



BEHAVIORAL HEALTH:

Mitigating Risk in Healthcare Facility Design

A Module on a Safety Risk Assessment Component

THIS SAFETY MODULE INCLUDES:

Backgrounder

Design Strategies

Issue Brief

This module 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.

The Safety toolbox is made available through a partnership with



This document will be updated in 2018 to be a stand-alone reference under the Grainger sponsorship.



BACKGROUND

Understanding Harm in Behavioral Health

AN ARRAY OF BEHAVIORAL HEALTH DISORDERS

BH encompasses many disorders (NIMH, n.d.), including:

- Anxiety Disorders
- Attention Deficit Hyperactivity Disorder (ADHD, ADD)
- Autism Spectrum Disorders (ASD)
- Bipolar Disorder (Manic-Depressive Illness)
- Borderline Personality Disorder
- Depression
- Eating Disorders
- Generalized Anxiety Disorder
- Obsessive-Compulsive Disorder (OCD)
- Panic Disorder
- Post-Traumatic Stress Disorder (PTSD)
- Schizophrenia
- Social Phobia (Social Anxiety Disorder)

See the associated Issue Brief for additional detail.

It is important to understand that behavioral health (BH) is a term that covers a vast array of ages and disorders, and each population and age group may include unique situations (NIMH, n.d.). These unique characteristics need to be considered when evaluating the environment of this vulnerable population. Certain BH locations or BH patient groups might be more “at risk” than others. For example, studies indicate that while the majority of self-harm (e.g., suicide) and violence against others (e.g., assault) occurs in a behavioral health-specific unit, other departments of the facility are affected as well (Mills, DeRosier, Ballot, Shepherd, & Bagian, 2008; Mills, Watts, DeRosier, Tomolo, & Bagian, 2012; Mills, Watts, & Hemphill, 2014). People with BH issues can present in any type of healthcare setting. In an acute state, they are most likely to be seen in the emergency department and then moved to another part of the hospital, including behavioral health, critical care, or general medical/surgical units.

When it comes to self-harm or harm of others, people with BH issues may not be fully aware of their own behavior. This can be due to their symptoms, their specific psychopathology, and/or the medications they take to help them control their symptoms. Much more research is needed to address each of the behavioral health diagnoses, age groups, and other special needs (e.g., the elderly, who may have memory lapses alongside their other issues; a child in a wheelchair who is autistic).

Based on the “at risk” considerations identified and the available data, the degree of potential harm must be estimated (e.g., injury, sentinel event) to establish priorities during the caregiving process. This may be supplemented with national data. However, findings on BH self-harm and workplace violence in healthcare settings are sparse. The Joint Commission reports data on sentinel event root cause analysis related to suicide in participating hospitals (The Joint Commission, 2010), and some states track overall suicide statistics that include hospital suicides (New York State, 2009). With respect to violence against healthcare workers, the Bureau of Labor Statistics collects data by industry (BLS, n.d.), and NIOSH and OSHA (2013) provide guidance on harm prevention programs including background BLS data.



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TOP DESIGN STRATEGIES

OVERVIEW

Design to mitigate self-harm and harm against others for people with behavioral health symptoms range from large-scale decisions (e.g., site design) to more detailed decisions (e.g., door hinges). However, even small details can affect the layout, so it is helpful to be aware of all considerations in the early stages of the project.

It is also important to understand where one decision may be a tradeoff with another, such as bathroom privacy and visibility. Note that safety is not necessarily improved by a “score” derived from the use of a particular number of features.

Safety Risk Assessment: Injury of Behavioral Health Design Strategies

The following design solutions are a brief summary of the content found in the SRA Issue Brief “Behavioral Health: Mitigating Risk in Healthcare Facility Design.” They are organized by building design category.

Site Optimization

- Ensure that exterior areas accessible to the unit or patients are well-lit.
- Secure the outdoor perimeter in a manner appropriate for the population served, and consider exterior fences and walls designed to mitigate elopement.
- Select and design exterior landscaping to mitigate the risk of elopement through access to roofs, fences, or walls.
- Design exterior landscaping to allow visibility and surveillance by staff where patients have outdoor access to detect and mitigate patient self-harm and elopement.
- Select non-toxic exterior (and interior) landscaping to preclude the use of landscaping features (e.g., branches) as weapons.
- Provide visual and/or physical access to nature for patients, where possible, as appropriate for the population.

