

FINDINGS



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 2019 to be a stand-alone reference under the Grainger sponsorship.



BACKGROUND

MENTAL HEALTH DISORDERS

A recent classification of mental health disorders highlights the broad range of BMH conditions, including:

- Neurocognitive and “organic” disorders, such as Alzheimer’s dementia, vascular dementia, and delirium
- Substance-related disorders, such as alcohol dependence, opioid dependence, and substance-induced psychotic disorder
- Neurodevelopmental disorders, such as Autistic disorder, Asperger’s syndrome, and ADHD
- Mood disorders, such as bipolar disorder, anxiety, and stress-related disorders

The Safety Toolbox is made available through a partnership with:



Understanding Injury in Behavioral and Mental Health Settings

Based on a 2016 survey by the Substance Abuse and Mental Health Services Administration (SAMHSA), the National Institute of Mental Health (NIMH) found that 18% of adults in the U.S. had a mental illness in the previous year (National Institute for Mental Health, 2017). Prevalence varies across age groups, from 22.1% among young adults (18–25 years) to 21.1% among adults (26–49 years) and 14.5% among older adults (50+). Some of those living with mental illnesses may not even be aware of their condition; NIMH found that in the same year (2016), only 43.1% received mental health treatment.

Behavioral and mental health (BMH) patient populations may present a higher risk for self-harm or harm to others. Self-harm can be broadly defined as “all acts of intentional injury to self, regardless of intent” (James, Stewart, & Bowers, 2012). According to Corrigan, Druss, and Perlick (2014), “Suicide and violence are among the most serious consequences of mental illnesses.” A meta-analysis of 44 studies found the number of suicides among psychiatric inpatients to be “disturbingly high,” with an increase over the past three decades (Walsh, Sara, Ryan, & Large, 2015). However, a larger population of non-psychiatric patients identified as a low risk for suicide may actually present a higher risk burden (Roaten, Johnson, Genzel, Khan, & North, 2018). 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).

Suicide is among the top five sentinel events in The Joint Commission’s (TJC) Sentinel Event Database (The Joint Commission, 2017b), but suicide ideation across settings can be difficult to identify (The Joint Commission, 2016). Approximately half of suicides take place in psychiatric units, and up to 10% of suicide attempts occur in the ED, but risk is also present in medical-surgical units, intensive care units, and clinics (Mills, DeRosier, Ballot, Shepherd, & Bagian, 2008; Mills, Watts, DeRosier, Tomolo, & Bagian, 2012; Mills, Watts, & Hemphill, 2014). This problem is not unique to the U.S. Studies conducted in Japan and Taiwan also found that



The Center for Health Design: Moving Healthcare Forward

The Center for Health Design advances best practices and empowers healthcare leaders with quality research that demonstrates the value of design to improve health outcomes, patient experience of care, and provider/staff satisfaction and performance.

Learn more at
www.healthdesign.org

approximately half of inpatient suicides were in medical settings, and half were in psychiatric settings (Cheng, Hu, & Tseng, 2009; Inoue et al., 2017).

The Centers for Medicare and Medicaid, along with TJC, continue to develop measures for suicide prevention in “inpatient psychiatric hospitals, inpatient psychiatric units in general acute care hospitals, and non-behavioral health units designated for the treatment of psychiatric patients,” as well as those areas that may temporarily serve psychiatric patients (The Joint Commission, 2017a). The most common methods of inpatient suicide are hanging and jumping, though suicide methods may vary by unit type (Mills et al., 2008; Mills et al., 2012; Mills et al., 2014).

While self-harm (suicide or non-suicidal harm) is one area of concern, aggression and violence can also lead to physical and/or psychological harm against staff and other patients. Violent crime in hospitals has been on the rise, rising from 2 to 2.8 events per 100 beds between 2012 and 2015 (Gooch, 2018). In fact, physical violence affects nurses in nearly all work environments across every region of the world (Gillespie, Gates, & Berry, 2013), with the most risk associated with emergency departments and inpatient mental health units violence (Lenaghan, Cirrincione, & Henrich, 2017; Perkins, Beecher, Aberg, Edwards, & Tilley, 2017). One meta-analysis found that 17% of patients in mental health units committed at least one act of violence (Iozzino, Ferrari, Large, Nielsens, & de Girolamo, 2015). The Bureau of Labor Statistics collects data on workplace violence by industry (Bureau of Labor Statistics, n.d.), and NIOSH and OSHA (2016) provide guidance on harm prevention programs.

