

TAKEAWAYS



SAFETY RISK ASSESSMENT:

The Center for Health Design Toolkit – Risk Components

An Executive Summary on Mitigating Risk in Healthcare Facility Design

INSIDE YOU WILL LEARN ABOUT:

Six risk components that contribute to safety risk in healthcare settings

Design solutions for the built environment that may mitigate risk

Risk mitigation as part of a systems approach that includes facility design

This executive summary was created as a supplement to the Safety Risk Assessment (SRA) toolkit and other SRA-related Issue Briefs, Backgrounders, and Top Design Strategies. This toolkit is not intended to be a guarantee of a safe environment; the environment is one part of a safety solution that includes operational policies, procedures and behavior of people. It is intended for use with collaborative input of project- and facility-based expertise.



AUTHORS

Ellen Taylor, AIA, MBA, EDAC
Director of Research

Xiaobo Quan, PhD, EDAC
Senior Researcher

Terri Zborowsky, PhD, EDAC
Research Associate

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This summary compiles the executive summaries of six Safety Risk Assessment Issue Briefs to provide a high-level overview of the latent conditions of the built environment and their related design categories found in the CHD SRA toolkit.

The CHD Safety Risk Assessment (SRA):

Mitigating Risk in Healthcare Facility Design

A large and growing body of evidence indicates that the physical environment impacts patient and staff safety; stress and satisfaction; staff effectiveness; and organizational resource outcomes in hospitals and other healthcare settings. Facility replacement and renovation projects provide an opportunity to identify and mitigate or eliminate built environment underlying (latent) conditions that may lead to active failures impacting patient safety.

The design industry often thinks of safety in the context of fire and life safety. Healthcare owners and caregivers may think of safety in the context of, serious reportable events and hospital-acquired conditions. Poorly designed and operated healthcare environments can contribute to harm associated with adverse events such as healthcare-associated infections (HAIs), medication errors, injury from patient handling, self-harm (or violence against others), security breaches, and falls. It may seem overly simple to indicate a list of design interventions can improve safety, but safety begins with an awareness of features within the facility that may be an underlying condition of harm. Safety in healthcare is complex and requires a systems approach – understanding the organizational factors, the people, and the environment. The environment is often overlooked.

The goal of the Safety Risk Assessment (SRA) toolkit is to provide guidance to consider the underlying conditions that can lead to harm. This tool supports the requirement for the SRA found in the FGI *Guidelines* (a requirement instituted in 2014).

There are six components of consideration in the SRA toolkit: infection control, patient handling, medication safety, falls, injury of behavioral health, and security. The toolkit is not intended to be a guarantee of a safe environment; the environment is one part of a safety solution that includes operational policies and procedures and behavior of people. It is intended for use with collaborative input of project and facility-based expertise. The tool is also not a comprehensive list of guideline requirements but provides a high-level



overview of certain considerations and their relationship to safety. It is important to note that the tool does not provide a “score” derived from the inclusion of considerations. Safety is not necessarily improved by using more features, but by the thoughtful consideration of risk and implications of choices within the context of each healthcare setting.

The online SRA toolkit (www.healthdesign.org/sra) has been created through a consensus process of experts in each of the safety risk areas. The Center for Health Design extends its gratitude to all the participants and volunteers that supported content development and testing. The Center also thanks the three pilot sites who made their project teams available for testing: Barnes-Jewish Hospital, University of California Irvine Medical Center, and Memorial Sloan Kettering Cancer Center. The toolkit has been created with support from the Agency for Healthcare Research and Quality (AHRQ) Grant R13HS021824 and the Facility Guidelines Institute (FGI). The content is solely the responsibility of the authors and does not necessarily represent the official views of the Agency for Healthcare Research and Quality.

