Environmental Evaluation for Workplace Violence in Healthcare and Social Services

Kathleen M. McPhaul [a,*], Matthew London [a,b], Kevin Murrett [c], Kelly Flannery [a], Jonathan Rosen [b], Jane Lipscomb [a]

[a] University of Maryland School of Nursing, USA
[b] Public Employees Federation, USA
[c] Architectural Resources, Inc., USA

Abstract

Problem: Federal policy recommends environmental strategies as part of a comprehensive workplace violence program in healthcare and social services. The purpose of this project was to contribute specific, evidence–based guidance to the healthcare and social services employer communities regarding the use of environmental design to prevent violence. *Method:* A retrospective record review was conducted of environmental evaluations that were performed by an architect in two Participatory Action Research (PAR) projects for workplace violence prevention in 2000 and, in the second project in 2005. Ten facility environmental evaluation reports along with staff focus group reports from these facilities were analyzed to categorize environmental risk factors for Type II workplace violence. *Results:* Findings were grouped according to their impact on access control, the ability to observe patients (natural surveillance), patient and worker safety (territoriality), and activity support. *Discussion:* The environmental assessment findings reveal design and security issues that, if corrected, would improve safety and security of staff, patients, and visitors and reduce fear and unpredictability. *Impact on industry:* Healthcare and social assistance employers can improve the effectiveness of violence prevention efforts by including an environmental assessment with complementary hazard controls.
© 2008 National Safety Council and Elsevier Ltd. All rights reserved.

Keywords: Workplace violence prevention; Participatory action research; Environmental assessment; Healthcare workers; Occupational injury

1. Problem and purpose

Risk factors for Type II workplace violence, defined as violence toward employees perpetrated by a client or customer, include overcrowded waiting areas in healthcare, working in isolation from coworkers, working in a high crime area, having a mobile workplace, transporting patients, poor environmental design, access to firearms, and working with volatile patients. Environmental approaches to reducing the risk of violence toward healthcare and social assistance workers are recommended (National Institute for Occupational Safety and Health [NIOSH], 1996), but have yet to be evaluated for their impact on violence prevention. Ideally, violence prevention would be an important consideration addressed in the design of a new facility and in advance of a major renovation project.

The U.S. Occupational Safety and Health Administration (OSHA) recommends environmental design and security technologies for violence prevention in healthcare in the context of a comprehensive program (OSHA, 1996, 2004, 2008). A comprehensive workplace violence prevention program as outlined in the OSHA guidelines includes hazard assessment and control elements, along with management commitment/employee involvement, recordkeeping and evaluation, and employee training. Evaluation of the impact of environmental design and security technology toward reducing Type II workplace violence has been limited.

Furthermore, the process by which employers select, implement, and evaluate environmental design and security technology has not been adequately described or tested.

To contribute specific, evidence–based guidance to the healthcare and social services communities regarding the use

---

* Corresponding author.
E-mail addresses: kf@drexel.edu, mcphaul@son.umaryland.edu (K.M. McPhaul).

of environmental design to prevent violence, we examined environmental survey reports from two workplace violence prevention research projects to accomplish the following:

1. Identify security technology and/or architectural design risk factors for violence in public mental health and addiction treatment facilities.
2. Examine staff perception of those hazards and of potential control measures to reduce violence in their workplace.
3. Describe the process by which environmental hazard assessment findings are included in the hazard assessment and control phases of a comprehensive workplace violence program.
4. Propose a working paradigm for involving direct care staff in design and security assessment and procurement decisions in their facilities.

2. Background

Reducing injury through environmental design, an approach long promoted by injury epidemiologists (Haddon, 1972, 1974) appeals to public health practitioners because this approach does not depend on changing personal behavior and because the controls can be broadly applied to protect a large population (e.g., the introduction of airbags into automobile design and production; Haddon, 1974; Peek-Asa & Zwerling, 2003). Preventing exposure to occupational hazards through engineering controls is a parallel concept. "Engineering out" job hazards via elimination of, substitution of, or enclosure of a hazard or redesigning a job improves job safety without depending on permanently and consistently changing workers' behavior (Harris, 2000). In the area of workplace violence prevention, examples exist for the successful use of environmental design to control community, residential, and retail crime (Mair & Mair, 2003; Peek-Asa & Zwerling, 2003). In addition, the field of criminal justice can inform efforts of preventing workplace violence.

Some research has been conducted assessing environmental design controls for workplace violence, including a study by Gates, Ross, and McQueen (2006) who examined workplace violence in five facilities with emergency departments in a mid–western U.S. city. Facilities included a Level 1 Trauma hospital with separate medical, psychiatric, and air care, and four facilities with a general emergency department. They found that 32% of surveyed staff (n = 115) worked in facilities where patient and triage areas were open to the public; 25% reported that weapons were easily brought into their facilities; and 22% noted a lack of metal detectors or alarms in their emergency department. Sixty percent felt that long waiting times contributed to violence in their facilities (Gates, Ross, & McQueen).

The Bureau of Labor Statistics recently completed a representative survey of U.S. employers, both private sector and public sector, looking at the prevalence of security and environmental design features in American workplaces. This survey also examined risk factors, experiences of workplace violence, and workplace violence prevention programs. The survey represents 7.4 million U.S. establishments that employ over 128 million workers. Remarkably, a key finding of the study noted that nearly 5% of the workplaces had experienced at least one episode of workplace violence in the past year, but most reported that this experience did not prompt any changes in programming or procedures. Healthcare and social assistance workplaces were more likely to experience Type II violence; however, state government workplaces reported the highest percentages of workplace violence episodes overall (32%) in the past year. Forty–three percent of private sector healthcare and social service employers and 80% of state government healthcare and social assistance workplaces control or limit access to the workplace compared to 31% of all establishments. In terms of measures such as surveillance cameras, metal detectors, and personal alarms, private sector healthcare and social assistance workplaces are less likely than state government settings to utilize surveillance cameras (12.1% vs. 50.7%), metal detectors (0.2% vs. 20.6%), and employee personal alarms (2.0% vs. 15.4%). These findings provide national baseline data for benchmarking improvements in workplace violence prevention programming (Bureau of Labor Statistics [BLS], 2006).

