Designing for Safety

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In 2010 one of the topics introduced to the *Guidelines for Design and Construction of Health Care Facilities* was a patient safety risk assessment. However, as a brief section in the appendix, this assessment was not a requirement. In 2014 the *Guidelines* will require a safety risk assessment (SRA) that includes an overarching risk identification process, with considerations for infection control, patient handling, falls, medication safety, psychiatric injury, immobility, and security. This requirement (and related recommendations) is included in Part 1 of the *Guidelines* (Planning, Design, Construction, and Commissioning) with additional requirements and recommendations specific to facility types in Part 2 (Hospitals) and Part 3 (Outpatient Facilities). The purpose of the SRA requirement is to help foster a proactive approach to patient and caregiver safety by mitigating risks from the physical environment that could directly or indirectly contribute to harm.

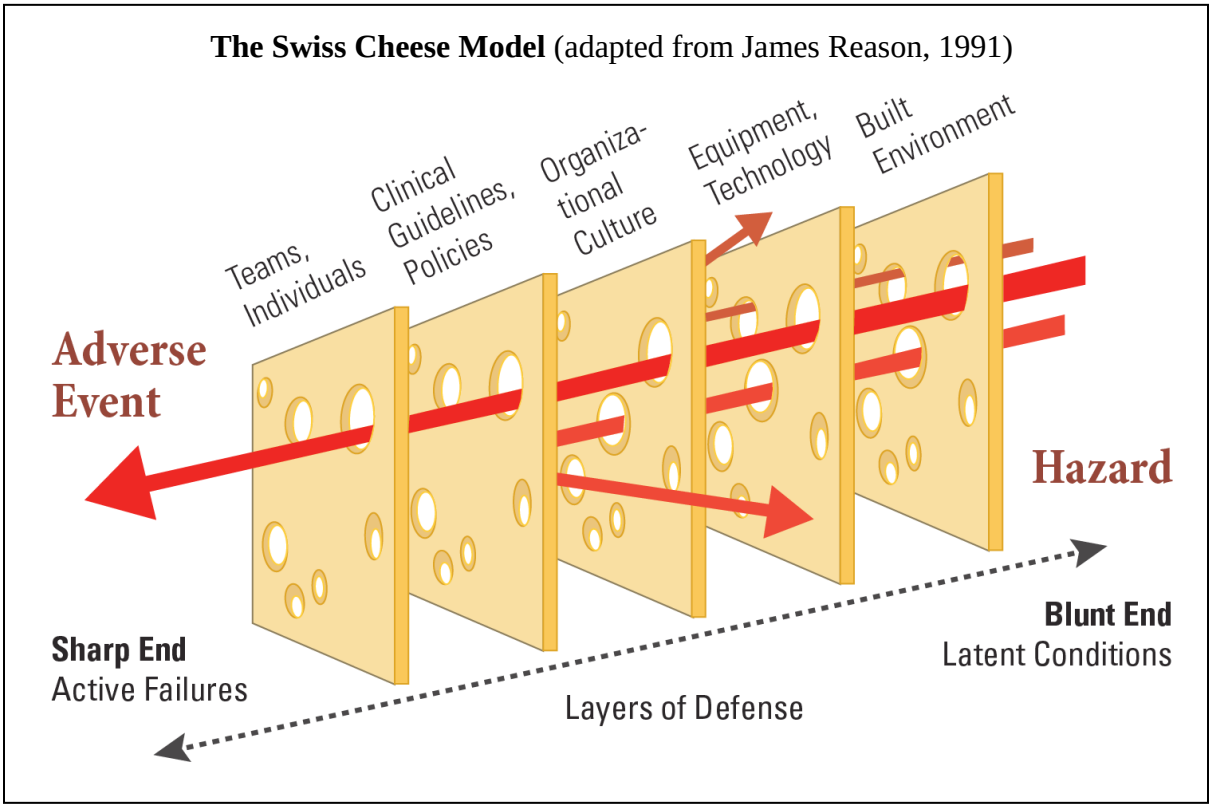
Why is safety being addressed in the physical environment?

Health care reform has brought a shift in attention from volume-based services to performance-based outcomes, including patient safety outcomes. However, the focus on patient safety had already increased over the past 15 years, largely stemming from two reports issued by the Institute of Medicine (IOM) in 1999 and 2001. "To Err is Human: Building a Safer Health System" (1999) concluded that between 44,000 to 98,000 people die each year as a result of preventable medical errors, while "Crossing the Quality Chasm: A New Health System for the 21st Century" (2001) expanded the conversation about the gap in quality care. These were followed with work in 2002 by the National Quality Forum that introduced 27 never events—medical errors that should never occur. This concept has been expanded to mean "adverse events that are unambiguous (clearly identifiable and measurable), serious (resulting in death or significant disability), and usually preventable."

