



# REDUCING INJURY AND HARM

An Issue Brief on Safety for Behavioral & Mental Health

## INSIDE YOU WILL LEARN ABOUT:

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

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

Design considerations to mitigate the risk of injury associated with behavioral and mental health populations.

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*This issue brief was created as a supplement to the Safety Risk Assessment Tool and should be used with the SRA toolkit. The toolkit includes six topics and is intended for use with the collaborative input of project- and facility-based expertise.*

*The Safety Toolbox is made available through a partnership with*





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# Reducing Injury and Harm: Safety for Behavioral & Mental Health

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## EXAMPLES OF LIGATURE ANCHOR POINTS

- Site: Trees, fencing, gazebos, covered walkways, gutters and downspouts
- Building structure: False ceilings, maintenance access hatches/panel
- Doors: Hinges, handles
- Ceilings: Suspended ceilings, lights, air vents and diffusers, smoke detectors, extractor grilles
- Curtain tracks
- Windows: Handles, opening restrictors, locks
- Pipes
- Wall-mounted devices: Alarm panels/bells/pulls, soap dispensers, paper towel dispensers, shelves, coat hooks, pictures and paintings, mirrors, cabinets, hold back/hold open devices, wall-mounted TVs, sconces, rails/grab bars
- Beds
- Closet shelving, coat hooks, hangers, clothing racks

(NHS Trust, 2017)

## Executive Summary

As outlined in the accompanying Backgrounder, behavioral and mental health (BMH) patient populations may present a higher risk for self-harm or harm to others. This brief includes an update to the content developed in 2013 through a consensus-based expert workgroup. Design considerations are outlined in the associated [Design Strategies](#) and the online Safety Risk Assessment (SRA).

Methods of self-harm frequently used in healthcare environments include hanging, jumping, cutting, intentional drug overdose, and strangulation. Risk factors for BMH-associated injury include those related to the individual (intrinsic), as well as external conditions (extrinsic), including the built environment. Due to the wide range of BMH diagnoses, careful consideration is required to find the appropriate balance between a safe and healing environment.

Ligature-resistant environments have been a recent area of focus in the U.S., but there are many additional considerations for mitigating the risk of injury. Latent (underlying) conditions that may contribute to BMH-associated self-harm, harm to others (aggression and violence), and elopement (escape) include:

- Access to high-risk areas (e.g., roof, balcony, porch, window);
- Uncontrolled egress;
- Poor exterior/interior visibility/accessibility to patient-occupied areas;
- Unauthorized access to staff (e.g., team stations) or high-risk areas (e.g., environmental service supplies);
- A lack of secure holding (i.e., emergency departments, unit seclusion);
- Unsafe finishes or design elements (e.g., toxic or flammable elements);
- Furnishings and/or furniture that can be used for barricades, suicide, projectiles, or entrapment;



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

- Access to ligature (hanging) points (e.g., plumbing fixtures, mechanical (HVAC) systems, electrical fixtures, outlets, doors); and
- Other issues that may contribute to negative patient perceptions (e.g., institutional lighting, colors, signage).

These latent conditions can, in part, be mitigated by a facility design that considers site planning, the building envelope, unit layout, room layout, interior design and finishes, lighting, furnishings, mechanical/electrical/plumbing systems, and technology integration to address environmental conditions such as visibility, secured access, ligature resistance, proximity, social density (occupancy), elimination/control of hazardous items and materials, autonomy/individual control, aesthetics/atmosphere, and the acoustic environment. This brief has been organized according to the building design categories included in the SRA, as well as the desired environmental conditions.

Studies have found that most suicide attempts occur in private areas of the unit/ward (e.g., bedrooms, bathrooms, toilet rooms), while fewer attempts take place in public areas (Bayramzadeh, 2016; Bowers, Dack, Gul, Thomas, & James, 2011). This data is consistent with how design guidelines outline risk levels for patient care areas, although naming conventions vary. Guidelines by Hunt and Sine (2018) and the New York State Office of Mental Health (2018) suggest:

- The highest risk areas (Level IV-V) are those where the patient is difficult to manage, where there are unknown risks at admission, or where the patient is alone and unsupervised (e.g., bedrooms, bathrooms/toilet rooms, exam rooms, admissions areas, seclusion rooms, comfort rooms).
- Medium-risk areas (Level II-III) include spaces behind self-locking doors, where patient access is controlled, and/or use is supervised (e.g., living rooms, dining rooms, group spaces, corridors).
- The lowest risk areas (Level I) are those not authorized for patient use, such as medication rooms, offices, and utility rooms.

A safe care environment should take into account the built environment, organizational culture and policies, patient evaluation and engagement, staff resources and training, emergency management, and error prevention (Phoenix, 2013).



