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IMPROVING SAFETY IN THE EMERGENCY DEPARTMENT

Improving Safety in the Emergency Department: Utilizing Metal Detectors to Mitigate Weapon Possession

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Executive Summary

Today's high risk-healthcare environment has prioritized patient safety with great initiatives and, unfortunately, placed staff safety second. However, safety for both groups should be equal priorities. Evidence suggests that Emergency Departments (ED) often care for patients with a history of crime and mental health diagnoses, creating an environment where the threat of violence and weapons is increasingly prevalent compared to other clinical settings. (Erlyana, 2019) Risk mitigation is possible if we consider studies by Malka et al. (2015) and Laidlaw et al. (2017) that indicate the efficacy of metal detectors in accurately identifying concealed weapons. To improve clinician and patient safety, the proposed change implements the utilization of metal detectors at all entry points into the ED. Concealed weapon screenings will incorporate static pole magnetic devices supplemented by hand-held metal detectors (HHMD). The initial investment would require ~\$400,000 for the first year due to equipment and staffing costs. Subsequent years would decrease in cost based on staffing wages.

Rationale

When considering mitigating workplace violence (WPV) risk, several factors must be considered, and multiple approaches can be made. In the clinical setting of a large, level-one hospital based in a large city, the following question was proposed. In the emergency department (P), how does using a metal detector to screen for weapons (I), compared to no metal detector use (C), affect the possession of weapons in treatment areas (O) within six months of implementation (T)?

According to OSHA (2015), the incidence of WPV is highest in healthcare settings. The issue is not only worsening nationwide but is increasingly present globally, particularly affecting the ED environment (Davey et al., 2020). Despite OSHA's recommendations and guidelines for

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WPV, mandates are not required at the federal, state, or local levels. The gap in response is then left to hospitals and bedside clinicians to fill. The reality of WPV will not be addressed without action.

Literature Synthesis

Literature on metal detector use in the ED is minimal. Despite that, multiple studies show its efficacy and accuracy in detecting weapons or other prohibited weapons at the point of entry (Malka et al., 2015; Laidlaw et al., 2017). As previously mentioned, OSHA (2015) identified the increased risk of WPV for healthcare clinicians when compared to other work settings. EDs can serve as the sole healthcare access for the community's most vulnerable. A portion of that group, in part to being disenfranchised by socioeconomic factors such as poverty, may have a significant criminal history (Erlyana et al., 2019)

Stakeholders

The stakeholders for this initiative will include:

- Nursing
 - Staff
 - Manager
 - Director
 - Administrative Director
 - Chief Nursing Officer
- Emergency Medicine
 - Medical Director
 - Administrative Faculty
- Security

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- Staff
- Director
- Operations
 - Vice President of Operations
- Legal
 - Corporate Compliance Officer
 - Corporate Lawyer

The roles under the Nursing umbrella have significant exposure to patients at the bedside, increasing their risk of WPV. The current check-in process also places nursing staff as the first point of contact for all patients. Unfortunately, this increases the vulnerability to nursing because of the unknown presence of concealed weapons. Security is often involved when weapons are identified or episodes of WPV occur. Therefore, the process will be co-owned by the two most impacted groups: nursing and security.

The medical director will primarily serve as a consultant to offer different perspectives and considerations related to medical conditions that can bypass the process, such as insulin pumps, internal defibrillators/pacemakers, LVADs, nerve stimulators, or other devices. Corporate compliance and corporate lawyers will provide guidance surrounding patient and visitor rights with a required metal detector screening and bag/purse searches. Operation leadership, as well as executive sponsors under the nursing umbrella (Chief Nursing Officer), will facilitate high-level organization and incorporation into policy and procedures.

Implementation

This project will follow a Plan Do Check ACT (PDCA) framework, an effective method of project coordination according to Sperl (2013). The first planning step will be collecting and

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analyzing recent internal data. Collecting at least six months of recent data will help identify current trends in the incidence of WPV, weapon possession, confiscation location, type, reason for visit, and other factors. This level of planning will help in the post-implementation stage to help determine if the intervention was effective.