Infection Control

Healthcare-associated infections (HAIs) are defined as infections that patients acquire during the process of receiving care in healthcare facilities. Among the most common complications in U.S. healthcare, HAIs directly contribute to the deaths of ten of thousands and extra costs of billions of dollars each year that are otherwise preventable. Mounting evidence from scientific research indicates that the physical environment of healthcare facilities plays a significant role in infection prevention. Key recommendations include:

- Single-bed patient rooms, as compared to multi-bed rooms, may provide physical separation between patients therefore reduce risk of cross-contamination through air and contact transmission;
- Isolation rooms with proper air flow design may help reduce air-borne transmission of pathogens;
- Hand hygiene device design (including number, location, features that reduce the possibility of re-contamination, reminder of hand hygiene)





may impact hand hygiene performance which is considered as the single most important measure of infection prevention.

- Heating ventilation and air-conditioning (HVAC) design to provide air dilution, filtration, and disinfection for the purpose of reducing air contamination.
- Easy-to-clean/maintain finishes and furnishings that can help contribute to environmental cleanliness.
- Potential sources of contamination, such as construction sites, should be monitored and controlled.

There is no silver bullet for solving the problem of HAIs. When healthcare organizations endeavor to prevent HAIs, they often find a systems approach to be most effective. In this approach, the physical environment measures are coordinated with many other factors, including the organizational and clinical policies and procedures, as well as the workflow and behavior of caregivers, staff, and patients that use the facility, to achieve the best possible outcomes.

Falls

Falls were one of 28 medical errors that were identified by the national Quality Forum (NQF) as a “never event” - unambiguous, serious, and usually preventable. In 2008, the U.S. Centers for Medicare and Medicaid ceased reimbursement for certain injuries associated with hospital falls. Risk factors for falls include intrinsic and extrinsic conditions – those related to the individual and those outside of the individual, including the environment. Latent conditions that contribute to falls risk include:

- Visibility of/accessibility to patients, from staff and family perspectives
- Distance to the bathroom (related to frailty);
- Bathroom identification due to cognitive limitations (e.g., confusion).
- The reachability of personal items, nurse call technology, or assistive devices such as grab bars due to physical limitations (i.e., anthropometrics, strength).





- Glare, improper lighting, or inadequate contrast aggravated by perceptual limitations, including visual acuity.
- Specific environmental hazards that contribute to slips trips and falls, such as slippery floors due to weather (e.g., ice, snow, rain) or other contamination such as spills or urine; the presence of obstacles in the path of travel, such as equipment, cords, tubing, or clutter; flooring characteristics and design conditions; or furniture that inhibits mobility.
- Noise, that may increase sleep disturbances and fatigue that contribute to the risk of falls
- Reduced awareness of fall risk due to inadequate visual cues (e.g. signs).

These latent conditions can, in part, be mitigated by facility design that addresses the building envelope, unit layout, room layout, material selection, lighting, assistive devices (i.e., grab bars), furniture selection, technology, and signage. Solutions should also take into account the organizational and clinical policies and procedures, as well as the workflow and behavior of caregivers, staff, and patients that use the facility.

Patient Handling and Movement

Patient handling and movement (PHAM) activities (e.g., lifting, transferring, positioning, and sliding patients without assistive technology) constitute an essential component of healthcare. However, manual patient handling and movement often introduces safety risks to both staff (e.g., musculoskeletal injury) and patients (e.g., pressure ulcers, skin tears, depression). This results in potential financial consequences to the organization (e.g., lost time, backfilling injured staff, workman's compensation) (Alamgir, Li, Gorman, et al., 2009; Health Guidelines Revisions Committee Specialty Subcommittee on Patient Movement, 2010). To mitigate the risks associated with patient handling and movement, many healthcare organizations have engaged in safe patient handling programs including policy change, ergonomic assessment, education, and physical environment interventions.