Building Envelope/Structure

- Limit opening sizes of operable windows to mitigate jumping risk (i.e., 4”).
- Specify security glazing to address the risks associated with the room type (e.g., seclusion room, patient room, activity room, group room, corridor). (This consideration is also relevant under room layout for interior windows.)



Building Layout

- Locate security in close proximity to behavioral health units to facilitate quick response times.
- Secure or design to mitigate jumping in any areas where the risk of jumping may be an issue (e.g., roof, balcony, porch, window).
- Include secure psychiatric/behavioral health units for those at risk of self-harm.

Unit Layout

- Balance safety and security of inpatient unit design between the need for a therapeutic environment and patient/staff safety.
- Include spaces with opportunities for both reflection and social interaction on the unit to provide patients a choice of stimulation or privacy.
- Control unit doors for entry and exit where warranted by the patient population (e.g., sally port, locked with viewing panel).
- Design layout to eliminate blind spots and areas where staff can become isolated and overcome.
- Design layout to maximize visibility and accessibility to all patient-occupied areas, including treatment spaces (e.g., exam rooms).
- Where the layout cannot be changed, reduce hazards by other means (e.g., corner mirrors or cameras).
- Provide nurse stations/team care areas with open access to communication while providing safety for staff.
- Provide separate secure rooms for patients at risk for suicide, self-harm, or harm against others in both inpatient units (as warranted) and the ED (e.g., psychiatric, criminal patients).
- Provide visual access for staff to all areas of secure holding (including cameras or mirrors for blind spots) to mitigate self-harm and detect elopement.
- Include secure storage for environmental service items.
- Provide ceilings high enough to mitigate the risk of access to ceiling fixtures. (This consideration is also relevant under building envelope/structure, as it may affect floor-to-floor heights.)





Room Layout

- Provide space immediately outside any seclusion room for the response team to manage a patient needing seclusion.
- Provide any seclusion room with the space needed for additional staff when required to contain a patient (i.e., no less than 7 feet wide and no more than 11 feet long).
- Design patient rooms with no more than two beds.
- If doors to patient rooms and/or patient toilet rooms are lockable, provide locks designed to allow emergency access.
- Specify that support rooms opening into patient-accessible corridors are lockable (e.g., utility, environmental services, administration).
- Design door swings to prevent a patient from barricading a room from the inside.
- Design patient toilet room doors in patient rooms to reduce hanging points.
- Eliminate doors entirely if adequate patient privacy can be maintained.

Interior Design/Finishes

- Design ceilings with monolithic surfaces to restrict ceiling space access in high-risk areas.
- Select door handles and other hardware (closers, hinges) to reduce possible anchor points for hanging.
- Eliminate doors with hold-open devices and self-closers that could be used as an anchor point for hanging.
- Consider materials to reduce noise and all forms of self-harm (e.g., breakability, breathability, toxicity, flame retardance).
- Incorporate room details designed to eliminate sharp edges and include rounded outside corners.
- Select mirrors made of non-breakable material.
- Specify bathroom hardware and accessories to reduce risk of self-harm (anchor points) and harm to others (fixture parts becoming weapons).
- Select “no gap” grab bars to eliminate suspension points for hanging.



- For patient-accessible storage, provide fixed, non-adjustable shelves or hooks that support no more than 4 pounds (and do not have rods or hangers).
- Affix wall and floor finishes, ceilings, molding, and other interior details to limit spaces where contraband items can be hidden.
- Install artwork in a manner that does not create potential hazards to patients (e.g., non-breakable frame/covering, secured with tamper-resistant fasteners).

Furnishings

- Design/select furnishings and/or furniture (by physical attachment or weight) to mitigate self-harm (barricade, suicide) and harm to others (projectiles, entrapment). (This consideration is also relevant under site optimization for exterior furniture.)