2.1. Crime Prevention Through Environmental Design (CPTED)

Security and design theory and interventions that have been applied to the retail environment (Casteel, Peek-Asa, Howard, & Kraus, 2004; Peek-Asa, Casteel, Mineschian, Erickson, & Kraus, 2004) may have application to the healthcare environment. One such paradigm is an approach known as Crime Prevention Through Environmental Design (CPTED; Crowe, 1991; Jeffery, 1971; Peek-Asa & Zwerling, 2003; Smith, 2004). The elements of CPTED include natural surveillance, access control, territoriality, and activity support. Applied to the healthcare environment, *natural surveillance* is the ability for the care providers to view a patient population in the ward, recreation, or program environment and to be viewed by the patients and other staff. *Access control* addresses entry to the facility, as well as the ward entrances, sleeping areas, offices, program areas, and medication and storeroom. This also includes the door type and traffic floor patterns to control patient movement. *Territoriality* is a concept that connotes an effort to empower the legitimate occupants of a space over the criminal elements who would occupy a space. In healthcare, this might apply to the nurses' station, therapists' offices, medication areas, program areas, and parking lots. Ideally, legitimate occupants of a space (staff and patients alike) develop a sense of "proprietorship" that discourages crime and violence. An element included in later CPTED work addresses *activity support*. For example, environmental design may encourage safe behavior and impact quality of care when program areas are clean, have adequate temperature control, are well–lit, not excessively noisy, and are comfortable for activities such as recreation, rest, group therapy, or private examination.

2.2. Ecological approach

Another approach that is used to study crime in other sectors that may have application to healthcare is an ecologic approach that includes community crime data to understand industry specific crime. For example, in a study of liquor stores in

California the researchers used crime data for all liquor stores in one city to calculate crime trends by liquor store location. Applying this approach to healthcare, regional crime rates could be used as a covariate to studies of violence in emergency rooms rather than relying on the crude categories of location such as "urban" vs. "suburban" or the level of complexity of services such as "trauma center"(Casteel et al., 2004).

2.3. Workplace violence legislation and environmental design

A growing number of states have adopted workplace violence regulations (Michigan Department of Human Services, 2007; Speier, Killea, & Watson, 1993; State of New Jersey 212th legislature, 2006; Washington State Department of Labor and Industries, 2002; New York State Department of Labor, 2007). One of the first state laws, California's Hospital Security Act (Speier et al.) requiring hospitals to provide security to reduce violence, prompted a study that is one of the earliest efforts to describe the presence or absence of specific environmental and security technology in healthcare (Peek-Asa, Cubbin, & Hubbell, 2002). The study found an increase in the proportion of hospital emergency departments with security at entrances (from 49% to 95.6%) and surveillance cameras (from 26% to 69.5%) over a 10 year period in California. The findings suggest that the law resulted in reduced violence in California emergency departments, but also appeared to result in increased attention to environmental design and security technology in emergency departments. The relationship between environmental design or security technology and the reduced violence is difficult to examine in the highly dynamic healthcare environment, but documenting the presence of environmental design and security technology represents an advance in the science of understanding the role environmental design and security technology may play in Type II workplace violence prevention (Peek-Asa et al., 2002).

A later study examined a representative sample of hospitals in two states categorizing the hospitals as follows: Trauma I and II, Trauma III and IV, Acute Care facility>300 beds, Acute care<300, Rural Acute<300, Rural Trauma II and IV. This categorization scheme represents a potentially important variable when considering the impact of design and security technology on workplace violence in healthcare facilities. This study also included the use of on–site visits to assess architectural and design features (environmental components of workplace violence programs). A scoring system identified the presence of specific violence prevention strategies required by law that were in place in one of the two states participating in the study. Environmental components of the workplace violence program included surveillance cameras, elimination of places that employees work alone, individual alarm system, good lighting and visibility, control of access and exit, and elimination of areas where staff can be isolated and overcome. The most common environmental feature in the hospitals in both states was surveillance cameras (88.8% and 90%). Eliminating areas where employees work alone or can become isolated was much less commonly achieved (8.8% and 0%); controlled access was surprisingly low as well, 40% in the state with the workplace violence law and 22% in the comparison state (Peek-Asa et al., 2007).

2.4. Training for Development of Innovative Control Technologies (TDICT)

Collaboration with the field of product design has led to the highly successful *Training for Development of Innovative Control Technologies* (TDICT) project, which has brought together the occupational health and product design fields, as well as frontline healthcare workers to develop and evaluate safe needles and other sharp devices for use in healthcare (Fisher, 1999; Fisher & Wilburn, 2000; Fisher, 2008a; Haiduven et al., 2006). The TDICT project utilizes a health and safety committee structure to identify and select safe sharp devices. Where devices are limited or do not exist, TDICT facilitates product designers and industrial hygienists to observe clinicians at work in combination with training healthcare workers in principles of product design and evaluation. The notion of involving front line workers in environmental walk–through evaluations for violence assessment is not new (Lipscomb et al., 2006; Rosen, 1999); however, involving frontline staff in the evaluation and procurement of security technology and environmental design services is an innovative, but logical extension of the TDICT paradigm. The TDICT process recommends focus group studies of healthcare workers to examine the design implications of engineered sharps. Finally, TDICT suggests an in–depth product evaluation of the selected engineered devices and structural and failure analyses by product designers. While the TDICT methodology has been integrated into training curricula (American Nurses Association, 2002; Fisher, 1999), an in-depth evaluation of its feasibility, effectiveness, and cost has not been done. OSHA has incorporated pieces of the process and requires the inclusion of frontline staff in the selection of engineered sharps in healthcare (OSHA, 2006).

The science of workplace violence prevention can be advanced by an approach that is informed by the distinct, yet overlapping theories and practices of injury control, public health, industrial hygiene, product design, and criminal justice. The inclusion of environmental design in workplace violence prevention interventions is based on the notion that such programs should be based on site specific risk assessments that consider the environment, organizational, and clinical practices, and the interpersonal interactions in the delivery of care.