However, it is essential to recognize that the BMH spectrum covers a vast array of ages and disorders, and each patient population may represent unique situations and needs (Kessler & Wang, 2008; NIMH, n.d.; Reed et al., 2013). There is often a stigma associated with mental illness at the individual and/or societal level (Corrigan et al., 2014), and this stigma may heighten perceived danger (Schneeberger et al., 2017). When designing the environment for vulnerable BMH populations, it is important to balance safety with patient comfort, as overly restrictive environments may reinforce stigmas, contribute to patient trauma, and increase suicide risk (Sakinofsky, 2014; Walsh et al., 2015). The degree of potential harm in different locations must be evaluated in order to establish priorities during the caregiving process. Refer to the associated Issue Brief, Design Strategies, and [SRA toolkit](#) for additional guidance.



References

- Bureau of Labor Statistics. (n.d.). Injuries, Illnesses, and Fatalities. Retrieved September 1, 2015, from <http://www.bls.gov/iif/#Data>
- Cheng, I.-C., Hu, F.-C., & Tseng, M.-C. M. (2009). Inpatient suicide in a general hospital. *General Hospital Psychiatry, 31*(2), 110–115. <https://doi.org/10.1016/j.genhosppsych.2008.12.008>
- Corrigan, P. W., Druss, B. G., & Perlick, D. A. (2014). The Impact of Mental Illness Stigma on Seeking and Participating in Mental Health Care. *Psychological Science in the Public Interest, 15*(2), 37–70. <https://doi.org/10.1177/1529100614531398>
- Gillespie, G. L., Gates, D. M., & Berry, P. (2013). Stressful Incidents of Physical Violence Against Emergency Nurses. *Online Journal of Issues in Nursing, 18*(1), 13.
- Gooch, P. (2018). Hospital Workplace Violence Prevention in California: New Regulations. *Workplace Health & Safety, 66*(3), 115–119. <https://doi.org/10.1177/2165079917731791>
- Inoue, K., Kawanishi, C., Otsuka, K., Cho, Y., Shiraishi, M., Ishii, T., ... Hirayasu, Y. (2017). A large-scale survey of inpatient suicides: comparison between medical and psychiatric settings. *Psychiatry Research, 250*, 155–158. <https://doi.org/10.1016/j.psychres.2017.01.076>
- Iozzino, L., Ferrari, C., Large, M., Nielsens, O., & de Girolamo, G. (2015). Prevalence and Risk Factors of Violence by Psychiatric Acute Inpatients: A Systematic Review and Meta-Analysis. *PLOS ONE, 10*(6), e0128536. <https://doi.org/10.1371/journal.pone.0128536>
- James, K., Stewart, D., & Bowers, L. (2012). Self-harm and attempted suicide within inpatient psychiatric services: a review of the literature. *International Journal of Mental Health Nursing, 21*(4), 301–309. <https://doi.org/10.1111/j.1447-0349.2011.00794.x>
- Kessler, R. C., & Wang, P. S. (2008). The Descriptive Epidemiology of Commonly Occurring Mental Disorders in the United States. *Annual Review of Public Health, 29*(1), 115–129. <https://doi.org/10.1146/annurev.publhealth.29.020907.090847>
- Lenaghan, P. A., Cirrincione, N. M., & Henrich, S. (2017). Preventing Emergency Department Violence through Design. *Journal of Emergency Nursing*, in press. <https://doi.org/10.1016/j.jen.2017.06.012>
- Mills, P. D., DeRosier, J. M., Ballot, B. A., Shepherd, M., & Bagian, J. P. (2008). Inpatient suicide and suicide attempts in Veterans Affairs hospitals. *Joint Commission Journal on Quality and Patient Safety, 34*(8), 482–488.
- Mills, P. D., Watts, B. V., DeRosier, J. M., Tomolo, A. M., & Bagian, J. P. (2012). Suicide attempts and completions in the emergency department in Veterans Affairs Hospitals. *Emergency Medicine Journal, 29*(5), 399–403. <https://doi.org/10.1136/emj.2010.105239>