## Mitigating Risk of BMH-Associated Injury: The Environment

Suicide- and ligature-resistant environments remain a key area of focus in the U.S. (Centers for Medicare & Medicaid Services, 2017; The Joint Commission, 2017a). A “ligature risk” has been defined as “anything which could be used to attach a cord, rope, or other material for the purpose of hanging or strangulation” (Centers for Medicare & Medicaid Services, 2017). Similarly, “ligature-resistant” has been defined as “without points where a cord, rope, bedsheet, or other fabric/material can be looped or tied to create a sustainable point of attachment that may result in self-harm or loss of life” (The Joint Commission, 2017b). While research suggests that common environmental risk factors include potential ligature points for hanging, those wishing to harm themselves possess a higher level of ingenuity. As a result, it is often not possible to identify all potential risks, and judgments must be made about potential for harm (Abbotts & NHS Trust, 2018; J. Hunt & Sine, 2018).

There are other risks associated with BMH populations to consider in the design process, including non-suicidal self-harm, violence and aggression/assault against others, elopement, and events involving hazardous items and materials (Mills, Watts, Shiner, & Hemphill, 2018). Security has been identified as a primary contributor to patients’ autonomy and sense of community, as individuals who feel safe are more likely to be proactive in their daily activities (Shepley et al., 2017). The American Psychiatric Nurses Association’s Council for Safe Environments (Phoenix, 2013) proposed eight components of a safe care environment:

- Patient assessment and monitoring (e.g., suicide risk, observation);
- Staff resources, education, and training (e.g., qualifications, staff levels);
- Space and equipment (i.e., design of the physical environment);
- Emergency management (e.g., restraint, seclusion);
- Error prevention (e.g., handoffs, minimal distractions);
- Rules (e.g., visitation, patient movement);
- Engagement (i.e., de-escalation of aggression); and
- Culture.



## SITE CONSIDERATIONS

Conditions associated with an optimized site design include:

- 1 Adequate lighting
- 2 Secure perimeters (to mitigate the risk of elopement)
- 3 Landscaping that:
  - Precludes access to roofs, fences, and walls
  - Allows visibility
  - Is non-toxic and can't be used as a weapon
- 4 Natural surveillance opportunities for staff to observe outdoor areas accessed by patients

Additionally, therapeutic design has evolved from a clinical approach to a systems view that is inclusive of a healing environment (Connellan et al., 2013; Mahoney, Palyo, Napier, & Giordano, 2009). Recent research has shown that a combination of stress-reducing design features improved outcomes related to two clinical markers of aggressive behavior: compulsory injections and physical restraints (Ulrich, Bogren, Gardiner, & Lundin, 2018). The authors proposed framework of stress-reducing design supports the need to balance safety with a healing and therapeutic environment .

### Site Optimization

While considerations of risk often focus on a building's interior, the building exterior and surrounding area play an important role in mitigating the risk of injury in BMH populations. However, the site's level of safety should be suited to the populations being served, and the design of any exterior surroundings, access, and landscaping must be part of the safety plan.

### *Autonomy/Individual Control & Social Density*

Numerous papers have supported the use of enclosed spaces (e.g., gardens, courtyards, walled enclosures, activity areas for large muscle movement), which can serve as a positive distraction, foster social interaction, reduce crowding and violence, and offer patient autonomy (Connellan, Due, & Riggs, 2011; Dobrohotoff & Llewellyn-Jones, 2011; Erbino, Toccolini, Vagge, & Ferrario, 2015; Haines, Brown, McCabe, Rogerson, & Whittington, 2017; Hung et al., 2014; Sun, Long, Boore, & Tsao, 2006; Trzpuć et al., 2016). The importance of *accessing* outdoor space, not just viewing the space, has been emphasized in multiple studies (Shepley et al., 2016; Ulrich et al., 2018), and some authors have noted additional benefits associated with outdoor spaces, including staff respite (Connellan et al., 2011; Shepley et al., 2016).

### *Visibility*

While outdoor areas may offer therapeutic benefits, supervision (based, as always, on the patient population) remains a top priority (Dobrohotoff & Llewellyn-Jones, 2011; J. Hunt & Sine, 2018). Sight lines between staff and patients should not be blocked (Cal/OSHA, 2018; J. Hunt & Sine, 2018). Moreover, the location of physical features, activities, and people should facilitate natural surveillance, maximizing visibility without cameras or other



technology (a key feature of crime prevention through environmental design, or CPTED) (McPhaul et al., 2008) and limiting hiding places (J. Hunt & Sine, 2018).

### *Secured Access & Elimination/Control of Other Hazards*

According to Hunt and Sine (2018), landscaping selections and site configuration should also be considered in order to mitigate the risk of elopement (e.g., climbing over a fence), restrict roof access, prevent the use of branches as weapons, and preclude self-harm through poisoning (i.e., plants – exterior and interior).

### Building Envelope (Façade, Windows, Entrances)

The enclosure and protection provided by the building envelope should balance environmental conditions (e.g., weather, sun) with human concerns (e.g., safety, security) (Arnold, 2016).