3. Methods

3.1. Design

The context of the environmental surveys described in this report was two large federally funded intervention effectiveness research projects. These projects used a participatory action research approach, where management, labor, and direct care staff representatives worked closely with researchers in the design and implementation of the project (Isreal, Eng, Schulz, Parker, & Satcher, 2005). A statewide advisory group provided guidance and oversight for the overall project. The intervention included three main components: (a) developing and supporting a facility–level Project Advisory Groups (PAG) to design and implement a facility–specific program; (b) conducting a comprehensive risk assessment, and (c) designing and implementing

Table 1
Environmental Assessments of Four Public Inpatient Psychiatric Facilities

	Facility A	Facility B	Facility C	Facility D
	Adult	Adult	Adult Forensic	Childrens
# of beds	360	240	172	55
Wards Assessed	2 wards	3 wards	2 wards	3 living units
Access Control	Sally ports are not visibly secure.	1st floor visiting area unsupervised/ open to secretarial area.	The dining room has only one exit	
Territoriality	Night shift feels unsafe walking to bus—add security escorts, improved lighting, and "blue light" station	Night shift safety office had concerns with parking lot security	Old closed circuit television system should be replaced with system with clearer images	Need personal alarm system
	Need personal alarm system	Need personal alarm system	Therapist's office locks with individual keys—should have master keys	
	Provide emergency communications link to nurses station			
Natural Surveillance	Cluster day areas to facilitate monitoring	Secluded alcoves: dining room and offices	Nurses station is fully enclosed, poor visibility	
	Cluster night areas to facilitate monitoring	Some not able to see well at night	The exam / treatment / medication / chart room is in a remote location	
	Nurses station / med room is isolated at the end of the hall	Peep holes in dorm doors are covered	Dorms need night light for better supervision	
	Need separate spaces for meds/ exams and charting		Fish eye mirrors are used—not sufficient for remote areas and alcoves	
	Program space at one end of the ward is isolated			
	Most bedrooms do not have night lights			
	No visibility into office and program rooms			
	Visiting area is remote from control point; unable to supervise			
	There is poor visibility into the seclusion room			
	Eliminate hidden areas behind greenhouse			

Activity Support
Layout/Design

	Column 1	Column 2	Column 3	Column 4
Layout/Design	Dining rooms are too small and furniture is condensed Staff could be cornered in large 16 bed wards In the seclusion room the door can be blocked by a foam mattress No natural light in the corridors Lack of light combined with the unstimulating interior is depressing	In the dining room there were complaints of unbearable noise.	The dining room has poor acoustics; allow high levels of noise Dorms overcrowded Patients can barricade the corridor door using hampers/shower bench Window air conditioners are ineffective Wall fans are scavenged for weapons Some program rooms are closed on cold days because of poor heating Limited opportunities for activities in the outdoor recreation area	Visiting area in vestibule offers little comfort or privacy Better separation of age groups would reduce fear of intimidation Very poor ventilation, odors quite obvious Hot water is limited; prompting arguments Heating, ventilation and air conditioning system needs maintenance and upgrading Improve lighting throughout Provide expanded outdoor recreation areas
Materials	Easy to pull pictures frames from wall Wardrobe units not anchored—can be used in altercations and to block doors. Open hinged doors—replace with continuous hinges Acoustics are very poor. All finishes are non absorbent and reflect sounds In the seclusion room grille blades are removable and can be used as weapons	Picture frames are potential weapons Suspended acoustic ceiling tiles can hide contraband and weapons Aluminum door guards have sharp edges/corners Bedroom furniture is not bolted in place Aluminum framed display cabinets have sharp corners.	Metal acoustic ceiling frames can be easily removed and used as weapon Bedroom door latches are "old asylum" type with pinch hinges Activity room tables have removable fasteners and hiding areas in the base Program room windows allow little light—replace with Lexan	Bedroom wardrobes can be tipped Dining room acoustics are very poor with all surfaces hard
Maintenance	Locks on cabinets and syringe drawers are missing or broken Exposed screws in seclusion room	Vandalism and poor maintenance in the bathroom		Lots of graffiti, much apparently gang related

Table 2
Environmental Assessments of Six Inpatients Addiction Treatment Facilities

	ATC1	ATC2	ATC3	ATC4	ATC5	ATC6
Year built	1965	1931	1995	1935	1929	1996
Original use	Transitional residence for Mental Health patients	Nurses' residence	ATC	Psychiatric Hospital Ward	Nurses' residence	ATC
Year became ATC	1995	1975	1995	1978	1978	1996
Number of beds	38	26	100	50	30	60
Setting	Grounds of PC	Grounds of PC	Free–standing	11th floor of PC	Grounds of prison	Grounds of PC
Number of floors	4	2	6	1	2	2
Access Control						
	No secure staff area for monitoring of cameras Staff need discrete and secure work areas on bedroom floors Install Dutch door in nursing area where meds dispensed	No visitor reception area Windows are old, in poor condition, resulting in security problems	Bedroom windows open, easy to get contraband Poor layout for safe med distribution—poor security of meds and nurses	Must enter thru psych center "Slam" locks can accidentally isolate staff	No visitor reception area No dedicated admissions area Nurse area is congested and multi–purpose	Replace panic bars on doors
Territoriality						
	Outdoor surveillance limited	Outdoor lighting and surveillance cameras are limited				
Natural Surveillance						
	Single bedrooms configured as suites—alcove not visible to staff, patients can move room–to–room Doors into program rooms and offices need view windows Increase visibility into program rooms by replacing part of wall with Lexan	No central area to observe patient movement	Corridors with turns, bedroom alcoves result in inability to observe patients Nurses located at end of long corridor—no ability to monitor patients	Slide bar locks can prevent entrance to office or bedroom Doors into program rooms and offices need view windows	Central corridor with bedrooms and offices on both sides– supervision is difficult	

Activity Support

Layout/Design					
Outdoor recreation areas limited	Outdoor recreation areas very limited	No outdoor recreation areas	Limited outdoor recreation areas	Outdoor recreation areas OK, but could be improved	Well designed and maintained building
Dining area limited	Dining area very limited and congested. Should be replaced			Dining area very limited and congested. Should be replaced	Virtually no recommendations made
Poor separation of male–female sleeping areas	No dedicated admissions area			Lack of air conditioning makes building hot in summer	
Indoor recreation space limited Program areas limited	Program areas limited				