Beginning in 2008, many of the "never events" (or serious reportable events [SREs]) were included in the Centers for Medicare & Medicaid Services (CMS) list of non-reimbursed hospital-acquired conditions (HACs). Now, under the Patient Protection and Affordable Care Act (PPACA), the Agency for Healthcare Research and Quality (AHRQ) is leading development of the National Strategy for Quality Improvement in Health Care. The PPACA and related Hospital Value-Based Purchasing Program tie reimbursement to performance, and provider organizations are increasingly concerned about how they can improve their results and financial return.

While these initiatives, policies, and legislation may seem unrelated to the *Guidelines* or the design of health care facilities, the physical environment can contribute to patient outcomes—for

good or bad. It is well-documented that accidents are rarely the fault of a single person who has done something wrong (administering incorrect medication, for example), but rather the result of a complex series of events (for example, fatigue, workload, distraction, and, in the case of medication safety, design elements such as lighting, noise, or layout) that ultimately leads to the mistake and potential harm. James Reason is largely credited with development of the "Swiss cheese" model, illustrating that the accident we all can see and experience (an active failure) is often the result of a hazard moving through numerous holes (latent conditions) in complex systems that include people, procedures, policies, technology, and ultimately design of the physical environment.



An understanding of this complexity is often achieved through root cause analysis (RCA)—a process used to determine what conditions led to an adverse event. The Joint Commission reports statistics related to sentinel events (an outcome of death or permanent loss of function), and the built environment is often cited as a contributing factor, most notably in suicide, falls, medication errors, and security-related events, as noted in Table 1 (see the next page). In fact, Joint Commission data on sentinel events collected between 2004 and 2012 show that the physical environment is listed as a contributing factor in 80 percent of abductions, 65 percent of elopements, 47 percent of hospital suicides, 39 percent of falls, 35 percent of criminal events, and almost 20 percent of both medication errors and hospital-associated infections. Although the data collected by the Joint Commission is voluntarily submitted and is not an epidemiological data set, it does shed light on the magnitude of the problem.

Table 1: Root Cause Analysis Data Related to the Physical Environment

Sentinel Events (Outcome: death/ permanent loss of function)	**Sorted by Top Physical Environment Root Cause**		
	Physical environment RCA events (may be multiple)	Total (N): 2004-12 (2Q) (top 5 bordered)	% Physical environment RCA (top 5 highlighted)
1. Suicide	**301**	**645**	**46.7%**
2. Falls	**197**	501	39.3%
3. foreign object	**165**	**727**	22.7%
4. delay in treatment	**129**	**738**	17.5%
5. medical equipment	**115**	184	**62.5%**
6. Criminal events	91	258	35.3%
7. wrong patient/site/procedure	86	**879**	9.8%
8. post-op complication	79	**683**	11.6%
9. Medication errors	65	354	18.4%
10. Elopement	47	72	**65.3%**
11. restraint	46	115	40.0%
12. fire	39	92	42.4%
13. perinatal	39	217	18.0%
14. Infection	27	147	18.4%
15. ventilator	23	40	**57.5%**
16. Abduction	20	25	**80.0%**

Note: Reporting to the Joint Commission is voluntary and represents only a small proportion of actual events; therefore, these data are not an epidemiologic data set. Source: http://www.jointcommission.org/assets/1/18/Root_Causes_Event_Type_2004_2Q2012.pdf.

In addition, numerous empirical research studies document the implications of adverse events (cost, length of stay, etc.) as illustrated in Table 2 (see the next page). Although these costs are not specifically attributed to the built environment, the contribution of the built environment as a component of these events underscores the long-term cost implications of operating a facility. The initial capital investment for construction needs to be balanced with ongoing costs following occupancy. Many research papers have also established links and correlations between specific built environment strategies or "bundles" of solutions and positive outcomes for patients and staff. For an overview, refer to Healthcare Leadership White Paper #5: Review of the Research Literature on Evidence-Based Healthcare Design (Ulrich et al. 2008).

Table 2: Potential Harm and Related Long-Term Financial Implications

Potential Harm	Implication
Falls	Operational costs for fallers with serious injury were $13,316 more than non-fallers and length of stay was 6.3 days longer than non-fallers. (Wong et al. 2011)
Patient handling injuries	The mean cost of devices was $53,571 versus the mean savings in workers' compensation costs associated with patient-transfer injuries of $71,822/yr.; the mean payback period was 15 months. (Garg and Kapellusch 2012)
Delayed ambulation/ immobility	Patients who increased their walking by at least 600 steps from the first to second 24-hour day were discharged approximately 2 days earlier than those who did not. (Fisher 2010)
HAIs (infections due to medical care)	A patient with an infection due to medical care during medical and surgical hospital stays (grouped by AHRQ as single patient safety indicator PSI #7) cost nearly $43,000 more to treat than non-infected patients with the average length of stay 19.2 days longer than patients without infections. (Lucado et al. 2010)

Note: See full references at the end of this article.