### *Secured Access*

Entries should be evaluated for appropriate levels of security and population segregation. Private staff entries are ideal (Shepley et al., 2017), but attention must be paid to staff-designated entries or emergency exits where unauthorized access may occur (Cal/OSHA, 2018). In one recent project involving integrated inpatient and outpatient BMH care, an interdependent inpatient “portal” has been used in conjunction with a transitional security zone (galleria) with patient amenities to restrict access to the public outpatient area (Ahern, Bieling, McKinnon, McNeely, & Langstaff, 2016). Access is controlled via therapeutic pass levels (i.e., not allowed off unit; unit and galleria; unit, galleria, and public side; offsite), which was found to support patient autonomy (in allowing for unlocked inpatient unit doors) as well as community integration, all while minimizing risk, protecting privacy, improving safety, and reducing stigma (Ahern et al., 2016).

Daylight exposure and windows are important components in providing a healing and therapeutic environment (Alexiou, Degl’Innocenti, Kullgren, Falk, & Wijk, 2016; Shepley et al., 2017, 2016; Trzpuć et al., 2016; Ulrich et al., 2018). However, windows pose a particular risk for BMH patients in the building envelope and interior. For example, a window can be used as a ligature point, a location for jumping, a method of escape, or a place to push others into harm.

## WINDOW GLASS

According to Hunt & Sine (2018):

- Tempered glass can break into small, sharp pieces (which can be used as a weapon) and fall out of the frame (which may facilitate elopement).
- Two layers of tempered glass can be laminated to an interlayer to keep broken glass in the frame.
- Heat-strengthened glass (about half the strength of tempered glass) may be appropriate where high-impact resistance is not needed.
- Glass-clad polycarbonate glazing (two layers of heat-strengthened glass bonded to a polycarbonate core) keeps broken material in the frame, reducing access to shards.



Controlled operability (i.e., sash openings limited to 4" or less) or non-operable windows (e.g., fixed panes, special locking) can reduce these risks (ECRI Institute & The Institute for Safe Medication Practices, 2007; Gournay & Bowers, 2000; J. Hunt & Sine, 2018; Lieberman, Resnik, & Holder-Perkins, 2004; New York State, 2009; New York State Office of Mental Health & architecture +, 2018). Heavy-duty screens might also be considered for low-risk areas (J. Hunt & Sine, 2018; Lieberman et al., 2004; New York State Office of Mental Health & architecture +, 2018).

### *Elimination/Control of Other Hazards*

A second area of concern is interior and exterior window glazing that can be broken into shards and used as a weapon for harm to self or others. Tempered glass, laminated glass, and polycarbonates all have different properties and should be selected based on location (e.g., exterior window, seclusion room, corridor), required strength, and breaking characteristics (Curran, 2005; ECRI Institute & The Institute for Safe Medication Practices, 2007; Gournay & Bowers, 2000; J. Hunt & Sine, 2018; Lieberman et al., 2004).

### Building Layout - Proximity

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). Other studies suggest that areas beyond the roof must be considered. Atria, balconies, porches, and open stairwells are all locations where a patient can jump or push someone else (Ballard et al., 2008; Mills, DeRosier, Ballot, Shepherd, & Bagian, 2008). One paper referenced a significant increase in response time (more than double) associated with renovations and additions that added elevators and doors with badge access (Yeager et al., 2005). Security staff, therefore, should be located in close proximity to behavioral health areas to allow quick response times.

Other adjacencies to consider include risk assessment areas. One UK-based study described regulatory language to provide intake/admissions assessment locations close to or within the main emergency department (ED) or acute medical unit, but this language was later revised to specify that patient risk

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Areas where the risk of jumping is higher include the roof, atria, balcony, porch, and windows.



## UNIT LAYOUT

Conditions associated with unit layout include:

- 1 Design layout to maximize visibility and accessibility to all patient-occupied areas, either through proximity (e.g., at-risk patients close to the team station) or equipment (e.g., convex mirrors, cameras).
- 2 Provide separate, secure rooms for patients at risk for harm to self or others (e.g., psychiatric patients, criminal patients).
- 3 Control unit doors for entry and exit where warranted by the patient population.

assessments should only occur within the main ED (Bolton, Palmer, & Cawdron, 2016).

### Unit Layout

#### *Secured Access*

Depending on the model of care, services offered, and patient demographics, secure units may be required in order to protect all users of the facility (Bowers, Banda, & Nijman, 2010; Dobrohotoff & Llewellyn-Jones, 2011; McPhaul et al., 2008; Mills et al., 2008). Influencing factors that may vary between facilities or units include the patient population age group(s) (pediatric, adult, elderly), diagnosis, facility ownership (private or public), and admission (voluntary or court-committed), among others.