Materials					
Hard finishes in corridors and common areas lead to noisy environment	Hard finishes in corridors and common areas lead to noisy environment	Replace glass windows with Lexan or tempered glass	Hard finishes in corridors and common areas lead to noisy environment	Hard finishes in corridors and common areas lead to noisy environment	
Replace glass windows with Lexan or tempered glass	Replace glass windows with Lexan or tempered glass	Bedroom wardrobes can barricade doors	Replace glass windows with Lexan or tempered glass	Survey for and eliminate sharp corners/edges	
Survey for and eliminate sharp corners/edges	Survey for and eliminate sharp corners/edges		Survey for and eliminate sharp corners/edges		
Bedroom doors can be barricaded Replace chairs that have sharp angular frames			Open hinges can cause pinch injury		

Maintenance					
	Eliminate leaks and properly remediate mold	Drywall in shower areas and kitchen leads to mold/pests Disintegrating façade, scaffolding			

feasible recommendations evolving from the risk assessment (Lipscomb et al., 2006).

The settings for these studies were selected based on the state government agencies' interest in enhancing their existing violence prevention programming and because of strong labor–management cooperation within the agencies. The state employees are represented by labor unions that have negotiated for agency and local labor/management health and safety committees in their collective bargaining agreements. Furthermore, occupational health and safety is addressed by an active labor–management health and safety committee within each agency. The environmental surveys and focus groups described in this report are a part of the overall violence prevention intervention projects and were undertaken to identify environmental risk factors for violence, including staff perceptions of how the physical work environment contributes to safety at work. The findings from the staff surveys determined the enhancement of each facility's violence prevention program. The overall study design, implementation, and program evaluation was guided by a state–wide project advisory (PAG) for each agency as well as local advisory groups facility level (FPAG's). The groups met regularly throughout the project. The data described in this report were a critical part of the risk analysis step in the overall violence prevention program. The findings from these environmental surveys served as a baseline environmental assessment and led to the development, implementation, and evaluation of feasible interventions.

For each of the two studies, a critical component was conducting a robust and multifaceted risk assessment in each worksite. There were a total of 10 study sites, four psychiatric hospitals (two adult, one adult forensic, and one children's) and six inpatient addiction treatment centers. Risk assessment activities included a review of available data (injury, staffing, overtime), key informant interviews with managers and union representatives, focus groups with frontline staff, written questionnaire surveys, and a comprehensive evaluation of the physical environment. The findings from each phase of the risk assessment were reviewed by the facility project advisory groups for opportunities to enhance facility violence prevention programs.

3.2. Focus groups

The focus groups were of 75–90 minutes in duration and included 6–12 front–line staff with no managers. The psychiatric center focus groups were facilitated by a psychiatric nurse consultant with the project's violence prevention coordinator as note taker. The Addiction Treatment Center (ATC) groups were facilitated by two of the authors and were tape recorded and transcribed. Summaries of the transcripts were prepared and shared with the Facility Project Advisory Groups (FPAGs) at each of the respective agencies.

3.3. Environmental evaluation

The comprehensive evaluations of the physical environment were conducted by one of the authors, a licensed architect specializing in evaluating and designing secure and semi–secure facilities. The architect took the unique approach of merging his knowledge of materials and design with the safety and therapeutic needs on each ward he reviewed. Prior to each visit, the architect was briefed about the facility. Each visit began with a meeting with facility managers and union representatives to obtain a relevant history for the facility. The architect was accompanied on each walkthrough by a small group of managers and union representatives as well as by a member of the building's maintenance staff. In the course of the walkthrough, the architect frequently spoke with staff that he encountered to learn more about their jobs, their concerns, and the facility itself. The walkthroughs typically took 2–3 hours. At the conclusion of each walkthrough, a debriefing with managers and union representatives was held. A comprehensive written report was later prepared and shared with the relevant FPAGs and PAG. The four psychiatric hospital surveys were conducted in 2000–2001. The six addiction treatment center surveys were conducted in 2005.

4. Results

The findings from the environmental surveys are largely organized using the categories that constitute the CPTED approach (Crowe, 1991; Jeffery, 1971): Access Control, Natural Surveillance, Activity Support, and Territoriality. Within Activity Support, we have created three sub–categories: Layout/Design, Materials, and Maintenance.

At the psychiatric centers, clearly issues of *access control* had been already considered, as very few findings were made during our visits (Table 1). *Territoriality*, meaning the ability of the space users to work and inhabit the space safely, was noted as a concern in all four facilities. These were principally related to exiting the building at night, and the need for a personal alarm system while within the facility. Suggestions related to natural surveillance (i.e., the ability to observe and be observed) were noted in three of the four facilities. Many of these suggestions focused on poor visibility into specific offices or work areas or isolated areas. The architect evaluated *activity support* issues such as layout/design features that encouraged safe behavior, use of safe materials, and proper maintenance of the facility. There were numerous findings from all four psychiatric centers. Some of the design problems included poor lighting, ventilation, and layout of the space. Materials–related issues included open–hinged doors providing pinch–points, sharp objects (including picture frames), furniture that could be used as a weapon, and so forth. There were only a few maintenance issues, mainly related to evidence of vandalism that had not yet been repaired. Some of the clinical design issues were the location of the nurses station to patient day room and the relative strength or weakness of ward design for promoting patient/staff interaction and staff observation of patient activity.