Plumbing

- Select flush-mount plumbing fixtures (e.g., shower heads) where possible to minimize risk of use as ligature points.
- Design plumbing with concealed pipes to minimize potential ligature points.
- Secure sprinkler heads from tampering (flush or a breakaway design that does not activate the head).

Mechanical (HVAC)/Electrical

- Select tamper-resistant light fixtures and other appurtenances.
- Eliminate or control electrical outlets to mitigate self-harm. Incorporate all HVAC components (e.g., air grilles, thermostats, under-window heating and cooling units) to reduce ligature attachments and possible patient tampering that could lead to hanging or harm to self or others.

Technology Integration

- Provide communication systems or panic (duress) alarms to mitigate risk of harm to staff and incorporate video surveillance systems.
- Ensure all telephones accessible to patients are specified with either safety cords or cordless/"hands-free" equipment.



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Additional Resources

OSHA. Guidelines for Preventing Workplace Violence for Health Care & Social Service Workers:

<http://www.osha.gov/Publications/OSHA3148/osha3148.html>

Shepley, M., & Pasha, S. (2013). Design Research and Behavioral Health Facilities (Literature Review): The Center for Health Design:

https://www.healthdesign.org/sites/default/files/chd428_researchreport_behavioralhealth_1013-final_0.pdf

Hunt, J., & Sine, D. (2015). Common Mistakes in Designing Psychiatric Hospitals: An Update:

http://www.fgiguideguidelines.org/pdfs/FGI_CommonMistakesPsychiatricHospitals_1505.pdf

Hunt, J., & Sine, D. (2015). Design Guide for the Built Environment of Behavioral Health Facilities:

http://www.fgiguideguidelines.org/pdfs/DesignGuideBH_7.0_1505_rev.pdf

Additional resources not focused on design:

National Institute for Mental Health: <https://www.nimh.nih.gov>

U.S. Department of Veteran's Affairs Mental Health:

<http://www.mentalhealth.va.gov>

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BEHAVIORAL HEALTH:

Mitigating Risk in Healthcare Facility Design

An Issue Brief on a Safety Risk Assessment Component

INSIDE YOU WILL LEARN ABOUT:

The importance of recognizing the presence of behavioral health patients throughout a facility.

The conditions of both self-harm and harm to others, including staff.

Design considerations that can mitigate harm.

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Safety Risk Assessment for Healthcare Facility Design: Injury of Behavioral Health

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Executive Summary

Risk factors for behavioral health patients include intrinsic and extrinsic conditions—those related to the individual, and those external to the individual, including the environment. Latent (underlying) 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;
- Exterior and interior visibility and accessibility to all patient-occupied areas;
- 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, unit seclusion);
- Safety of interior and exterior finishes and design elements (e.g., toxicity, flammability);
- 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 who use the facility.

This brief is a summary of information gathered during the development of The Center for Health Design Safety Risk Assessment (SRA) toolkit as it pertains to the topic of harm for people with Behavioral Health symptoms. See the associated [Backgrounder for additional context.](#)



Mitigating the Risks for Behavioral Health Patients With Environmental Design

Site Optimization

A building's exterior and surrounding area play an important role in mitigating risk for behavioral health patients. Experts cite the need for adequate exterior lighting with vandal-proof bulkhead fittings (Curran, 2005; Hunt & Sine, 2014). According to experts, the design should also preclude light being directed into patient rooms (Hunt & Sine, 2014). The authors of the National Association of Psychiatric Health Systems' (NAPHS) guidelines for behavioral health cite the relationship between exterior landscaping (e.g., position of trees or shrubs), elopement, and roof access (Hunt & Sine, 2014). According to the same authors, exterior landscaping that is planted too close together can create barriers to visibility of patients, in addition to supplying places to hide (Hunt & Sine, 2012). These commonly used guidelines identify a relationship between plants and their potential use as weapons or poisoning methods (Hunt & Sine, 2014).