Elopement from units can result in an interruption of treatment, violence to others, self-neglect, self-harm, and suicide (I. Hunt et al., 2010). Based on the available data on elopement and unauthorized access, numerous papers suggest securing exits (through locks or visual control) and/or minimizing the number of exits to reduce these risks (Goh, Salmons, & Whittington, 1989; I. Hunt et al., 2013, 2010; McPhaul et al., 2008). However, one study found that suicide, suicide attempts, and absconding with and without return did *not* increase in hospitals with an open-door policy as compared with locked wards (Huber et al., 2016), and another found no difference between the two in the forms of aggression observed (Schneeberger et al., 2017). Still, patients identified as at-risk for suicide or self-harm should have limited or no access to uncontrolled exits (Mills, Watts, DeRosier, Tomolo, & Bagian, 2012).

#### *Visibility*

According to one study, only two of 54 non-psychiatric suicidal inpatients were identified by non-psychiatric medical staff to be at risk before their suicides (Cheng, Hu, & Tseng, 2009). As at-risk patients may be difficult to identify, many experts emphasize visibility as a top priority for unit layout from the earliest stages of design (J. Hunt & Sine, 2015; Isobel, Foster, & Edwards, 2015; Jenkins, Dye, & Foy, 2015; Shepley et al., 2016). Staff and other bystanders can also be subject to harm in areas that are secluded or lack visibility (Cal/OSHA, 2018).



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## Visibility solutions include:

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

As with the exterior layout, visibility between staff and patients should be optimized within the unit. 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 staff travel patterns to increase visibility (J. Hunt & Sine, 2015; Lieberman et al., 2004; McPhaul et al., 2008; Peek-Asa et al., 2009; Stewart, Ross, Watson, James, & Bowers, 2012). Communal spaces and bedroom doors should also be observable from central areas (Ulrich et al., 2018). Physical layout, including corners or other structural blocks, can represent another barrier to adequate patient observation on units and into rooms (Mills et al., 2012; Stewart et al., 2012). Where the layout precludes visibility, convex mirrors or cameras at the junction of the wall and ceiling can eliminate blind spots (Dobrohotoff & Llewellyn-Jones, 2011; J. Hunt & Sine, 2018; Mills et al., 2018; New York State Office of Mental Health & architecture +, 2018; Peek-Asa et al., 2009). Some organizations have moved to a decentralized model that promotes visibility through increased circulation of staff (Yeager et al., 2005).

### *Social Density (Occupancy)*

Crowding, lack of privacy, and loss of control can contribute to violence on inpatient psychiatric units (Connellan et al., 2013; Dobrohotoff & Llewellyn-Jones, 2011; Shepley & Pasha, 2013). While safety is the top priority for unit configuration, the layout should also support low social density (Shepley et al., 2017, 2016; Ulrich et al., 2018) and social interaction (Ahern et al., 2016; Alexiou et al., 2016; Jenkins et al., 2015; Shepley et al., 2017; Trzpuć et al., 2016). Research indicates that having separate areas for social and private activities provides patients with a sense of control over their surroundings, offering them the opportunity to regulate social contact as well as a physical retreat when feeling threatened (Dobrohotoff & Llewellyn-Jones, 2011; Jenkins et al., 2015).

### *Aesthetics/Atmosphere*

Trauma may result when someone feels at risk and/or experiences or witnesses verbal abuse or physical violence (Dobrohotoff & Llewellyn-Jones, 2011). In their literature review, Shepley and Pasha (2013) cite the emerging evidence for providing a flexible, deinstitutionalized, and homelike environment. While stakeholders universally considered this to be a critical design consideration,



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## Basic anti-ligature devices are the most important component of a suicide-resistant environment (Shepley et al., 2017).

the definition of “homelike” was unclear, suggesting that “home” has less to do with a particular design genre and more to do with a feeling of welcome and security (Alexiou et al., 2016; Shepley et al., 2016). A feeling of security can be supported by a design approach that minimizes cues suggestive of danger and mitigates any confusion or delusion (Connellan et al., 2013; Dobrohotoff & Llewellyn-Jones, 2011).

### Unit Layout & Room Type

There are numerous room types that support safety and recovery in BMH settings. A complete functional program should establish the needs for patient rooms, ratio of activity areas per patient, number and design of seclusion rooms, and requirements for patient toilets and bathing facilities, in addition to staff spaces, support functions, and other features to support the model of care (J. Hunt & Sine, 2015).

### *Ligature Resistance*

There is a consensus among experts that basic anti-ligature devices are the most important component of a suicide-resistant environment (Shepley et al., 2017). Requirements for ligature-resistant environments vary according to unit type. For example, The Joint Commission (2017b) states that inpatient psychiatric units (in both psychiatric hospitals and general/acute care settings) should include ligature-resistant patient rooms, patient bathrooms, common areas, and corridors, including door hardware on doors into patient rooms. Medical/surgical units and EDs do not need to meet the same standards.