Findings from the ATC environmental surveys are summarized in Table 2. A number of access control issues were noted, including the security of medication distribution and the lack of separate visitor reception areas. The territorial issues that were raised related to surveillance of outdoor areas. Within the category of natural surveillance, many offices and program areas lacked view windows, and some of the bedrooms were

Table 3
Focus Groups in Psychiatric Centers: Staff Perceptions of Environmental Design and Risk for Violence

Center	Focus group findings
Adult A	No personal alarm system
	No paging system
	Mix of forensic and non forensic patients on insecure wards
	Escorting patient to treatment mall on different floor on elevators is risky
	No escort support: 1 staff on elevator with 10 patients
	Open nursing station on some wards perceived as dangerous by staff
	Many unsafe objects
	Renovation in progress, but staff not consulted about physical changes to environment
	TV room has restricted visibility requiring more staff
	Night checks of dorm rooms are dangerous; visibility is poor; staffing is low
	There are no routine searches
	Hallways have blind spots and alcoves where patients can hide
	Offices are isolated from other staff
	Areas without phone or emergency call button, such as laundry area
	Visitors to facility and packages are not searched
Adult B	Consider radical environment re–design to increase visibility; reduce risk
	Concern about objects being used as weapons
	Staff not consulted about ways to make the physical environment safer
	Patients use drop ceilings to hide contraband
	There are no searches
	Metal frames from the drop ceilings can be used as a weapon
	Dinning room tables/chairs are lightweight; easy to pick up and throw
	Chairs have parts that can be broken off and used as weapons
	Photo frames can be ripped off the wall and easily used as weapons
	Patients use balloon valances to hide contraband
	There are blind spots and alcoves
	Personal alarms systems are not effective due to: "dead zones," battery failure and there is no systems to check and ensure sure they are working
	Smoking policies promote violence; must escort patients to smoking areas
	Concerned about visiting and contraband policies, visitors bring in weapons, such as knives and gun parts
	Visitors to facility and packages are not searched
	Client's property cannot be checked
Forensic	There is no secure unit to send violent patients and no way to separate violent patients from other patients
	Often too many patients in elevators; opportunities to pass weapons;
	Elevators are slow; lengthy waits; patients arrive late to program
	Problems with key pad entry system; Staff occasionally forget to lock doors
	Small treatment rooms; furniture and other objects can be weaponized
	Tool crib in frame shop concerns staff; tools can be stolen
Children's	Physical layout of facility is not ideal according to staff
	Visitor and patient search policies should be revised/applied consistently
	Patients get together and form gangs against other patients and/or staff
	No good way to separate the violent patients from the others
	Day room is used as a "safe area" but was not designed for this purpose
	Must leave nurses station open when using day area to watch one patient

Table 3 (*continued*)

Center	Focus group findings
Children's	Calm patients lose their social space when day area in use as "safe area"
	"Secure" units have a mix of secure and non secure patients; not safe for all
	Some staff work alone with limited knowledge of patient history (of violence)
	Teachers alone in classrooms with 12 students
	Art room has lots of loose items that can become weapons;
	Art room is isolated at end of hall
	Furniture, electric wire, and light bulbs are weaponized frequently by children
	Patients can access nurses area when day room being used as safe area
	Many "dead zones" make personal alarms systems unreliable
	Motion detectors easy for patients to defeat
	Broken phone brings patients into nurses station to use phone
	Many arguments and much tension over phones—no phone use rules
	Install surveillance cameras to reduce allegations of abuse
	Increase space per child

configured so as to make observation of and access to patients difficult. Finally, with regard to activity support, a number of issues were noted. These included inadequate recreation areas, congested dining areas, and limited program areas, in a couple of ATCs. Numerous materials–related items were noted, including noisy environments due to the use of hard surfaces, the need to replace glass with Lexan or tempered glass, and the elimination of sharp corners/edges that could result in serious injury if someone were pushed. Maintenance was considered to be generally quite good, though moisture–related mold was identified in two ATCs.

While the staff focus groups did not center on risk factors related to the physical environment, a number of issues were raised. Findings from the four psychiatric centers are summarized in Table 3. Staff voiced concerns about natural surveillance such as blind spots and alcoves, which give patients an opportunity to hide. Additionally staff reported poor lighting, which makes night checks dangerous related to poor visibility. One facility described broken phones, which caused many arguments and tension and brought agitated patients to the nurses' station to use the phone there. Staff also described congested and slow elevators; which resulted in large groups of patients congregating in the hallways. These crowded situations are often unruly and provide opportunities for patients to pass contraband (if present). Also, numerous concerns were mentioned about existing furniture, decoration, or architectural structure being used to make weapons or hide contraband. All four facilities reported concerns with technology; either lack thereof or faulty existing technology. Lastly, at least two facilities voiced frustration about not being consulted when physical changes were made to their unit/wards environment.

Table 4 summarizes the focus group findings from the ATC's. Focus groups were conducted in five of the six ATCs. One facility declined to participate in the standard focus group, therefore only five facilities are presented here. Compared to the psychiatric centers, the addictions treatment facilities are much

Table 4
Focus Groups in Addictions Treatment Centers: Staff Perceptions of Environmental Design and Risk for Violence

ATC	Focus group findings
ATC2	Unsecure parking, domestic violence incident occurred
	Staff escort peers to parking lot
	Staff person trapped behind desk by angry patient
ATC3	Property destruction, especially in bedrooms
	Staff often isolated from peers when with group of patients
	Staff can be alone on sleeping floor with 30 patients
	No ability to communicate between floors
	Staff suggest panic buttons and/or walkie–talkies
	Staff often alone with patients on nights and weekends
	No access control to basement filing area
	Little/no recreation outside of facility
	There are numerous security cameras
	Security guards slow to respond in 6-story facility
	Neighborhood violence
ATC4	Patient fist fights over phone use
	Suggested soundproof enclosure for patients' phone
	Suggested have phone cut off after five minutes
	A patient stashed razor blades throughout facility
	Violence and gang activity outside building
	Must "walk gauntlet" of psychiatric patients to enter building
	Staff desire to move ATC to own facility
	Many patients waiting during intake process leads to volatility
	Staff suggest walkie–talkies
	Staff suggest more break space for patients
ATC5	Overcrowded dining area is source of tension
	Poor environmental conditions, especially summer heat
	Suggest panic buttons in offices
	Suggest PA system that reaches all areas of facility
	Suggest "red phone" 911 on each floor
	Suggest surveillance cameras
	Suggest alarm system in nurses station
	Staff feel isolated in offices with patients
	Staff suggest view windows for office doors
	Poor access to outside recreation areas due to proximal correctional facility
ATC6	Staff happy with physical environment
	Suggest everyone ensure office setup precludes being "cornered"

smaller with fewer staff and clients. Many of the ATC buildings were originally used for some other purpose before being commissioned for an ATC. While the issues were myriad, they included concerns about being isolated, being unable to get prompt help when needed, and office layout and visibility. Depending on the facility, the staff described insecure parking areas, feeling isolated in their offices, and the possibility of being trapped behind their desk by a hostile patient. Two facilities reported neighborhood violence directly outside the building. Natural surveillance, or the ability to observe and interact with clients, was also noted as a problem. For instance, one facility suggested viewing windows be placed in office doors. Additionally, in at least three of the facilities staff suggested updating or adding technology to improve safety, communication, and visibility.