Researchers cite sources suggesting violence is associated with patient density (spatial and social), a lack of privacy, and a lack of control that may be reduced by providing direct access to usable outdoor space (Dobrohotoff & Llewellyn-Jones, 2011). This also allows for patient choice. While outdoor areas may offer therapeutic benefits, staff supervision needs to be considered based on the patient population (Dobrohotoff & Llewellyn-Jones, 2011; Hunt & Sine, 2012), including natural surveillance. This includes the placement of physical features, activities, and people in such a way as to maximize visibility (McPhaul et al., 2008). As a result, staff should have visual access to patients in outdoor spaces.

Building Envelope

Research indicates that limited (e.g., sash control devices) or non-operable (e.g., fixed panes, special locking) windows reduce the risk of jumping. Heavy duty screens might also be considered for non-behavioral health areas where lower risk is anticipated (Gournay & Bowers, 2000; Hunt & Sine, 2012; Lieberman, Resnik, & Holder-Perkins, 2004; New York State Office of Mental Health & architecture +, 2012; New York State, 2009). Glass shards can be used as a weapon for self-harm or harm against others. Tempered glass, laminated glass, and polycarbonates all have different properties that must be considered

SITE OPTIMIZATION

Conditions associated with site optimization include:

- 1 Visual access for staff to outdoor areas to mitigate patient self-harm and detect elopement.
- 2 Exterior landscaping that mitigates risk of access to roofs, fences, or walls that could lead to elopement.
- 3 Non-toxic exterior and interior landscaping to preclude the use of landscaping features (e.g., branches) as weapons.

Features such as a high fence may give the appearance that the building contains dangerous individuals and are likely to impact negatively on the patients' sense of physical safety.



Designing for people with behavioral health symptoms is a complex issue that must balance the need for safety from self and others, as well as the need for comfort, privacy, and socialization.

individually (e.g., large shards and/or ability to remain in the frame) (Curran, 2005; ECRI Institute & The Institute for Safe Medication Practices, 2007; Gournay & Bowers, 2000; Hunt & Sine, 2014; Lieberman et al., 2004).

All the aspects of the exterior building, exterior access, and landscaping need to be part of the safety plan for this vulnerable population.

Building Envelope and Building Layout

Adjacencies to high-risk areas (e.g., locations that could be used for jumping) should always be considered. In several cases of suicide, patients were able to jump from a roof due to a door that was left unsecured or not easily visible to staff members (Gournay & Bowers, 2000). According to other studies, additional areas beyond the roof need to be considered, such as atria, balconies, porches, and open stairwells (Ballard et al., 2008; Mills, DeRosier, Ballot, Shepherd, & Bagian, 2008). One paper referenced the significant increase in response time associated with renovations and additions that added elevators and doors with badge access (Yeager et al., 2005).

Unit Layout

Based on the model of care and services offered, secure units may be required to protect all users of the facility (Bowers, Banda, & Nijman, 2010; Dobrohotoff & Llewellyn-Jones, 2011; McPhaul et al., 2008; Mills et al., 2008; Yeager et al., 2005). A balance must exist between a “typically residential” environment and the security required for behavioral health. For example, the U.S. Occupational Safety & Health Administration (OSHA) suggests comfortable waiting areas to minimize stress, while organizations suggest minimizing the use of signs and symbols that become a “hidden hazard,” or physical reminders that might suggest a dangerous place (Connellan et al., 2013; Dobrohotoff & Llewellyn-Jones, 2011; J. Hunt & Sine, 2009; OSHA, 2013). Influencing factors that may vary between facilities or units include patient populations that may represent different age groups (pediatric, adult, elderly), diagnoses, facility ownership (private or public), and admission (voluntary or court-committed), among others.

Research indicates that having separate areas for activities and privacy provides patients with control over their surroundings and offers a physical retreat space when patients feel threatened (Dobrohotoff & Llewellyn-Jones,



UNIT LAYOUT

Conditions associated with unit layout include:

- 1 Design layout to maximize visibility and accessibility to all patient-occupied areas, including treatment spaces (e.g., exam rooms).
- 2 Provide separate, secure rooms for patients at risk for suicide or harm to self and others (e.g., psychiatric, criminal patients).
- 3 Control unit doors for entry and exit where warranted by the patient population.

2011). Considerations about family participation might also result in both private spaces and waiting areas (Shepley & Pasha, 2013).