### *Proximity*

Expert opinion suggests that nurse stations/team areas should be designed to minimize barriers between staff and patients (J. Hunt & Sine, 2018). However, staff safety should be addressed through both counter design (to reduce the risk of patients jumping or climbing over the counter) and work spaces that are separate from patient care duties (Andes & Shattell, 2006; J. Hunt & Sine, 2018; Kalantari & Snell, 2017; Karlin & Zeiss, 2006; Riggs, Due, & Connellan, 2013). Studies have shown that nurses recognize the tradeoffs between open and enclosed nurse stations, with some reporting that enclosed nurse stations provided confidentiality and a space for concentrated work but also created a barrier for communication (Shattell et al., 2015). One study participant felt that



enclosed nurse stations contribute to increased violence (Shepley et al., 2016), while another found that an open nurse station improved perceived patient-staff interactions (Kalantari & Snell, 2017). Notably, Kalantari and Snell reported that several participants expressed concerns about safety, but could not point to any specific evidence of increased problems. As a result, decisions regarding open versus closed nurse stations should be made on a case-by-case basis in the context of the model of care and patient population (Shepley et al., 2017).

### *Aesthetics/Atmosphere*

Evidence suggests that visiting areas and other gathering spaces should support family participation (Isobel et al., 2015; Jenkins et al., 2015; Shepley & Pasha, 2013). To promote safety, these spaces should also be visible from the nurse station and easily accessible from the unit (Isobel et al., 2015). Comfortable waiting areas may minimize stress (OSHA, 2016), and communal areas should include movable seating and ample space to regulate relationships and reduce stress-related aggression (Ulrich et al., 2018).

### *Room Design & Layout*

The majority of safety incidents, including suicide, occur in patient rooms and bathrooms (Bayramzadeh, 2016).

### *Social Density (Occupancy)*

There is considerable debate at present about whether patient rooms and bathrooms should be shared or private (Shepley et al., 2017, 2016; Ulrich et al., 2018). Some reports suggest that shared rooms increase safety by allowing for another set of eyes (Shepley et al., 2016), but others do not feel that shared patient rooms or bathrooms contribute to suicide prevention (Shepley et al., 2017). Shared rooms can also be a source of distress and frustration for some patients (Hung et al., 2014; Ulrich et al., 2018). The Facility Guidelines Institute (FGI) *Guidelines for Design and Construction of Hospitals* require that the *maximum* room capacity for psychiatric units shall be two patients (Facility Guidelines Institute, 2018). While some projects have incorporated private rooms successfully (Alexiou, Degl'Innocenti, Kullgren, & Wijk, 2016; Ulrich et al., 2018), experts suggest a hybrid solution of private and semi-private rooms (J. Hunt & Sine, 2015; Shepley et al., 2017). Ultimately, the decision about room

## **SOCIAL DENSITY: THE PRIVATE VS. SHARED ROOM DEBATE**

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Shared rooms can also be a source of distress and frustration for some patients (Hung et al., 2014; Ulrich et al., 2018).

Ultimately, the decision about room occupancy should be based on patient diagnosis and acuity (J. Hunt & Sine, 2015; Shepley et al., 2017).



occupancy should be based on patient diagnosis and acuity (J. Hunt & Sine, 2015; Shepley et al., 2017). Organizations might also want to consider large, private rooms that can be converted into shared rooms if needed (Shepley et al., 2017).

Bathrooms that connect to the patient room promote patient privacy, dignity, and comfort (Trzpuc et al., 2016). The FGI *Guidelines* require that each patient have access to a toilet room without having to enter a corridor, though exceptions are allowed where corridor access is part of the hospital's written clinical risk assessment and management program (Facility Guidelines Institute, 2018).

### ***Secured Access***

Seclusion and restraint are viewed as traumatizing practices and should only be used as a last resort when less restrictive measures have failed and safety is at severe risk (SAMHSA, 2015). However, a seclusion room carries its own risks, requiring special attention to promote safety (J. Hunt & Sine, 2018; New York State Office of Mental Health & architecture +, 2018). Experts recommend a lobby or ante-room that includes space for a response team to organize, as the patient may be aggressive or struggling upon entry (Curran, 2005; J. Hunt & Sine, 2018). While some suggest a full seclusion suite (Curran, 2005), most experts agree that a space large enough to be functional, but too small for a patient to get a running start at the opposite wall, is adequate (J. Hunt & Sine, 2018). In other words, the room should be at least 7 feet wide and no greater than 11 feet long (Facility Guidelines Institute, 2018; VA National Center for Patient Safety, 2018). Studies increasingly note the potential benefits associated with sensory rooms, quiet rooms, and other areas where patients can exercise some control over their environment and engage in quiet, calming activities (Brown et al., 2015; Novak, Scanlan, McCaul, MacDonald, & Clarke, 2012; Trzpuc et al., 2016).

Secure holding should also be reevaluated in EDs, as root cause analysis has revealed that inadequate holding areas have been a contributing factor in suicide and self-harm in the ED (Mills et al., 2012). One study suggested a lack of evidence in the form of controlled trials to support specialty rooms, security upgrades, and ED modifications, but acknowledges that such "common sense" approaches are often recommended in regulatory guidance/standards and have



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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).

been widely implemented in EDs (Weiland, Ivory, & Hutton, 2017). Another study showed reduced ED seclusion and restraint rates after a glass door was installed to restrict waiting patients to the waiting area (McCurdy et al., 2015).