5. Discussion

In the 10 institutional psychiatric and addiction treatment centers that participated in these participatory action research projects, a robust environmental hazard evaluation was suc-

cessfully completed as part of a comprehensive workplace violence prevention program.

The findings included items relating to access control, safety of the premises (territoriality), ability to observe patients (natural surveillance), and activity support. It is important to note that these environmental assessments were used by the facility's management and union representatives as part of a multifaceted risk assessment, looking at environmental, organizational, and clinical risk factors as well. The risk assessment findings were used to develop an extensive list of potential control measures. Some of the environmental findings were easily and quickly remediated; some were more amenable to resolution in the mid–term; and some were clearly more long term as they would require significant capital expenditures. While not the subject of this paper, it is important to note that many control measures were implemented as a result of the projects.

While these environmental assessments certainly benefited from the involvement of a certified, experienced architect, we believe that the involvement of managers, union representatives, frontline staff, and building maintenance staff are of equal importance.

When contemplating conducting an environmental assessment, the first step is to assemble such a team. The attached checklist (Fig. 1 – Kevin's checklist) was developed for the project and provides a useful template, both for the walkthrough itself and for the process as well. The checklist should be modified to reflect the particular environment in which it will be used. As described in items 1 and 2 of the checklist, the assessment should also reflect information that is gathered from incident and injury reports, focus groups, staff surveys, and other activities that help identify areas of concern.

The healthcare and social service communities need additional guidance, stronger evidence, and more detailed tools and processes before environmental assessment and the application of cost effective environmental controls becomes the norm. Anecdotally and in focus groups we hear frustrated managers and staff alike complaining about their work spaces and wasteful renovations that do nothing to improve safety or productively. At a minimum, we suggest that involving the direct care workforce in design and renovation projects represents enlightened management. In addition, we have seen effective collaboration between architects, direct care staff, security, and management that improve overall working conditions with the subsequent benefit to the patient care environment as well. Our categorization of the findings using the CPTED approach may not be as simple as identifying an environmental concern, delineating the specific safety issue associated with the staff or patient concern, and listing the environmental and/or operational approach to mitigating the problem. But it does provide a framework for examining the environment within the larger context of patient care and work.

6. Impact on industry

6.1. Prevention through design

At the recent NIOSH Prevention through Design meeting attendees challenged the healthcare and social assistance sectors

to transform the current fragmented vision of safety (which focuses almost solely on patient safety) by integrating patient, staff, and environment safety (NIOSH, 2007). This work group of national leaders also felt that management culture and leadership must shift to facilitate this transformation and that frontline workers must be engaged in processes that improve safety. They also called for a renewed emphasis on applied research to provide the necessary evidence. While not focused on workplace violence, this Prevention through Design Workshop and Breakout Session provided useful guidance for practice, education, policy, and research that will benefit Type II workplace violence prevention efforts (Fisher, 2008b; McPhaul, 2008).

The evolving science known as Evidence Based Design (Berry et al., 2004) also holds promise for promoting and

Violence prevention project

Architectural Resources
Buffalo, NY

Creating a Safe Environment
Ward Survey Checklist

1. Meet with faculty staff and labor representatives
   a. Discuss concerns, incidents, resources and priorities
   b. Collect specific incident and injury data
   c. Identify a survey facilitator
   d. Combine the survey process with an examination of policies and procedures
   e. Schedule ward surveys and follow up process

2. Meet with individual ward staff
   a. Explain the goal of creating a safer work environment
   b. Review the process and schedule
   c. Discuss the layout of the ward and its ability to support the therapeutic program
   d. Review ward specific incidents
   e. Review ward specific conditions and construction details
   f. Discuss daily routines and staff assignments
   g. Review incident procedures
   h. Describe a process for ongoing input and comments

3. Survey the ward
   a. Entry area
      i. Locking procedures and locking mechanisms
      ii. Sally port ?
         1. Visibility
         2. Duress communication

   b. Circulation
      i. Eliminate alcoves
      ii. Visibility from control points

   c. On-ward offices
      i. Locking provisions
      ii. Visibility
      iii. Duress communication

   d. Nursing stations
      i. Discuss type and level of security/protection
      ii. Maximize view and supervision
      iii. Security for equipment and supplies
      iv. Off ward duress communication
      v. Emergency medical/fire safety equipment

   e. Program areas
      i. Space and furniture configuration to support small groups
      ii. Isolate noise generators (TV, stereo, active programs)
      iii. Visibility
      iv. Acoustics

Fig. 1.

Violence prevention project

Architectural Resources
Buffalo, NY

    f.   Toilets
        i.   Ability to unlock in an emergency
       ii.   Smoke detectors

    g.   Finishes
        i.   Acoustic materials in high activity areas (i.e. nurses station, program areas)
       ii.   Soft materials in area of incidents (nurses stations, outside isolation rooms, corridors)
      iii.   Be aware of metal suspension systems and concealed metal splines.

    h.   Doors and hardware
        i.   Tamper proof fasteners
       ii.   Emergency access to all rooms
      iii.   No sharp edges on hardware or door knobs
      iv.   No slam locks on isolation rooms
       v.   Automatic latching on storage rooms
      vi.   Examine hardware functions for each door/room type
     vii.   Specify continuous hinges

    i.   Furniture
        i.   Heavy furniture if throwing is a concern
       ii.   No sharp edges on trim
      iii.   Check for loose hardware, spring coils, cords
      iv.   Anchor furniture if door barricading is an issue

    j.   Accessories
        i.   No picture frames (instead use laminated panels)
       ii.   No loose HVAC louver blades

    k.   Fire safety
        i.   Clear identification of emergency exits including walls, doors and floors

    l.   Lighting
        i.   Ability to control lighting
       ii.   Night lighting
      iii.   No glass lenses

4.   Follow up
    a.   Review findings with survey committee
    b.   Review findings with ward staff
    c.   Develop a schedule for implementing improvements
    d.   Schedule a follow up evaluation of data and results

Fig. 1 (*continued*).

evaluating healing environments. While this field has not focused on testing innovative healthcare designs for staff safety, there is evidence for improved patient outcomes associated with natural light, windows allowing views of nature, and noise reduction. What is needed is the integration of design sciences with occupational safety science to better understand the impact of ward and facility design together with security technology on the effectiveness of workplace violence programs. Ideally, violence prevention and other occupational safety considerations become part of the design of every new and renovated building in the healthcare and social services industry.