Research shows that the built environment may play a significant role in facilitating (e.g., wider bathroom door) or impeding (e.g., limited storage spaces





for patient handling assistive devices) PHAM tasks, even research evidence is limited on some of the building design elements. Based on research evidence and best practices, key design considerations for PHAM include:

- Short patient transport routes with features that facilitate patient movement (e.g., design of corridors, ramps, and doorways);
- Flexible and adaptable room designs to reduce patient transfers;
- Selection of PHAM equipment depending on patient population characteristics and the ease of use of the equipment;
- Spaces for using and storing the PHAM equipment;
- Structural, electrical, and lighting design that support the use of PHAM equipment (e.g., convenient, easy-to-reach electrical outlets) and
- Ceiling and flooring design that facilitate the use of overhead and mobile PHAM equipment (e.g., removal of thresholds, ramps).

Medication Safety

The work environment is often identified as a contributing factor to medication errors (Chaudhury, Mahmood, & Valente, 2009; Mahmood, Chaudhury, & Valente, 2011). According to recent standards issued by the United States Pharmacopeia (2010), there are five key areas that are latent conditions that contribute to risk in medication safety. These include: workspace organization, lighting, interruptions and distractions, sound and noise, and medication safety zones.

Design to mitigate risk and improve medication safety include:

- Workspace organization informed by the all of the work tasks that will be performed in the space.
- Medication safety zones (i.e., work surfaces in a medication room, countertops on medication carts, automated dispensing cabinets, locations where prescribing decisions are made, pharmacies, and patients' bedsides medications are administered) to accommodate the number of workers and the range of tasks, while:
 - Decreasing potential for interruptions and distractions through visual or physical separation.





- Controlling noise through selection of HVAC systems, equipment, acoustical absorbing materials, and physical layout.
- Providing appropriate illumination with focused task lighting and transition lighting to avoid light and dark spots in these areas.
- Standardizing placement of items, where possible, to reduce staff cognitive load and help increase efficiency and reduce errors.
- Providing clear visualization of medications by minimizing clutter through drawer and storage design, lighting design, counter height, use of adjustable fixtures and workspace design.
- Accounting for technology and potential future technology that will impact workflow and layout planning including provision of cabling and electrical outlets.
- Design for safe sharps use to minimize needlestick injuries, reduce contamination from blood and body fluids, minimize postural stress and injury, and minimize risk of accidental or unauthorized access by others.

These latent conditions can, in part, be mitigated by a facility design that addresses the unit layout, room layout, interior design/finishes, lighting, furnishings and technology integration. Solutions should also take into account the organizational and clinical policies and procedures, as well as the workflow and behavior of the staff who engage in medication preparation and delivery.

Security

In the context of preventing harm and loss in healthcare settings, there is a relationship between safety and security. Safety is often associated with accidents (inadvertent harm), whereas security events are often associated with a conscious decision or intent to cause harm (York & MacAlister, 2015). However, since accidents and disasters are both security-related events, security concerns can be seen as spanning a range from intentional harm (e.g., burglary, arson) to unintentional harm (e.g., natural or man-made disasters, accidental fire).

In the context of the National Quality Forum (NQF) “never events,” security is aligned with patient protection associated with suicide or elopement and



criminal acts, such as abduction or serious injury from assault. Layers of protection (IAHSS, 2012) should be incorporated to offer protection:

- At the perimeter of the facility site;
- At the building perimeter;
- Against unauthorized visitor access to security sensitive areas;
- Against unauthorized access to non-public areas of the facility; and
- Against unauthorized staff access to highly sensitive areas.

Conditions that contribute to improved security include physical controls, psychological deterrents, and often an interaction between the two (York & MacAlister, 2015). Latent conditions include:

- Control of access points into the site and at the facility perimeter;
- Lighting of the site and parking;
- Visibility - direct lines of sight and surveillance (inside and outside);
- Adjacencies of security-sensitive areas (e.g., intensive care, newborn nursery) to public spaces;
- Levels of enclosure and safe exit from work spaces;
- Highly hazardous materials (e.g., biological, chemical, radioactive);
- Technology separation and independence; and
- Threats to specific areas such as pharmacies, health information management spaces, and emergency departments.