After analyzing the data, findings should be presented to the stakeholders for confirmation and baseline reporting. If the findings are strong and confirm the need, the exploration of metal detectors should begin. Depending on the types of vendors, in-services for different types of devices should be organized for stakeholders to consider. Static pole metal detectors have proven to be >90% effective in detecting weapons or metal-containing objects in randomized controlled trials. (Laidlaw et al., 2017) Supplementation of HHMD, which has also been identified to have an effective identification rate of >90%, should provide nearly total coverage during screenings. (Nation, 2017)

Installation planning must be finalized once the vendor has been selected and purchases made. Implementation of the project will occur primarily in the ED entrances. The main entrance and ambulance entrance will require both a static pole device and an HHMD. The HHMD will likely be utilized in the ambulance dock more often due to the use of metal stretchers by paramedics and EMTs. Education for ED staff will occur three weeks before the go-live date. Three weeks allows for education and training for both nursing and security, as well as opportunities for clarifying questions and gaps.

Signage of the screening process will be placed at all points before the go-live date. It will be essential to emphasize the purpose and adherence of weapon reporting through the electronic incident reporting system (EIRS). Through continued reporting, data capture can occur. The data will help determine if the system is effective.

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Implementation starts at the one-day mark but will be closely monitored for two weeks. Project leaders will observe the process in real-time to be readily available for guidance and check-ins to ensure the process is adhering to the plan. After implementation, findings for the first three weeks will be analyzed. Depending on the findings, modification may be necessary.

Timetable/Flowchart

Action	Timeframe	PDCA
• Evaluate current practice and analyze recent data	2 weeks	Plan
• Engaged staff and stakeholders	2 weeks	Plan
• Evaluate the infrastructure and develop an implementation strategy	2 weeks	Plan
• Gain approval for change/budget from executive team	Variable	Plan
• Shop for metal detector vendors	Variable	Plan
• Plan for installation	Variable	Do
• Disseminate plan and educate staff	3 weeks	Do
• Implement practice change	2 weeks	Do
• Analyze outcome data and refine practice and processes	3 weeks	Check
• Modify (if necessary)	Variable	Act
• Celebrate Success	Ongoing	

Data Collection Methods

The goal established, considering such an accuracy, will be to reduce the presence of weapons in clinical areas by 50%. Some of the limitations regarding metal detectors include missing weapons made of ceramic or other materials. However, coupling this process with a belonging search and required clothing change for behavioral health patients should yield results that help meet the goal. Additionally, because all patient changing and belonging searches are conducted in clinical areas, any modification should improve this prevention. Blando et al. (2021) highlight a stark contrast between hospitals that utilize metal detectors and those that do not, finding that “hospitals with metal detectors are more than five times as likely to frequently confiscate weapons.” Blando et al. (2021) also recognize that hospitals with psychiatric units are

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more likely to confiscate weapons due to standard procedure. The evaluation of my project involving the installation of metal detectors in the ED can be broken down into three steps:

1. Collecting current data on confiscated weapons dating back at least three months.
2. Collecting data after implementation
3. Analyze data using a Chi-square test

Step one will be collected by collaborating with Risk Management and Security Department leadership to obtain weapon confiscation data. That data will be analyzed and organized by dates, type of weapon confiscated, location of confiscation, and patient's chief complaint.

Step two will follow a similar approach to data collection as step one. Coordination with Risk Management's data analyst will be important to receive weekly updates on data. This data will be collected for a minimum of 3 months.

Step three is more complex.

1. Establish hypothesis: My null hypothesis is that there's no association between using metal detectors and preventing weapon entry into the ED. My alternative hypothesis is that there is an association between the two.
2. Create a 2x2 contingency table where one axis is "Use of metal detectors (yes or no)," and the other is "Weapon confiscation (Point of entry or care space)."
3. Calculate the values using the Chi-square test.
4. Evaluate Chi-square test results.

By following these steps, an evaluation of the metal detector's efficacy can be performed.

Cost/Benefit Discussion

Purchasing four metal detectors and five security guards to cover the implementation will be necessary. To provide an estimated implementation cost, the equipment will cost ~\$160,000

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for two static pole metal detectors and ~\$9,000 for the three HHMDs. Staffing the position with five security guards for 24-hour coverage throughout the week will cost approximately \$197,000 - \$239,000. Equipment and staffing will yield a total cost of about \$400,000 per year. After the initial investment in equipment, the cost will reduce to ~\$239,000, assuming the equipment does not need expensive maintenance and functions as intended while under warranty. While the cost may seem like a significant value in the first year, WPV costs upwards of \$121 billion each year in lost productivity and legal fees, according to OSHA (2015).