7. Summary

This retrospective review of environmental survey findings from two participatory action research projects illustrates the nature and type of environmental risk present in 10 public facilities.

This work demonstrates that engagement of the direct care workforce in understanding and evaluating the security and design issues involved in their day–to–day safety is an integral aspect of workplace violence prevention. Much like the successful paradigm used to control and regulate exposure to blood

borne pathogens in healthcare, existing state workplace violence prevention regulations and federal OSHA guidelines call for comprehensive programs and involvement of frontline workers (OSHA, 1996, 2004). In addition, practical guidance to health-care and social assistance employers is emerging from lessons from crime prevention, industrial hygiene, public health, product and building design, and security technology.

References

American Nurses Association. (2002). *Needlestick prevention guide.* Retrieved January 16, 2008, 2008, from http://www.needlestick.org/needlestick/needleguide.pdf

Berry, L. L., Parker, D., Coile, R. C., Jr., Hamilton, D. K., O'Neill, D. D., Sadler, B. L., et al. (2004). The business case for better buildings. *Frontiers of health services management*, 21(1), 3−24.

Bureau of Labor Statistics. (2006). *Survey of workplace violence prevention, 2005.* Retrieved January 19, 2008, 2008, from http://www.bls.gov/iif/osh_wpvs.htm

Casteel, C., Peek-Asa, C., Howard, J., & Kraus, J. (2004). Effectiveness of crime prevention through environmental design in reducing criminal activity in liquor stores: A pilot study. *Journal of Occupational and Environmental Medicine*, 46, 450.

Crowe, T. D. (1991). *Crime prevention through environmental design: Applications of architectural design and space management concepts.* Boston, MA: Butterworth–Heinemann.

Fisher, J. (1999). Strategies for integrating health care workers into the process of design, selection and use of control technology. In W. Charney (Ed.), *Handbook of modern hospital safety.* Boca Raton, FL: CRC Press.

Fisher, J. (2008a). *TDICT.* Retrieved January 11, 2008, from www.ospedalesicuro.org/materiali/doc/TDICT.htm.htm

Fisher, J. (2008b). User-based design: A case study in prevention of occupational exposure to blood. *PTD in Motion*, 1, 5−6. http://www.cdc.gov/niosh/topics/ptd/#motion

Fisher, J., & Wilburn, S. (2000). Don't get stuck with unsafe needles. *American Journal of Nursing*, 100(10), 139.

Gates, D., Ross, C., & McQueen, L. (2006). Violence against emergency department workers. *Journal of Emergency Medicine*, 31(3), 331−337.

Haddon, W. (1972). A logical framework for categorizing highway safety phenomena and activity. *Infection & Critical Care*, 12(3), 193−207.

Haddon, W. (1974). Strategy in preventive medicine: Passive vs. active approaches to reducing human wastage. *Journal of Trauma–Injury Infection & Critical Care*, 14(4), 353−354.

Haiduven, D., Applegarth, S., DiSalvo, H., Mangipudy, S., Konopack, J., & Fisher, J. (2006). A pilot study to measure the compressive and tensile forces required to use retractable intramuscular safety syringes. *American Journal of Infection Control*, 34(10), 661−668.

Harris, R. L. (Ed.). (2000). *Patty's industrial hygiene (5th edition) volumes 1–4* (5th ed.). Chichester, West Sussex, UK: John Wiley & Sons.

Isreal, B. A., Eng, E., Schulz, A. J., Parker, E. A., & Satcher, D. (2005). *Methods in Community–Based Participatory Research for Health.* San Francisco: John Wiley & Sons.

Jeffery, C. R. (1971). *Crime prevention through environmental design.* Beverly Hills, CA: Sage Publications.

Lipscomb, J., McPhaul, K., Rosen, J., Geiger Brown, J., Choi, M., Soeken, K., et al. (2006). Violence prevention in the mental health setting: The New York state experience. *Canadian Journal of Nursing Research*, 38(4), 96−117.

Mair, J. S., & Mair, M. (2003). Violence prevention and control through environmental modifications. *Annual Review of Public Health*, 24, 209−225.

McPhaul, K. (2008). Comprehensive workplace violence programs include attention to environmental design. *PTD in Motion*, 1, 4−5. http://www.cdc.gov/niosh/topics/ptd/#motion

Michigan Department of Human Services (2007). *Worker's safety: Lisa's law.* (Retrieved August 24, 2007, from http://www.michigan.gov/dhs/0,1607,7-124-5459_7341-15406-,00.html).

National Institute for Occupational Safety and Health [NIOSH]. (1996). *Violence in the workplace: Risk factors and prevention strategies.* Cincinnati, OH: Author No. CIB #57.

National Institute for Occupational Safety and Health [NIOSH]. (2007). *Prevention through design.* 2007, July 9–11, http://www.cdc.gov/niosh/topics/ptd/#workshop

New York State Department of Labor (2007). *Workplace violence prevention requirements for New York state public employers.* Retrieved March 5, 2008, from http://www.labor.state.ny.us/workerprotection/safetyhealth/PDFs/Workplace%20Violence%20FlyerNov3.pdf

Occupational Safety and Health Administration [OSHA]. (1996). *Guidelines for preventing workplace violence for healthcare and social service workers.* Washington, DC: Author No. OSHA # 3148.