- Mills, P. D., Watts, B. V., & Hemphill, R. R. (2014). Suicide attempts and completions on medical-surgical and intensive care units. *Journal of Hospital Medicine: An Official Publication of the Society of Hospital Medicine*, 9(3), 182–185. <https://doi.org/10.1002/jhm.2141>
- National Institute for Mental Health (NIMH). (2017). Health Information: Mental Illness [NIMH]. Retrieved August 31, 2018, from <https://www.nimh.nih.gov/health/statistics/mental-illness.shtml>
- NIMH. (n.d.). Mental Health Information. Retrieved September 1, 2015, from <https://www.nimh.nih.gov/health/topics/index.shtml>
- OSHA. (2016). *Guidelines for Preventing Workplace Violence for Health Care & Social Service Workers* (Guidelines No. OSHA 3148-06R 2016) (pp. 1–53). Washington, D.C.: U.S. Department of Labor, Occupational Safety and Health Administration. Retrieved from <https://www.osha.gov/Publications/osa3148.pdf>
- Perkins, C., Beecher, D., Aberg, D. C., Edwards, P., & Tilley, N. (2017). Personal security alarms for the prevention of assaults against healthcare staff. *Crime Science*, 6, 11. <https://doi.org/10.1186/s40163-017-0073-1>
- Reed, G. M., Roberts, M. C., Keeley, J., Hooppell, C., Matsumoto, C., Sharan, P., ... Medina-Mora, M. E. (2013). Mental Health Professionals' Natural Taxonomies of Mental Disorders: Implications for the Clinical Utility of the ICD-11 and the DSM-5. *Journal of Clinical Psychology*, 69(12), 1191–1212. <https://doi.org/10.1002/jclp.22031>
- Roaten, K., Johnson, C., Genzel, R., Khan, F., & North, C. S. (2018). Development and Implementation of a Universal Suicide Risk Screening Program in a Safety-Net Hospital System. *Joint Commission Journal on Quality and Patient Safety*, 44(1), 4–11. <https://doi.org/10.1016/j.jcjq.2017.07.006>
- Sakinofsky, I. (2014). Preventing Suicide Among Inpatients. *Canadian Journal of Psychiatry. Revue Canadienne de Psychiatrie*, 59(3), 131–140.
- Schneeberger, A. R., Kowalinski, E., Fröhlich, D., Schroeder, K., Felten, S., Zinkler, M., ... Huber, C. G. (2017). Aggression and violence in psychiatric hospitals with and without open door policies: A 15-year naturalistic observational study. *Journal of Psychiatric Research*, 95, 189–195. <https://doi.org/10.1016/j.jpsychires.2017.08.017>
- The Joint Commission. (2016). Sentinel Event Alert 56: Detecting and treating suicide ideation in all settings. The Joint Commission. Retrieved from https://www.jointcommission.org/assets/1/18/SEA_56_Suicide.pdf
- The Joint Commission. (2017a). Ligature Risks: Assessing and Mitigating Risk for Suicide and Self-Harm. Retrieved July 19, 2017, from http://www.jointcommission.org/standards_information/jcfaqdetails.aspx
- The Joint Commission. (2017b). Now effective: Surveying, scoring of ligature, suicide, self-harm in inpatient psychiatric setting. Retrieved August 31, 2018, from <http://www.jointcommission.org/issues/article.aspx>
- Walsh, G., Sara, G., Ryan, C. J., & Large, M. (2015). Meta-analysis of suicide rates among psychiatric in-patients. *Acta Psychiatrica Scandinavica*, 131(3), 174–184. <https://doi.org/10.1111/acps.12383>



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.

The Safety Toolbox is made available through a partnership with:



Reducing Injury and Harm in Behavioral & Mental Health Settings Design Strategies

The following design solutions are a brief summary of the content found in [Reducing Injury and Harm: An Issue Brief on Safety for Behavioral & Mental Health](#). 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.



The Center for Health Design: Moving Healthcare Forward

The Center for Health Design advances best practices and empowers healthcare leaders with quality research that demonstrates the value of design to improve health outcomes, patient experience of care, and provider/staff satisfaction and performance.

Learn more at
www.healthdesign.org

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>

This 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 the collaborative input of project- and facility-based expertise.



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.

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





AUTHOR

Ellen Taylor, AIA, MBA, EDAC
Director of Research

Terri Zborowsky, PhD, EDAC
Research Associate

Reducing Injury and Harm: Safety for Behavioral & Mental Health

January 2016, updated February 2019

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

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).