Based on data evaluation, numerous papers suggest securing exits (through locks or visual control) and/or minimizing the number of exits to reduce the risk of elopement and unauthorized access (Goh, Salmons, & Whittington, 1989; Hunt et al., 2010, 2013; McPhaul et al., 2008). Studies indicate that patients who have been identified by staff to be at risk of suicide or self-harm should have limited or no access to uncontrolled exits (Mills, Watts, DeRosier, Tomolo, & Bagian, 2012), as elopement from units can result in loss of treatment, violence, self-neglect, self-harm, or suicide (Hunt et al., 2010).

Room and Unit Layout

Physical layout (corners or other structural blocks) is cited as a barrier to adequate patient observation (Hunt & Sine, 2009; Mills et al., 2012; Stewart, Ross, Watson, James, & Bowers, 2012). Studies also suggest staff and others can be subject to harm in areas that lack visibility. Where the layout precludes visibility, convex mirrors at the junction of the wall and ceiling can eliminate blind spots (Dobrohotoff & Llewellyn-Jones, 2011; Hunt & Sine, 2014; Peek-Asa et al., 2009). As at-risk patients may be difficult to identify, visibility and accessibility to all patient areas is a primary consideration.

While operational procedures for patient observation may vary, expert opinion suggests that at-risk patients be placed closest to the nursing/team station or near staffing travel patterns to provide greater visibility (Hunt & Sine, 2009; Lieberman et al., 2004; McPhaul et al., 2008; Peek-Asa et al., 2009; Stewart et al., 2012). Due to the required level of monitoring, visibility is a priority in secure holding/seclusion room location and design, whether in

Visibility solutions include:

- » Physical devices, such as video surveillance or convex mirrors to eliminate blind spots
- » Placing at-risk patients closest to the nursing/team station



an emergency department or patient unit (Curran, 2005; Hunt & Sine, 2014; Mills et al., 2012). Windows and/or camera surveillance may be required. Root cause analysis has revealed that inadequate holding areas were a contributing factor to suicide and self-harm in the ED (Mills et al., 2012).

Expert opinion suggests that nurse stations/team areas should be designed to minimize barriers between staff and patients. However, staff safety needs to be addressed through both the counter design (to reduce the risk of a patient jumping or climbing over the counter) and the availability of staff workspaces that are separated from patient care duties (Andes & Shattell, 2006; Hunt & Sine, 2014; Karlin & Zeiss, 2006; Riggs, Due, & Connellan, 2013). Some organizations have moved to a decentralized model that promotes increased circulation of staff (Yeager et al., 2005).

Room Layout

Behavioral health patients must be protected from causing self-harm in their environment. Access to ingestible chemicals should be restricted to reduce the risk of self-harm (Cardell, Bratcher, & Quinnett, 2009; Mills et al., 2008). This includes access to environmental services (EVS) supplies and carts that should be stored in secure spaces (Yeager et al., 2005). EVS rooms should be self-locking (Mills et al., 2010). Ancillary spaces such as conference rooms and interview rooms should be secured when not in use to prevent unauthorized patient entry (Cardell et al., 2009; Hunt & Sine, 2014).

Ceiling heights should help prevent patients from reaching and tampering with fixtures that can serve as ligature points. Most sources recommend a minimum of 9 feet (Curran, 2005; Hunt & Sine, 2014; New York State Office of Mental Health & architecture +, 2012).

A seclusion room is a high-risk space (Hunt & Sine, 2014; New York State Office of Mental Health & architecture +, 2012). Expert opinions from the NAPHS guidelines suggest a lobby or ante-room that includes space for a response team to organize, as the patient may be aggressive or struggle upon entry (Curran, 2005; Hunt & Sine, 2014).

Crowding, a lack of privacy, and loss of control are related to violence on inpatient psychiatric units (Connellan et al., 2013; Dobrohotoff & Llewellyn-Jones, 2011; Shepley & Pasha, 2013). As such, authors suggest a capacity limit

CEILINGS

Ceiling heights and material selection should help prevent patients from reaching fixtures that can serve as ligature points as well as to prevent tampering.



for bedroom occupancy as a possible strategy, with private rooms when clinically indicated.