Overall Discussion/Results

With the mounting concerns for public safety, healthcare setting safety should be addressed. High-volume EDs in major cities are at increased risk for such events, requiring an increased need for proactive and preventative measures. Literature suggests that there are methods to reduce the occurrence and severity of WPV, should it be unavoidable. When hospitals perform risk management, WPV mitigation should be an ongoing part of the discussion.

No current results for the project exist, as it has yet to be implemented. However, a thorough, step-by-step plan exists for when it is implemented. As mentioned before, the statistics will be analyzed using a chi-square test.

Recommendations

The major challenge to this project is the cost associated with metal detector purchasing. Excluding costs, the screening process is fairly simple, making its implementation a realistic solution for ED across the nation. The next step for my organization is to purchase determine which vendor the hospital will utilize. Personally, I encourage clinicians to build the evidence-based practice surrounding WPV from an action perspective and less of a prevalence one. To

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support that recommendation, a portion of the focus on WPV impact and burnout should be diverted into action plans. The field of nursing knows and understands how WPV contributes to burnout, but no solutions are offered.

Based on the available literature, using metal detectors at points of entry in the ED can prevent weapon-related incidents and reduce WPV. By using both static pole metal detectors and HHMD, EDs can equip themselves with reliable methods of detection. Additionally, continuous monitoring and evaluation of incident reporting systems is crucial to identify trends in WPV. Not all incidents are reported, which will yield lower-than-reality results. Education for clinicians and creating a user-friendly reporting system will benefit any organization in detecting WPV incidents. Lastly, establishing a WPV committee and gathering a group of stakeholders with the general goal of addressing WPV is essential to create sustainable change for a department and organization.

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References:

- Blando, J. D., Paul, C., & Szklo-Coxe, M. (2021). Risk factors for workplace encounters with weapons by hospital employees. *Public health in practice (Oxford, England)*, 2, 100105. <https://doi.org/10.1016/j.puhip.2021.100105>
- Erlyana, E., Reynolds, G. L., Fisher, D. G., Pedersen, W. C., & Van Otterloo, L. (2019). Arrest and Trait Aggression Correlates of Emergency Department Use. *Journal of Correctional Health Care : The Official Journal of the National Commission on Correctional Health Care*, 25(3), 253–264. <https://doi-org.ezproxy.uttyler.edu/10.1177/1078345819854373>Links to an external site.
- Laidlaw, J., Dix, R., Slack, P., Foy, C., Hayward, A., Metherall, A., Ireland, S., Wright, J., O'Rourke, P., Williams, J., & Rose, A. (2017). Searching for prohibited items in mental-health hospitals: A randomised controlled trial of two metal-detecting technologies. *Medicine, Science, and the Law*, 57(4), 167–174. <https://doi.org/10.1177/0025802417725642>Links to an external site.
- Malka, S. T., Chisholm, R., Doehring, M., & Chisholm, C. (2015). Weapons retrieved after the implementation of emergency department metal detection. *The Journal of Emergency Medicine*, 49(3), 355–358. <https://doi.org/10.1016/j.jemermed.2015.04.020>Links to an external site.
- Nation, J., & Jiang, W. (2017). The utility of a handheld metal detector in detection and localization of pediatric metallic foreign body ingestion. *International journal of pediatric otorhinolaryngology*, 92, 1–6. <https://doi.org/10.1016/j.ijporl.2016.10.035>

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Occupational Safety and Health Administration (OSHA). (2015). *Caring for Our Caregivers*

Preventing Workplace Violence: A Road Map for Healthcare Facilities.

<https://www.osha.gov/sites/default/files/OSHA3827.pdf>

Sperl, Todd, et al. *Practical Lean Six Sigma for Healthcare : Using the A3 and Lean Thinking to*

Improve Operational Performance in Hospitals, Clinics, and Physician Group Practices.

Chelsea, Mi, Mcs Media, 2013.