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,



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

Some reports suggest that shared rooms increase safety by allowing for another set of eyes (Shepley et al., 2016), but others do not feel 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).

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



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



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).



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).



The Center for Health Design: Moving Healthcare Forward

The Center for Health Design advances best practices and empowers healthcare leaders with quality research that demonstrates the value of design to improve health outcomes, patient experience of care, and provider/staff satisfaction and performance.

Learn more at
www.healthdesign.org

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
- VA Environmental Programs Service. (2014). *Environmental Programs Service Mental Health Guide 2014*. US Department of Veterans Affairs. https://www.patientsafety.va.gov/docs/joe/eps_mental_health_guide.pdf

Acknowledgements

The 2013–14 literature review content for the SRA was supported by The Center’s research team (Anjali Joseph, PhD, EDAC, Ellen Taylor, AIA, MBA, EDAC, Xiaobo Quan, PhD, EDAC, and Upali Nanda, PhD, EDAC) and the expert workgroups for each topic area.



References

- Abbotts, M., & NHS Trust. (2018, June). Policy S05: Assessment of Environmental Ligatures in Inpatient Settings. Devon Partnership NHS Trust.
- Ahern, C. C., Bieling, P., McKinnon, M. C., McNeely, H. E., & Langstaff, K. (2016). A Recovery-Oriented Care Approach: Weighing the Pros and Cons of a Newly Built Mental Health Facility. *Journal of Psychosocial Nursing and Mental Health Services*, 54(2), 39–48.
- Alexiou, E., Degl'Innocenti, A., Kullgren, A., & Wijk, H. (2016). The impact of facility relocation on patients' perceptions of ward atmosphere and quality of received forensic psychiatric care. *Journal of Forensic and Legal Medicine*, 42, 1–7. <https://doi.org/10.1016/j.jflm.2016.04.014>
- Alexiou, E., Degl'Innocenti, A., Kullgren, A., Falk, H., & Wijk, H. (2016). The Physical and Psychosocial Environment's Influence on Patients' and Staff's Perceptions of Person-Centered Care in Forensic Psychiatry. *Austin Journal of Forensic Science and Criminology*, 3(2), 1–7.
- Andes, M., & Shattell, M. M. (2006). An exploration of the meanings of space and place in acute psychiatric care. *Issues in Mental Health Nursing*, 27(6), 699–707. <https://doi.org/10.1080/01612840600643057>
- Arnold, C. (2016). Building Envelope Design Guide - Introduction | WBDG Whole Building Design Guide. Retrieved September 11, 2018, from <https://www.wbdg.org/guides-specifications/building-envelope-design-guide/building-envelope-design-guide-introduction>
- Ballard, E. D., Pao, M., Henderson, D., Lee, L. M., Bostwick, J. M., & Rosenstein, D. L. (2008). Suicide in the medical setting. *Jt Comm J Qual Patient Saf*, 34(8), 474–481.
- Bayramzadeh, S. (2016). An Assessment of Levels of Safety in Psychiatric Units. *HERD: Health Environments Research & Design Journal*, 10(2), 66–80. <https://doi.org/10.1177/1937586716656002>
- Bolton, J., Palmer, L., & Cawdron, R. (2016). Survey of psychiatric assessment rooms in UK emergency departments. *BJPsych Bulletin*, 40(2), 64–67. <https://doi.org/10.1192/pb.bp.114.049742>
- Bowers, L., Banda, T., & Nijman, H. (2010). Suicide inside: a systematic review of inpatient suicides. *J Nerv Ment Dis*, 198(5), 315–328. <https://doi.org/10.1097/NMD.0b013e3181da47e2>
- Bowers, L., Dack, C., Gul, N., Thomas, B., & James, K. (2011). Learning from prevented suicide in psychiatric inpatient care: an analysis of data from the National Patient Safety Agency. *Int J Nurs Stud*, 48(12), 1459–1465. <https://doi.org/10.1016/j.ijnurstu.2011.05.008>
- Brown, J., Fawzi, W., McCarthy, C., Stevenson, C., Kwesi, S., Joyce, M., ... Shah, A. (2015). Safer Wards: reducing violence on older people's mental health wards. *BMJ Quality Improvement Reports*, 4(1), eCollection. <https://doi.org/10.1136/bmjquality.u207447.w2977>
- Brown, J., Fawzi, W., Shah, A., Joyce, M., Holt, G., McCarthy, C., ... Solomon-Ayeh, K. (2016). Low stimulus environments: reducing noise levels in continuing care. *BMJ Quality Improvement Reports*, 5(1), 1–4. <https://doi.org/10.1136/bmjquality.u207447.w4214>
- Cal/OSHA. (2018). California Code of Regulations, Title 8, Section 3342. Violence Prevention in Health Care. [Cal/OSHA - Title 8 regulations]. Retrieved from <https://www.dir.ca.gov/Title8/3342.html>