Patient access to ingestible chemicals should be restricted in order 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, which should be stored in secure spaces (Yeager et al., 2005). EVS rooms should be self-locking (Mills et al., 2010), and ancillary spaces (e.g., conference rooms, interview rooms) should be secured when not in use (Cardell et al., 2009; J. Hunt & Sine, 2018).

#### *Ligature Resistance*

Secure rooms in EDs should either be ligature-resistant or made ligature-resistant by closing off equipment that could serve as a ligature point (for example, with a pull-down rolling security door) (The Joint Commission, 2017b).

#### *Visibility*

Due to the required level of monitoring, visibility is a priority in secure holding/seclusion room location and design, whether in the ED or patient unit (Curran, 2005; J. Hunt & Sine, 2018; Mills et al., 2012). Windows and/or camera surveillance may be required. However, visibility should be balanced with the need for privacy. One survey study indicated that many ED assessment areas do not offer sufficient privacy (Bolton et al., 2016). Several respondents noted that their conversations could be overheard by staff members or other patients, and/or the interior of the room could be seen easily from outside the room.

#### Interior Design/Finishes

##### *Ligature Resistance*

Doors—particularly toilet room doors—are often cited as a ligature point for hanging. Some organizations use accordion doors or doors with slanted tops, and some eliminate doors entirely in private rooms and other locations allowed by code (Cardell et al., 2009; Mills et al., 2008; Yeager et al., 2005). Good visibility may, however, impinge on patients' privacy, most notably around bathrooms in patient rooms and treatment spaces (e.g., the ED) where hangings often occur (Dobrohotoff & Llewellyn-Jones, 2011; Gournay & Bowers, 2000;



Mills et al., 2012; Mills, Watts, & Hemphill, 2014). In inpatient psychiatric units, the transition zone between patient rooms and bathrooms should be ligature-free or ligature-resistant (The Joint Commission, 2017b).

Door hardware is also a risk. Non-lever handles, handles that face down, recessed grip handles, push/pull handles, and ligature-resistant handles can mitigate the use of door handles as ligature points for hanging (ECRI Institute & The Institute for Safe Medication Practices, 2007; J. Hunt & Sine, 2018; Mills et al., 2008, 2012, 2010; New York State Office of Mental Health & architecture +, 2018). Door closing devices should also be carefully considered (Curran, 2005; J. Hunt & Sine, 2018) and, if used, should be mounted on the public-facing side of the door (J. Hunt & Sine, 2018; Lieberman et al., 2004; New York State Office of Mental Health & architecture +, 2018). Door hinges should be in the continuous “piano” style, extending from the top of the door to the bottom in an unbroken manner (Lipscomb et al., 2006; McPhaul et al., 2008; Mills et al., 2008, 2010; New York State, 2009; Yeager et al., 2005).

## CEILINGS

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

Ceiling heights and material selection should help prevent patients from reaching and tampering with fixtures that can serve as ligature points. Most sources recommend a height minimum of 9 feet (Curran, 2005; J. Hunt & Sine, 2018; New York State Office of Mental Health & architecture +, 2018; VA National Center for Patient Safety, 2018). Accrediting organizations state that all inpatient psychiatric unit patient rooms and bathrooms must have solid ceilings, while drop ceilings can be used in hallways and other common areas (The Joint Commission, 2017b). However, lay-in acoustical ceiling tiles that may allow for exposed plumbing, piping, or ductwork are considered high-risk (Lieberman et al., 2004; New York State, 2009). Where dropped ceilings are used, the hallway should be fully visible to staff, and there should be no objects that might allow a patient to climb up to the ceiling, remove a panel, and gain access to any ligature points above the ceiling (The Joint Commission, 2017b). A plaster/lath, gypsum board, or metal pan system requiring special tools for removal generally presents a lower risk (Curran, 2005; Dobrohotoff & Llewellyn-Jones, 2011; Lieberman et al., 2004).

Toilet room accessories can also be used as ligature points for hanging. Soap dishes and toilet paper holders should be recessed (Cardell et al., 2009; J. Hunt & Sine, 2015; Mills et al., 2014; New York State Office of Mental Health &



architecture +, 2018). Shower stalls should be designed so that a shower curtain is not needed (J. Hunt & Sine, 2018). Where shower curtains are used, tracks must be in a break-away recessed style, and fabric should be breathable (New York State Office of Mental Health & architecture +, 2018).

The use of clothing rods and hangers in BMH settings is discouraged (Cardell et al., 2009; J. Hunt & Sine, 2015; Lieberman et al., 2004; New York State Office of Mental Health & architecture +, 2018). Hanging attempts (e.g., twisting) also occur with ligature points below waist height (J. Hunt & Sine, 2015; Lieberman et al., 2004; NHS Trust, 2017; Yeager et al., 2005), including assistive devices such as grab bars. Eliminating any ligature points in grab bars is often cited as a mitigation technique (J. Hunt & Sine, 2015; Mills et al., 2012; New York State, 2009; Yeager et al., 2005).