Occupational Safety and Health Administration [OSHA]. (2004). *Guidelines for preventing workplace violence for health care & social service workers.* Washington, DC: Author No. OSHA 3148-01R 2004.

Occupational Safety and Health Administration [OSHA]. (2006). *Regulations (standards–29 CFR) bloodborne pathogens. - 1910.1030.* Washington, DC: Author No. 1910.1030.

Occupational Safety and Health Administration [OSHA]. (2008). *Hospital eTool–healthcare wide hazards module workplace violence.* Retrieved January 16, 2008, 2008, from http://www.osha.gov/SLTC/etools/hospital/hazards/workplaceviolence/viol.html

Peek-Asa, C., Casteel, C., Allareddy, V., Nocera, M., Goldmacher, S., OHagan, E., et al. (2007). Workplace violence prevention programs in hospital emergency departments. *Journal of Occupational & Environmental Medicine*, 49(7), 757−763.

Peek-Asa, C., Casteel, C., Mineschian, L., Erickson, R. J., & Kraus, J. F. (2004). Compliance to a workplace violence prevention program in small businesses. *American Journal of Preventive Medicine*, 26(4), 276−283.

Peek-Asa, C., Cubbin, L., & Hubbell, K. (2002). Violent events and security programs in california emergency departments before and after the 1993 hospital security act. *Journal of Emergency Nursing: JEN: Official Publication of the Emergency Department Nurses Association*, 28(5), 420−426.

Peek-Asa, C., & Zwerling, C. (2003). Role of environmental interventions in injury control and prevention. *Epidemiologic Reviews*, 25, 77−89.

Rosen, J. (1999). A joint labor/management experience in implementing OSHA's violence prevention guidelines in the NYS office of mental health. In W. Charney (Ed.), *Handbook of modern hospital safety.* Boca Raton, FL: CRC Press.

Smith, K. (2004). *Environmental hazards: Assessing risks and reducing disaster* (4th ed.). New York: Routledge.

Speier, Killea, & Watson. (1993). *AB 508.* Retrieved January 20, 2008, 2008, from http://www.leginfo.ca.gov/pub/93-94/bill/asm/ab_0501-0550/ab_508_bill_931008_chaptered

State of New Jersey 212th legislature. (2006). *Senate no. 1761 No. Senate No.1761.*

Washington State Department of Labor and Industries. (2002). *Violence in Washington workplaces, 1995–2000.* No. 39–4–2002.

Kathleen M. McPhaul *PhD, MPH, BSN, RN.,* is Assistant Professor and core faculty member of the University of Maryland Work and Health Research Center. She is a co-investigator on several on-going and completed workplace violence research projects. She is an occupational health nurse specialist with over 20 years experience in occupational health services, program development, policy and research. She has authored and co-authored several publications on workplace violence and has presented widely on the topic at scientific, clinical, and public meetings. She provides consultation to health care systems and facilities on workplace violence prevention. She teaches courses on leadership and safety in the healthcare work environment.

Matthew London *MS* has worked in occupational health and safety for 25 years. He earned an M.S. in industrial hygiene from the University of Cincinnati, received epidemiologic training as a member of the CDC's Epidemic Intelligence Service (EIS), and then worked from 1982–87 at the National Institute for Occupational Safety and Health (NIOSH) conducting Health Hazard Evaluations. Beginning in 1987, Matt worked at the NYS Department of Health (DOH), helping to develop New York's statewide Occupational Health Clinic Network and overseeing DOH's industrial hygiene activities. Since May 2004, Matt has worked as project coordinator for two NIOSH–funded workplace violence prevention projects being conducted within NYS government.

Kevin Murrett is an architect with experience in designing and renovating secure buildings for patient and other populations. He participated in two federally funded workplace violence intervention studies conducting the environmental assessments and providing the reports for use by staff and management. He has participating in educational and scientific conferences presenting aspects of his strategies for environmental assessments for workplace violence.

Jonathan Rosen *MPH, CIH* has served as Director of the Occupational Health & Safety Department for NYS Public Employees Federation, AFL–CIO since 1990. In this capacity he has facilitated PEF's 130 joint health & safety committees and developed programs addressing infectious disease, chemical, ergonomic, and safety hazards, including workplace violence prevention. Jonathan has conducted workshops on workplace violence for the George Meany Institute, the Albany Law Center, the SUNY School of Public Health, the American Psychiatric Association, the Oregon Industrial Relations Research Association, the 1999 Montreal International Conference on Occupational Health for Healthcare Workers, the University of Iowa Workplace Violence Intervention Research Workshop, and the Veteran's Health Administration. He is a contributing author to Lewis Publishers Volume 4, Essentials of Modern Hospital Safety: "A Joint Labor/ Management Experience in Implementing OSHA's Violence Prevention Guidelines in the NYS Office of Mental Health" and the author of "*A Labor Perspective of Workplace Violence Prevention*," published in the February 2001 American Journal of Preventive Medicine. He is currently co-investigator on a federal NIOSH intervention research grant studying workplace violence intervention in New York State Social Service Agencies and also a NIOSH grant evaluating TYPE III Violence. Jonathan has completed a Master's Degree in Industrial Health at the University of Michigan and is a Certified Industrial Hygienist.

Kelly Flannery *R.N., B.S.N.* – has been a registered nurse for five years. She earned her bachelors of science in nursing from Drexel University. She has worked in critical care, the operation room and research. Currently she is a graduate research assistant on two workplace violence projects at the University of Maryland. She completed an internship at the Public Employees Federation conducting a study on the impact of a state workplace violence law. Her interests are public health and epidemiology.

Jane Lipscomb *RN, PhD, FAAN*, is Professor and Director of the School of Nursing's Center of Excellence, the Work and Health Research Center. She is Principal Investigator on three NIOSH–funded intervention evaluation R01s. She has recently completed a NIOSH–funded study entitled "Effects of OSHA Guidelines on Violence Prevention in Mental Health." In each of these projects, Dr. Lipscomb has successfully led a team of researchers, union, and management partners in the development, implementation, and evaluation of workplace interventions. Dr. Lipscomb is an epidemiologist with over 25 years of experience conducting research focusing on health care and other groups of workers. She has conducted intervention effectiveness research on workplace violence for the past 10 years.