- Cardell, R., Bratcher, K. S., & Quinnett, P. (2009). Revisiting “suicide proofing” an inpatient unit through environmental safeguards: a review. *Perspect Psychiatr Care*, 45(1), 36–44. <https://doi.org/10.1111/j.1744-6163.2009.00198.x>
- Centers for Medicare & Medicaid Services. (2017). *Clarification of Ligature Risk Policy* (Center for Clinical Standards and Quality/Survey & Certification Group No. S&C Memo: 18-06-Hospitals). Baltimore, MD: CMS. Retrieved from <https://www.cms.gov/Medicare/Provider-Enrollment-and-Certification/SurveyCertificationGenInfo/Downloads/Survey-and-Cert-Letter-18-06.pdf>
- Cheng, I.-C., Hu, F.-C., & Tseng, M.-C. M. (2009). Inpatient suicide in a general hospital. *General Hospital Psychiatry*, 31(2), 110–115. <https://doi.org/10.1016/j.genhosppsych.2008.12.008>
- Connellan, K., Due, C., & Riggs, D. (2011). Gardens of the mind: Nature, power and design for mental health. In *Diversity and Unity: Proceedings of the IASDR 2011 4th World Conference on Design Research* (pp. 1–13). Delft, The Netherlands: University of Technology Delft.
- Connellan, K., Gaardboe, M., Riggs, D., Due, C., Reinschmidt, A., & Mustillo, L. (2013). Stressed Spaces: Mental Health and Architecture. *HERD: Health Environments Research & Design Journal*, 6(4), 127–168. <https://doi.org/10.1177/193758671300600408>
- Curran, C. (2005). Seclusion: factors to consider when designing and using a seclusion suite in a mental health hospital. *Health*, 4.
- Dobrohotoff, J. T., & Llewellyn-Jones, R. H. (2011). Psychogeriatric inpatient unit design: a literature review. *Int Psychogeriatr*, 23(2), 174–189. <https://doi.org/10.1017/S1041610210002097>
- ECRI Institute, & The Institute for Safe Medication Practices. (2007). Diligence and Design in Behavioral Health Impact Patient Safety. *PA Patient Safety Advisory*, 4(3), 78–82.
- Erbino, C., Toccolini, A., Vagge, I., & Ferrario, P. S. (2015). Guidelines for the design of a healing garden for the rehabilitation of psychiatric patients. *Journal of Agricultural Engineering*, 46(2), 43–51. <https://doi.org/10.4081/jae.2015.426>
- Facility Guidelines Institute. (2018). *FGI Guidelines for Design and Construction of Hospitals*. St. Louis, MO: FGI.
- Goh, S. E., Salmons, P. H., & Whittington, R. M. (1989). Hospital suicides: are there preventable factors? Profile of the psychiatric hospital suicide. *Br J Psychiatry*, 154, 247–249.
- Gournay, K., & Bowers, L. (2000). Suicide and self-harm in in-patient psychiatric units: a study of nursing issues in 31 cases. *Journal of Advanced Nursing*, 32(1), 124–131. <https://doi.org/10.1046/j.1365-2648.2000.01453.x>
- Gunnell, D., Bennewith, O., Hawton, K., Simkin, S., & Kapur, N. (2005). The epidemiology and prevention of suicide by hanging: a systematic review. *Int J Epidemiol*, 34(2), 433–442. <https://doi.org/10.1093/ije/dyh398>
- Haines, A., Brown, A., McCabe, R., Rogerson, M., & Whittington, R. (2017). Factors impacting perceived safety among staff working on mental health wards. *BJPsych Open*, 3(5), 204–211. <https://doi.org/10.1192/bjpo.bp.117.005280>
- Huber, C. G., Schneeberger, A. R., Kowalinski, E., Fröhlich, D., von Felten, S., Walter, M., ... Lang, U. E. (2016). Suicide risk and absconding in psychiatric hospitals with and without open door policies: a 15 year, observational study. *The Lancet Psychiatry*, 3(9), 842–849. [https://doi.org/10.1016/S2215-0366\(16\)30168-7](https://doi.org/10.1016/S2215-0366(16)30168-7)