#### *Elimination/Control of Other Hazards*

Doors are potential barricades, leading to risk of self-harm and harm to others (Dobrohotoff & Llewellyn-Jones, 2011; J. Hunt & Sine, 2015; New York State Office of Mental Health & architecture +, 2018). Fire codes and egress width should also be considered; for example, doors recessed into a corridor to allow egress can also create alcoves that obscure visibility (J. Hunt & Sine, 2018). Options include wicket doors or doors that swing inward, accommodating plans for easy removal (New York State Office of Mental Health & architecture +, 2018; Stowell, Hughes, & Rozel, 2016). One UK-based study referenced ED regulatory standards requiring new patient risk assessment facilities to include two out-swinging doors that cannot be locked from the inside (Bolton et al., 2016). Another ED-based study suggested that interview rooms include unobstructed exits with doors that open outward, cannot be locked from the inside, and allow easy access from the outside in the event of an emergency (Stowell et al., 2016).

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; J. Hunt & Sine, 2018). Some guidelines note the risk of concealed weapons (J. Hunt & Sine, 2018; New York State Office of Mental Health & architecture +, 2018). One safety advisory suggests

#### DOORS

Doors have been associated with risk of self-harm and harm to others in BMH settings. When selecting or specifying doors, consider that a door can:

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



### MATERIAL SELECTION TO DECREASE RISK OF HARM TO SELF OR OTHERS

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

Mirrors should be made of stainless steel, unbreakable glass, polycarbonate, or acrylic to reduce the risk of broken glass being used as a weapon.

the use of permanent wall and ceiling treatments, moldings, and floors to prevent the 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 +, 2018).

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; J. Hunt & Sine, 2015, 2018; Lieberman et al., 2004; New York State Office of Mental Health & architecture +, 2018). It is also possible for artwork, frames, and glass shards to be used as a weapon (Mills et al., 2010). 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 deflection of large pieces (J. Hunt & Sine, 2015). Yeager et al. (2005) noted that, while using glass as a weapon has not been documented as a safety event, a proactive approach can only reduce any potential risk.

Hard plastic paper towel, toilet paper, toiletry shelves, and soap dispensers can be broken, resulting in sharp pieces of plastic that can be used as a weapon (Cardell et al., 2009; J. Hunt & Sine, 2015; Mills et al., 2014; New York State Office of Mental Health & architecture +, 2018).

### *Secured Access*

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 studies recommend unlockable doors (Cardell et al., 2009), but in cases where this is not possible, classroom-style locks may be an alternative (J. Hunt & Sine, 2015). 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



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Noise has not been widely studied in BMH settings, but it is perceived as an important environmental condition of care (Shepley et al., 2017).

patients to be present in the room together when the door is closed (Mills et al., 2010).

#### *Acoustic Environment*

While noise has not been widely studied in BMH settings, it is perceived as an important environmental condition of care (Shepley et al., 2017). OSHA-based design guidelines suggest that the use of absorptive wall panels in day rooms may reduce anxiety and stress (Lipscomb et al., 2006). A 2011 literature review noted that hard-surface flooring in hallways contributed to noise levels and led to negative perceptions of the environment (Dobrohotoff & Llewellyn-Jones, 2011). More recently, a quality improvement study found a relationship between reducing noise and reducing levels of violence on a mental health ward for elders (Brown et al., 2016).

#### Furnishings

##### *Ligature Resistance*

Furniture should be evaluated for ligature resistance. In inpatient psychiatric units, risk should be assessed to determine the appropriate patient bed type (The Joint Commission, 2017b). If beds do include any ligature points, additional safety precautions should be put into place.

##### *Elimination/Control of Other Hazards*

Furniture can be used by patients to harm themselves, to barricade themselves, to throw at/strike staff members, or to climb in elopement attempts (Bolton et al., 2016; Cal/OSHA, 2018; ECRI Institute & The Institute for Safe Medication Practices, 2007; Gunnell, Bennewith, Hawton, Simkin, & Kapur, 2005; J. Hunt & Sine, 2015; McPhaul et al., 2008; New York State Office of Mental Health & architecture +, 2018; Yeager et al., 2005). While safety is a critical consideration in selecting furniture for both indoor and outdoor spaces, it can be difficult to balance against durability, aesthetics, and budget (Shepley et al., 2016). In some instances (e.g., an ED interview room), furniture may need to be secured to the floor (Stowell et al., 2016). However, there have been concerns about the effects such safety measures can have on agitated or anxious patients (Bolton et al., 2016).



## MECHANICAL, ELECTRICAL, AND PLUMBING SYSTEMS

Often-overlooked elements of mechanical, electrical, and plumbing systems can increase risk to patients. Plumbing fixtures, sprinkler heads, interior and exterior lighting fixtures, electrical outlets, and HVAC components should be evaluated to mitigate any risk of hanging.