Interior Design/Finishes

Lay-in acoustical ceiling tiles that may allow for exposed plumbing, piping, or ductwork are high-risk features (Lieberman et al., 2004; New York State, 2009). A plaster/lath, gypsum board, or metal pan system (requiring special tools for removal) represent a lower risk (Curran, 2005; Dobrohotoff & Llewellyn-Jones, 2011; Lieberman et al., 2004).

Locks may be required to prevent unauthorized entry into rooms or to afford privacy, but they can also present a hazard if staff cannot access the room (Dobrohotoff & Llewellyn-Jones, 2011). Self-harm can occur when patients are allowed privacy in the toilet or other private areas and lock doors behind them (Bowers et al., 2010). Some suggest unlockable doors (Cardell et al., 2009), but in cases where this is not possible, classroom-style locks may be an alternative (Hunt & Sine, 2009). According to one author, while these interventions can prevent unauthorized patient entry, they also need to be balanced against staff safety due to the increased potential for staff and patients to be present in the room together when the door is closed (Mills et al., 2010).

Numerous studies reference the door as a potential barricade, leading to a risk of self-harm and harm to others (Dobrohotoff & Llewellyn-Jones, 2011; Hunt & Sine, 2009; New York State Office of Mental Health & architecture +, 2012). Door locations need to be balanced with the need to prevent obstructions associated with fire codes and egress width, with the recognition that doors recessed into a corridor to allow egress create the potential for alcoves that can obscure visibility (Hunt & Sine, 2014). Options may include wicket doors or in-swinging door design that accommodates plans for easy removal if needed (New York State Office of Mental Health & architecture +, 2012).

Doors are often cited as a location for hanging. Toilet room doors, especially, are often a risk. Some organizations use accordion doors or doors with slanted tops, or they eliminate doors entirely in private rooms and other locations where doors are not mandated by code (Cardell et al., 2009; Mills et al., 2008; Yeager et al., 2005). It is a tradeoff that good visibility may impinge on patients' privacy, most notably around patient bathrooms and toilet areas in treatment

DOORS

The door is a potential risk for self-harm and harm to others. When selecting or specifying doors, consider that the door can:

- Be used as a barricade
- Obscure visibility
- Become a hanging hazard



spaces (e.g., emergency) where hangings often occur (Dobrohotoff & Llewellyn-Jones, 2011; Gournay & Bowers, 2000; Mills et al., 2012; Mills, Watts, & Hemphill, 2014).

Door hardware is also a risk. Non-lever handles, handles that face down, recessed grip handles, push/pull handles, and ligature-resistant handles are all solutions suggested to mitigate the door handle as a point for hanging (ECRI Institute & The Institute for Safe Medication Practices, 2007; Hunt & Sine, 2014; Mills et al., 2010, 2008, 2012; New York State Office of Mental Health & architecture +, 2012). Door closer devices should be carefully considered (Curran, 2005; Hunt & Sine, 2014) and, when used, mounted on the public side of the door instead of the private patient side (Hunt & Sine, 2014; Lieberman et al., 2004; New York State Office of Mental Health & architecture +, 2012). Door hinges should be in a continuous piano style that extends from the top of the door to the bottom in an unbroken manner (Lipscomb et al., 2006; McPhaul et al., 2008; Mills et al., 2010, 2008; New York State, 2009).

Interior finishes should take into account impact resistance (e.g., wall construction), toxicity (e.g., paint), and properties to reduce concealment of contraband or weapons that can be used for self-harm (e.g., seamless flooring with an integral cove, moldings) (Curran, 2005; ECRI Institute & The Institute for Safe Medication Practices, 2007; Hunt & Sine, 2009, 2014). OSHA-based design guidelines suggest that the use of absorptive wall panels in day rooms may reduce anxiety and stress (Lipscomb et al., 2006). Another study suggests hard-surface flooring in hallways contributes to disturbing noise, as well as negative perceptions of the environment (Dobrohotoff & Llewellyn-Jones, 2011). Some guidelines reference concealment of weapons as a risk (Hunt & Sine, 2014; New York State Office of Mental Health & architecture +, 2012). One safety advisory suggests the consideration of permanent wall and ceiling treatments, moldings, and floors to prevent concealment of harmful items such as razor blades, matches, and drugs (ECRI Institute & The Institute for Safe Medication Practices, 2007).