- Hung, L., Loewen, E., Bindley, B., McLaren, D., Feist, T., & Phinney, A. (2014). The impact of an acute psychiatry environment on older patients and their families. *Journal of Gerontological Nursing, 40*(9), 50–56. <https://doi.org/10.3928/00989134-20140325-01>
- Hunt, I., Bickley, H., Windfuhr, K., Shaw, J., Appleby, L., & Kapur, N. (2013). Suicide in recently admitted psychiatric in-patients: A case-control study. *Journal of Affective Disorders, 144*(1–2), 123–128. <https://doi.org/10.1016/j.jad.2012.06.019>
- Hunt, I., Windfuhr, K., Swinson, N., Shaw, J., Appleby, L., Kapur, N., & National Confidential Inquiry into Suicide and Homicide by People with Mental Illness. (2010). Suicide amongst psychiatric in-patients who abscond from the ward: a national clinical survey. *BMC Psychiatry, 10*(1), 14.
- Hunt, J., & Sine, D. (2015). *Common Mistakes in Designing Psychiatric Hospitals: An Update*. Retrieved from http://www.fgiguideguidelines.org/wp-content/uploads/2015/07/FGI_CommonMistakesPsychiatricHospitals_1505.pdf
- Hunt, J., & Sine, D. (2018). *Behavioral Health Design Guide: Edition 7.3*. White Paper/Guidelines, Behavioral Health Facility Consulting, LLC (BHFC). Retrieved from <http://www.bhfc.com/download-the-design-guide/>
- Isobel, S., Foster, K., & Edwards, C. (2015). Developing family rooms in mental health inpatient units: an exploratory descriptive study. *BMC Health Services Research, 15*(1). <https://doi.org/10.1186/s12913-015-0914-0>
- Jenkins, O., Dye, S., & Foy, C. (2015). A study of agitation, conflict and containment in association with change in ward physical environment. *Journal of Psychiatric Intensive Care, 11*(01), 27–35. <https://doi.org/10.1017/S1742646414000065>
- Kahn, R. L., & Antonucci, T. C. (1980). Convoys Over the Life Course: Attachment, Roles and Social Support. *Life-Span Development and Behavior* Edited by P. B. Baltes and O. Brim. New York: Academic Press., 3, 253–286.
- Kalantari, S., & Snell, R. (2017). Post-Occupancy Evaluation of a Mental Healthcare Facility Based on Staff Perceptions of Design Innovations. *HERD: Health Environments Research & Design Journal, 10*(4), 121–135. <https://doi.org/10.1177/1937586716687714>
- Karlin, B. E., & Zeiss, R. A. (2006). Best Practices: Environmental and therapeutic issues in psychiatric hospital design: Toward best practices. *Psychiatric Services, 57*(10), 1376–1378. <https://doi.org/10.1176/appi.ps.57.10.1376>
- Lieberman, D. Z., Resnik, H. L., & Holder-Perkins, V. (2004). Environmental risk factors in hospital suicide. *Suicide Life Threat Behav, 34*(4), 448–453. <https://doi.org/10.1521/suli.34.4.448.53740>
- Lipscomb, J., McPhaul, K., Rosen, J., Brown, J. G., Choi, M., Soeken, K., ... Porter, P. (2006). Violence prevention in the mental health setting: the New York state experience. *Can J Nurs Res, 38*(4), 96–117.
- Mahoney, J. S., Palyo, N., Napier, G., & Giordano, J. (2009). The Therapeutic Milieu Reconceptualized for the 21st Century. *Archives of Psychiatric Nursing, 23*(6), 423–429. <https://doi.org/10.1016/j.apnu.2009.03.002>
- McCurdy, J. M., Haliburton, J. R., Yadav, H. C., Yoder, A. M., Norton, L. R., Froehlich, J. A., ... El-Mallakh, R. S. (2015). Case Study: Design May Influence Use of Seclusion and Restraint. *HERD: Health Environments Research & Design Journal, 8*(3), 116–121. <https://doi.org/10.1177/1937586715575905>
- McPhaul, K. M., London, M., Murrett, K., Flannery, K., Rosen, J., & Lipscomb, J. (2008). Environmental evaluation for workplace violence in healthcare and social services. *Journal of Safety Research, 39*(2), 237–250.



