerge from a blind corner, thereby making it challenging for security and healthcare personnel to engage them. People may shy away from isolated areas, and in turn, such places could be perceived as even more unsafe.

Staff can visually monitor multiple patients from a central location. In addition to this, troublemakers can be spotted from a distance that allows early intervention. The nursing station acts as a physical barrier to disorderly crowds. Counters should have sufficient height and depth to prevent reaching or jumping over. The staff can take cover behind the counter if there is a threat of manhandling or from firearms. Security guards should be directed to actively monitor the ED through closed-circuit surveillance cameras and call reinforcements as and when necessary.

ASIS International's Workplace Violence Prevention and Intervention Standard conducts workplace safety assessments to guarantee that best practices are taken into account and incorporated into each new or renovated healthcare institution. These standards guide the medical staff, security workers, and architects participating in the design process (20). Hospital codes are used to discretely inform staff members about who needs to respond to an emergency, what to bring, and what to expect, without directly explaining the situation. The color of the code varies from hospital to hospital, but the expected response and behavior are largely the same. A Code Grey is an organization-level response to actual or potentially violent, aggressive, abusive, or threatening behavior exhibited by patients or visitors towards others or themselves, which creates a risk to health and safety. The guidelines are designed to lower the risk of harm to staff, patients, and visitors, ensure that patients are treated safely, and with clinical needs met, and ensure that health services implement a uniform escalation procedure to any real or

perceived threat, enabling staff to respond consistently (21). Modern access control systems have several advantages. A skilful combination of management, technology, planning, and physical design is required to provide a secure hospital environment. Improved surveillance measures are expected to reduce the fear of crime (22).

Uniformed security personnel stationed at the entrance and strategic points can deter troublemakers. Workplace safety assessments, as recommended by ASIS International's Workplace Violence Prevention and Intervention Standard, can ensure best practices are incorporated into each new or renovated healthcare institution. Additionally, more vigilance during night shifts is recommended, as emergency medical technicians frequently experience workplace violence, particularly verbal threats from patients' relatives during night shifts (23).

5. Conclusion

Research on ED design's ability to prevent violence against healthcare personnel is limited. Design should create a welcoming and positive environment while minimizing opportunities for inappropriate behavior and providing access to all areas. Ideas from prisons, psychiatric hospitals, and pubs can be adapted to handle emotionally unstable individuals. Design alterations should begin at the entrance and extend throughout the ED. Focus should be on enhancing staff security, quality patient furnishings, and strategic staff stations. Hospitals proposing new constructions or alterations should consider efficient design and engineering controls to decrease danger and prevent workplace violence.

6. Declarations

6.1. Acknowledgement

None.

6.2. Authors' contribution

The project was conceptualized by WM and SSM. All the authors contributed to the review of the literature, writing, reviewing, proofreading, and finalizing the final draft.

6.3. Conflict of interest

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