### Mechanical (HVAC)/Electrical/Plumbing Systems

#### *Ligature Resistance*

Potential ligature points for hanging include HVAC terminal devices and covers, as well as thermostats, vents, and grilles. These should be fastened with security screws, locks, or tamper-resistant fasteners. Heat/smoke detectors should be flush mounted with the ceiling (Curran, 2005; ECRI Institute & The Institute for Safe Medication Practices, 2007; New York State Office of Mental Health & architecture +, 2018). Diffuser and grille size should be minimized to prevent patient elopement and concealment of contraband (New York State Office of Mental Health & architecture +, 2018). Serviceable components should be located outside of patient rooms (J. Hunt & Sine, 2018).

To eliminate ligature points in higher-risk interior areas, light fixtures should either be recessed/flush-mounted with fully enclosed frames (including shatter resistant polycarbonate or similar “safe” lenses) and security fasteners, or have substantial (heavy duty) lenses securely anchored in place with frames secured by tamper-resistant screws (Curran, 2005; Gunnell et al., 2005; J. Hunt & Sine, 2015, 2018; New York State Office of Mental Health & architecture +, 2018).

Plumbing fixtures such as shower heads and controls should be flush or slanted so they cannot be used as ligature points, while toilets should be selected and installed to prevent gaps between the wall or floor (J. Hunt & Sine, 2018; New York State Office of Mental Health & architecture +, 2018). Concealed or button flushers and integral seats are also suggested for toilets (Curran, 2005; J. Hunt & Sine, 2018; Lieberman et al., 2004; Mills et al., 2014; New York State Office of Mental Health & architecture +, 2018). P-traps and supply pipes under lavatories should be provided with covers (Cardell et al., 2009; Gunnell et al., 2005; J. Hunt & Sine, 2015, 2018; Kahn & Antonucci., 1980; Lieberman et al., 2004; Yeager et al., 2005).

Sprinkler heads should be ligature-resistant, with no accessible parts that activate if vandalized (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 +, 2018). Similarly, they should break away at a load of no less than 50 lbs. (New York State Office of Mental Health & architecture +, 2018).




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## Use video surveillance:

- » 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

### *Elimination/Control of Other Hazards*

Multiple experts suggest that traditional electrical outlets should not be used in behavioral health settings, and that AFCI (Arc Fault Circuit Interrupter) & GFCI (Ground Fault Circuit Interrupter) should be specified whenever possible (Cardell et al., 2009; Dobrohotoff & Llewellyn-Jones, 2011; ECRI Institute & The Institute for Safe Medication Practices, 2007; J. Hunt & Sine, 2018; New York State Office of Mental Health & architecture +, 2018). Some recommend that outlets include a ground fault circuit interrupter that can be controlled remotely (J. Hunt & Sine, 2018; New York State Office of Mental Health & architecture +, 2018).

### Technology Integration

#### *Visibility*

Experts suggest the use of video surveillance in high-risk areas (indoor and outdoor) to deter elopement and unauthorized access (I. Hunt et al., 2010; J. Hunt & Sine, 2018; OSHA, 2016; 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 experts note that 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).

#### *Secured Access*

Numerous studies suggest a relationship between attacks (and threats of attack) on staff and a lack of alarm systems (Curran, 2005; Dobrohotoff & Llewellyn-Jones, 2011; Lipscomb et al., 2006; McPhaul et al., 2008; OSHA, 2016; 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 (Bolton et al., 2016; Stowell et al., 2016).

Telephones should not be left with suicidal patients without supervision, as phones and/or cords can be used for self-harm (Cardell et al., 2009; Curran, 2005; Gunnell et al., 2005; J. Hunt & Sine, 2018; Mills et al., 2014).



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## Conclusion

Planning and designing for patients with behavioral and mental health conditions is complex, and it is impossible to control for all risks present within a treatment environment. Sometimes patient behavior is predictable, but not always, making these types of design decisions difficult. It is important to strike the balance between a safe and healing environment. While this alone is not a cure, optimizing the environment has been shown to mitigate the risk of extreme behaviors. As such, a multifactorial approach must consider the interactions of the built environment, the people in the system (both patients and staff), and organizational policies and procedures as layers of protection against risk. More information on specific products and materials that meet BMH safety requirements can be found in the following sources:

- Hunt, J., & Sine, D. (2018). *Behavioral Health Design Guide: Edition 7.3*. White Paper/Guidelines, Behavioral Health Facility Consulting, LLC (BHFC). <http://www.bhfllc.com/download-the-design-guide/>
- New York State Office of Mental Health, & architecture +. (2018). *Patient Safety Standards, Materials and Systems Guidelines*. Design Guidelines, Albany, NY. [https://www.omh.ny.gov/omhweb/patient\\_safety\\_standards/guide.pdf](https://www.omh.ny.gov/omhweb/patient_safety_standards/guide.pdf)
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