- Mills, P. D., DeRosier, J. M., Ballot, B. A., Shepherd, M., & Bagian, J. P. (2008). Inpatient suicide and suicide attempts in Veterans Affairs hospitals. *Joint Commission Journal on Quality and Patient Safety*, 34(8), 482–488.
- Mills, P. D., Watts, B. V., DeRosier, J. M., Tomolo, A. M., & Bagian, J. P. (2012). Suicide attempts and completions in the emergency department in Veterans Affairs Hospitals. *Emergency Medicine Journal*, 29(5), 399–403. <https://doi.org/10.1136/emj.2010.105239>
- Mills, P. D., Watts, B. V., & Hemphill, R. R. (2014). Suicide attempts and completions on medical-surgical and intensive care units. *Journal of Hospital Medicine: An Official Publication of the Society of Hospital Medicine*, 9(3), 182–185. <https://doi.org/10.1002/jhm.2141>
- Mills, P. D., Watts, B. V., Miller, S., Kemp, J., Knox, K., DeRosier, J. M., & Bagian, J. P. (2010). A checklist to identify inpatient suicide hazards in veterans affairs hospitals. *Jt Comm J Qual Patient Saf*, 36(2), 87–93.
- Mills, P. D., Watts, B. V., Shiner, B., & Hemphill, R. R. (2018). Adverse events occurring on mental health units. *General Hospital Psychiatry*, 50, 63–68. <https://doi.org/10.1016/j.genhosppsych.2017.09.001>
- New York State, O. M. H. (2009). *Incident Reports and Root Cause Analyses* (pp. 1–14). New York State Office of Mental Health. Retrieved from http://www.omh.ny.gov/omhweb/statistics/suicide_incident_rpt/
- New York State Office of Mental Health, & architecture +. (2018). *Patient Safety Standards, Materials and Systems Guidelines*. Design Guidelines, Albany, NY. Retrieved from https://www.omh.ny.gov/omhweb/patient_safety_standards/guide.pdf
- NHS Trust. (2017). Ligation Risk Reduction Policy–CLP074. Northamptonshire Healthcare NHS Trust.
- Novak, T., Scanlan, J., McCaul, D., MacDonald, N., & Clarke, T. (2012). Pilot study of a sensory room in an acute inpatient psychiatric unit. *Australasian Psychiatry*, 20(5), 401–406. <https://doi.org/10.1177/1039856212459585>
- OSHA. (2016). *Guidelines for Preventing Workplace Violence for Health Care & Social Service Workers* (Guidelines No. OSHA 3148-06R 2016) (pp. 1–53). Washington, D.C.: U.S. Department of Labor, Occupational Safety and Health Administration. Retrieved from <https://www.osha.gov/Publications/osa3148.pdf>
- Peek-Asa, C., Casteel, C., Allareddy, V., Nocera, M., Goldmacher, S., OHagan, E., ... Harrison, R. (2009). Workplace Violence Prevention Programs in Psychiatric Units and Facilities. *Archives of Psychiatric Nursing*, 23(2), 166–176. <https://doi.org/10.1016/j.apnu.2008.05.008>
- Phoenix, B. J. (2013). Expanding the Concept of Safety in Psychiatric Inpatient Units to Create Healing Environments. *Journal of the American Psychiatric Nurses Association*, 19(5), 304–305. <https://doi.org/10.1177/1078390313505203>
- Riggs, D. W., Due, C., & Connellan, K. (2013). Duty stations and the regulation of space in mental health wards: A South Australian case study. *Special Section: Psychology and Poverty Reduction* 7, 25(1), 78.
- SAMHSA. (2015). Alternatives to Seclusion and Restraint [US DHHS Substance Abuse and Mental Health Services Administration]. Retrieved from <https://www.samhsa.gov/trauma-violence/seclusion>
- Schneeberger, A. R., Kowalinski, E., Fröhlich, D., Schroeder, K., Felten, S., Zinkler, M., ... Huber, C. G. (2017). Aggression and violence in psychiatric hospitals with and without open door policies: A 15-year naturalistic observational study. *Journal of Psychiatric Research*, 95, 189–195. <https://doi.org/10.1016/j.jpsychires.2017.08.017>