According to experts, edges and corners in patient areas (e.g., plumbing, bathroom accessories, furniture) should be rounded off to eliminate the potential for self-harm and harm to others (Curran, 2005; McPhaul et al., 2008; New York State Office of Mental Health & architecture +, 2012). In addition,

MATERIAL SELECTION TO DECREASE RISK OF HARM

Seemingly inconspicuous items can be used as a weapon for self-harm or harm to others. Attention should be paid to all interior design finishes and fixtures. For example, some guidelines reference concealment of weapons in wall or ceiling treatments, moldings, and floors.

Unbreakable glass, polycarbonate, or acrylic should be used to reduce the risk of broken glass (whether windows or artwork), and metal might be used for unbreakable mirrors.



toiletry shelves and hard plastic paper towel, toilet paper, and soap dispensers can be broken, resulting in sharp pieces of plastic that can be used as weapons. They can also be used for hanging. Soap dishes and toilet paper holders should be recessed (Cardell et al., 2009; Hunt & Sine, 2009; Mills et al., 2014) and, if possible, shower stalls should be designed so that a shower curtain is not needed (Hunt & Sine, 2009).

Research indicates that common environmental risk factors include potential anchor points for hanging—one of the most frequently used methods of self-harm. The use of clothes rods and hangers in behavioral health areas is discouraged (Cardell et al., 2009; Hunt & Sine, 2009; Lieberman et al., 2004; New York State Office of Mental Health & architecture +, 2012). Hanging attempts also occur with objects below waist height (Hunt & Sine, 2009; Lieberman et al., 2004), including assistive devices such as grab bars. The elimination of ligature points in grab bars is often cited as a mitigation technique (Hunt & Sine, 2009; Mills et al., 2012; New York State, 2009; Yeager et al., 2005).

It is possible that artwork, frames, and glass shards can also be used as weapons for self-harm or harm against others (Mills et al., 2010). While using items such as glass as a weapon has not been documented as a safety event,

one study recommended a proactive approach to identify possible risk rather than assuming the risk did not exist (Yeager et al., 2005). Several sources suggest mirrors should be made of stainless steel, unbreakable glass, polycarbonate, or acrylic to reduce the risk of broken glass being used as a weapon (Dobrohotoff & Llewellyn-Jones, 2011; ECRI Institute & The Institute for Safe Medication Practices, 2007; Hunt & Sine, 2009, 2014; Lieberman et al.,

Interior design should take into account impact resistance (e.g., wall construction), toxicity (e.g., paint), and properties to reduce concealment of contraband or weapons that can be used for self-harm (e.g., seamless flooring with an integral cove, moldings).



2004). As with exterior windows, tempered glass does not yield large shards of glass when broken, but does not stay in the frame; laminated glass will stay in the frame, but will yield shards. Polycarbonate sheets will satisfy both of these requirements, provided that the stops are deep enough to account for the amount of deflection of large pieces (Hunt & Sine, 2009).

Furnishings

Furniture (both interior and exterior) can be used by patients to harm themselves, to throw at/strike staff, or to climb in elopement attempts (ECRI Institute & The Institute for Safe Medication Practices, 2007; Gunnell, Bennewith, Hawton, Simkin, & Kapur, 2005; Hunt & Sine, 2009; McPhaul et al., 2008; New York State Office of Mental Health & architecture +, 2012).

Plumbing

Plumbing fixtures such as shower heads should be flush or slanted to avoid being used for a hanging attempt, while toilets should be selected and installed to avoid gaps at the wall or floor that can become ligature points. Button flushers and integral seats are also suggested for toilets (Cardell et al., 2009; Curran, 2005; Hunt & Sine, 2014; Lieberman et al., 2004; Mills et al., 2014; Yeager et al., 2005). P-traps, supply pipes under lavatories, and flush valves for toilets and faucets are all potential attachment points for hanging (Cardell et al., 2009; Gunnell et al., 2005; Hunt & Sine, 2009, 2014; Kahn & Antonucci, 1980; Lieberman et al., 2004; Yeager et al., 2005). Sprinkler head design should minimize the opportunity for attachment (Cardell et al., 2009; ECRI Institute & The Institute for Safe Medication Practices, 2007; Lieberman et al., 2004; Mills et al., 2012; New York State Office of Mental Health & architecture +, 2012). They should break away at less than a 50-pound load (Hunt & Sine, 2009).