These latent conditions can, in part, be mitigated by facility design that addresses site optimization, the building envelope, building layout, unit layout, interior design, and technology. Solutions should take into account the internal forces (culture, organizational policies and procedures) and external forces (regulatory requirements for operation), as well as the workflow and behavior the facility occupants, whether staff, patients, families, or visitors.



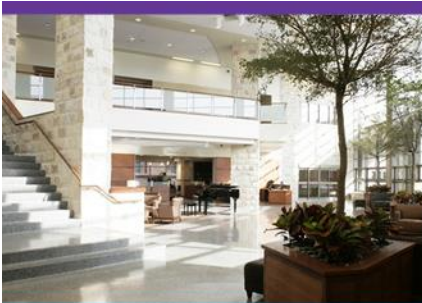


Injury of Behavioral Health

Risk factors for behavioral health patients include intrinsic and extrinsic conditions – those related to the individual and those outside of the individual, including the environment. Latent environmental conditions that contribute to behavioral health associated risks of self-harm, harm to others, elopement, and unauthorized access include:

- Access to high risk areas (e.g., a roof, balcony, porch or window);
- Controlled egress;
- Visibility and accessibility to patient-occupied areas (inside and outside);
- Patient accessibility to staff (e.g., team stations) or high-risk areas (e.g., environmental service supplies);
- Availability of secure holding (i.e., emergency departments, seclusion);
- Safety characteristics of finishes and design elements (e.g., toxicity);
- Furnishings and/or furniture that can be used for barricades, suicide, projectiles, or entrapment;
- Patient accessibility to ligature (hanging) points (e.g., plumbing fixtures, mechanical (HVAC) systems, electrical fixtures and outlets, doors); and
- Other issues that may contribute to negative patient perceptions (e.g., lighting, colors, signage).

These latent conditions can, in part, be mitigated by a facility design that addresses the building envelope, unit layout, room layout, material selection, lighting, assistive devices (i.e., grab bars), furniture selection, technology, and signage. Solutions should also take into account the organizational and clinical policies and procedures, as well as the workflow and behavior of caregivers, staff, and varied patient populations that use the facility.



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The Center for Health Design advances best practices and empowers healthcare leaders with quality research providing the value of design in improving patient and performance outcomes in healthcare facility planning, design, and construction, optimizing the healthcare experience and contributing to superior patient, staff, and performance outcomes.

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References

- Chaudhury, H., Mahmood, A., & Valente, M. (2009). The Effect of Environmental Design on Reducing Nursing Errors and Increasing Efficiency in Acute Care Settings A Review and Analysis of the Literature. *Environment and Behavior*, 41(6), 755–786. <http://doi.org/10.1177/0013916508330392>
- Health Guidelines Revisions Committee Specialty Subcommittee on Patient Movement. (2010). *Patient Handling and Movement Assessments: A White Paper* (White Paper) (p. 149). Dallas, TX: Facility Guidelines Institute. Retrieved from www.fgiguideelines.org/pdfs/FGI_PHAMA_whitepaper_042810.pdf
- IAHSS, D. G. T. F. (2012). *Security Design Guidelines for Healthcare Facilities*. Glendale Heights, IL: International Association for Healthcare Security and Safety (IAHSS). Retrieved from <http://www.iahss.org/REF-MATERIALS/guidelines/designguidelines2012.pdf>
- Mahmood, A., Chaudhury, H., & Valente, M. (2011). Nurses' perceptions of how physical environment affects medication errors in acute care settings. *Applied Nursing Research : ANR*, 24(4), 229–237.
- United States Pharmacopeia (USP). (2010). General Chapter (1066) Physical Environments That Promote Safe Medication Use. *United States Pharmacopeia, National Formulary, USP 34-NF 29*. Retrieved from http://www.usp.org/sites/default/files/usp_pdf/EN/USPNF/c1066.pdf
- York, T. W., & MacAlister, D. (2015). *Hospital and Healthcare Security* (Sixth Edition). Waltham, MA: Butterworth-Heinemann.