- Shattell, M., Bartlett, R., Beres, K., Southard, K., Bell, C., Judge, C. A., & Duke, P. (2015). How Patients and Nurses Experience an Open Versus an Enclosed Nursing Station on an Inpatient Psychiatric Unit. *Journal of the American Psychiatric Nurses Association*, 21(6), 398–405. <https://doi.org/10.1177/1078390315617038>
- Shepley, M. M., & Pasha, S. (2013). *Design Research and Behavioral Health Facilities* (Literature Review) (pp. 1–81). Concord, CA: The Center for Health Design. Retrieved from https://www.healthdesign.org/sites/default/files/chd428_researchreport_behavioralhealth_1013_final_0.pdf
- Shepley, M. M., Watson, A., Pitts, F., Garrity, A., Spelman, E., Fronsman, A., & Kelkar, J. (2017). Mental and behavioral health settings: Importance & effectiveness of environmental qualities & features as perceived by staff. *Journal of Environmental Psychology*, 50(June), 37–50. <https://doi.org/10.1016/j.jenvp.2017.01.005>
- Shepley, M. M., Watson, A., Pitts, F., Garrity, A., Spelman, E., Kelkar, J., & Fronsman, A. (2016). Mental and Behavioral Health Environments: Critical Considerations for Facility Design. *General Hospital Psychiatry*, 42, 15–21. <https://doi.org/10.1016/j.genhosppsy.2016.06.003>
- Stewart, D., Ross, J., Watson, C., James, K., & Bowers, L. (2012). Patient characteristics and behaviours associated with self-harm and attempted suicide in acute psychiatric wards. *Journal Of Clinical Nursing*, 21(7–8), 1004–1013.
- Stowell, K. R., Hughes, N. P., & Rozel, J. S. (2016). Violence in the Emergency Department. *Psychiatric Clinics of North America*, 39(4), 557–566. <https://doi.org/10.1016/j.psc.2016.07.003>
- Sun, F.-K., Long, A., Boore, J., & Tsao, L.-I. C.-? psychiatric ward context. (2006). Patients and nurses' perceptions of ward environmental factors and support systems in the care of suicidal patients. *Journal of Clinical Nursing*, 15(1), 83–92.
- The Joint Commission. (2017a). Ligature Risks - Assessing and Mitigating Risk For Suicide and Self-Harm. Retrieved July 19, 2017, from http://www.jointcommission.org/standards_information/jcfaqdetails.aspx
- The Joint Commission. (2017b). November 2017 Perspectives Preview: Special Report: Suicide Prevention in Health Care Settings. Retrieved August 31, 2018, from <http://www.jointcommission.org/issues/article.aspx>
- Trzpuć, S. J., Wendt, K. A., Heitzman, S. C., Skemp, S., Thomas, D., & Dahl, R. (2016). Does Space Matter? An Exploratory Study for a Child-Adolescent Mental Health Inpatient Unit. *HERD: Health Environments Research & Design Journal*, 10(1), 23–44. <https://doi.org/10.1177/1937586716634017>
- Ulrich, R. S., Bogren, L., Gardiner, S. K., & Lundin, S. (2018). Psychiatric ward design can reduce aggressive behavior. *Journal of Environmental Psychology*, 57, 53–66. <https://doi.org/10.1016/j.jenvp.2018.05.002>
- VA National Center for Patient Safety. (2018). Mental Health Environment of Care Checklist (MHEOCC) [General Information]. Retrieved September 25, 2018, from <https://www.patientsafety.va.gov/professionals/onthejob/mentalhealth.asp>
- Weiland, T. J., Ivory, S., & Hutton, J. (2017). Managing Acute Behavioural Disturbances in the Emergency Department Using the Environment, Policies and Practices: A Systematic Review. *Western Journal of Emergency Medicine*, 18(4), 647–661. <https://doi.org/10.5811/westjem.2017.4.33411>
- Yeager, K. R., Saveanu, R., Roberts, A. R., Reissland, G., Mertz, D., Cirpili, A., & Makovich, R. (2005). Measured Response to Identified Suicide Risk and Violence: What You Need to Know About Psychiatric Patient Safety. *Brief Treatment and Crisis Intervention*, 5(2), 121–141. <https://doi.org/10.1093/brief-treatment/mhi014>