Mechanical (HVAC)/Electrical

In high-risk interior areas, teams should consider whether light fixtures should be recessed/flush-mounted, security type with fully enclosed frames (polycarbonate or similar lenses) and security fasteners, or have substantial lenses securely anchored in place with frames secured by tamper-resistant screws (Curran, Hamilton, Monaghan, McGinlay, & Thakker, 2006; Gunnell et al., 2005; Hunt & Sine, 2009, 2014; New York State Office of Mental Health & architecture +, 2012). This is to mitigate the risk of hanging.

PLUMBING, MECHANICAL, AND ELECTRICAL SYSTEMS

Sometimes forgotten, the specification of system elements can contribute to risk. Plumbing fixtures, sprinkler heads, interior and exterior lighting fixtures, electrical outlets, and HVAC components should be evaluated to mitigate the risk of hanging.



Other potential anchor points for hanging include HVAC terminal devices and covers, thermostats, vents, and grilles. These should be fastened with security screws, locks, or tamper-resistant fasteners. Heat/smoke detectors should be flush ceiling mounted (Curran, 2005; ECRI Institute & The Institute for Safe Medication Practices, 2007; New York State Office of Mental Health & architecture +, 2012).

Many papers suggest that traditional electrical outlets should not be used in behavioral health areas (Cardell et al., 2009; Dobrohotoff & Llewellyn-Jones, 2011; ECRI Institute & The Institute for Safe Medication Practices, 2007; Hunt & Sine, 2014; New York State Office of Mental Health & architecture +, 2012). Some suggest that any outlets provided include a ground fault circuit interrupter that can be controlled without staff entering the room (Hunt & Sine, 2014; New York State Office of Mental Health & architecture +, 2012).

Use technology:

- » In high-risk areas (indoor and outdoor) to deter elopement and unauthorized access.
- » Where public safety is a greater concern than patient privacy, or where privacy would not be expected.

Technology Integration

Experts suggest the use of video surveillance in high-risk areas (indoor and outdoor) to deter elopement and unauthorized access (Hunt et al., 2010; Hunt & Sine, 2014; OSHA, 2013; Peek-Asa et al., 2009; Riggs et al., 2013). These should be installed where public safety is a greater concern than patient privacy, or where privacy would not be expected. However, some note it is not reasonable to expect staff to reliably monitor a camera for long periods, so it is better to make the environment safe enough to avoid over-reliance on technology (Mills et al., 2010; Peek-Asa et al., 2009).

Numerous studies suggest the relationship between attacks and threats of attack on staff with a lack of alarm systems (Curran, 2005; Dobrohotoff & Llewellyn-Jones, 2011; Hunt & Sine, 2009; Lipscomb et al., 2006; McPhaul et al., 2008; OSHA, 2013; Peek-Asa et al., 2009). Where risk is apparent or may be anticipated, alarms may include panic buttons (duress alarms), hand-held or noise devices, cellular phones, and private channel radios.

Telephones should not be left with suicidal patients without supervision, as phones and/or cords can be used for self-harm and harm against staff (Cardell et al., 2009; Curran, 2005; Gunnell et al., 2005; Hunt & Sine, 2014; Mills et al., 2014).



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Conclusion

Planning and designing for patients with behavioral health symptoms is complex. Sometimes the behaviors can be anticipated, but in other cases they may not be expected, making these types of design decisions difficult. It often becomes a balance of creating a safe and low-risk environment that is also healing and comfortable. The built environment alone is not a cure, but creating an optimal environment can mitigate the risk of extreme behaviors. As such, the multifactorial approach must consider the interactions of the built environment, the people in the system (both patients and staff), and organizational policies and procedures.

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