What are the requirements of a safety risk assessment?

In the 2014 *Guidelines*, the safety risk assessment is described as "a multidisciplinary, documented assessment process."

> It is intended to proactively identify hazards and risks and mitigate underlying conditions of the environment that contribute to adverse safety events. These include infections, falls, medication errors, immobility-related outcomes, security breaches, and musculoskeletal or other injuries. The process includes evaluation of the population at risk, and the nature and scope of the project. It takes into account the models of care, operational plans, sustainable/green design elements, and performance improvement initiatives of the health care organization. The SRA also proposes built environment solutions.

The SRA begins with an overarching assessment of if and when its different aspects are required for a particular design and construction project and what types of expertise might be needed to evaluate the risks and solutions. It is important to note that one goal of the SRA is to integrate all the considerations for a safe environment by coordinating conflicting or overlapping recommendations across disciplines. Although some components of the SRA are new (falls, security, medication safety, and immobility), the 2014 *Guidelines* text also incorporates language from prior editions of the *Guidelines* about infection control, patient handling, and psychiatric injury (previously found in the chapter on psychiatric hospitals).

The SRA is started during the planning phases of a project and continues to evolve with additional levels of detail throughout the project life cycle.

Table 3: FGI *Guidelines* Requirements for Safety Risk Assessment (SRA) Components

Assessment	Facility Type/Area	Project Scope	FGI*
Infection control risk assessment (ICRA)	All	1. New construction	1.2-3.2
		2. All renovations	
Patient handling and movement assessment (PHAMA)	Where patient handling, transport, transfer, and movement occur	1. New construction	1.2-3.3
		2. Major renovation and renovations changing functional use of space	
		3. Minor and minimal renovations where patient handling occurs	
Patient fall prevention	Any area to which a patient or family member has access	1. New construction	1.2-3.4
		2. Major renovation and renovations changing functional use of space	
		3. Minor and minimal renovations where patient falls may occur	
Medication safety	Medication safety zones	1. New construction	1.2-3.5
		2. Major renovation and renovations changing functional use of space	
		3. Minor and minimal renovations where medication preparation, processing, and distribution occurs	
Psychiatric injury and suicide risks	Any area where behavioral health patient care is provided	1. New construction	1.2-3.6
		2. Major renovation and renovations changing functional use of space to include the care of behavioral health patients	
		3. Minor and minimal renovations where behavioral health patient treatment occurs	
Patient immobility	Inpatient	1. New construction	1.2-3.7
		2. Major renovation and renovations changing functional use of space to inpatient use	
		3. Minor and minimal renovations where inpatient care occurs	
Security risks	All	1. New construction	1.2-3.8
		2. All renovations	

*References to the 2014 *Guidelines for Design and Construction of Hospitals and Outpatient Facilities*

As shown in Table 3 (see previous page), the project type determines which components of the safety risk assessment apply. For example, medication safety, psychiatric injury, patient handling, and immobility would most likely not need to be considered for a kitchen renovation; however, potential issues for infection control and security would need to be considered for such a project. More SRA components would apply to the renovation or construction of a nursing unit or a surgery suite.

An organization may elect to develop an overall safety risk plan for its facilities. The safety risk assessment components in this plan could then be referenced when planning minor renovations, reducing the need to perform individual risk assessments except for larger projects.

The 2014 *Guidelines* language further elaborates on the goals of the overall SRA process:

- To identify hazards (based on the location) that include physical obstacles and underlying conditions that may directly or indirectly contribute to harm;
- To identify vulnerabilities based on past data;
- To prioritize the degree of potential harm from the hazards identified; and
- To identify features that contribute to risk and strategies to reduce, mitigate, or eliminate risks (e.g. visibility, light, noise).

Although many organizations regularly assess safety and identify risk management strategies, applying these concepts to the built environment may be new to some. The Center for Health Design, through a three-year grant from AHRQ and additional financial support from FGI, is creating an online tool to support the SRA in the 2014 *Guidelines*. Six work groups of industry experts are finalizing content that will help guide the owner, design team, and diverse stakeholders in thinking about what conditions could be mitigated through built environment strategies. The tool will be further developed and tested in 2014.

What are the expected outcomes?

While there is no silver bullet that will guarantee a safe facility or elimination of all adverse patient outcomes, the SRA requirement advances a set of considerations that align with the clinical goals of any health care organization: Primum Non Nocere—First, Do No Harm. It also supports a proactive approach to problem-solving. Rather than looking at an adverse event in hindsight and addressing the influence of the physical environment through an expensive retrofit, the SRA is intended to prompt consideration of safety early in project development. It is during planning and predesign that recommendations can most effectively be incorporated into the project scope and budget. Thinking through safety considerations up front will have long-term cost-benefit implications throughout the life cycle of a facility through reduction of adverse events. The SRA will contribute to the ongoing development of safe health care environments that contribute to improved patient outcomes and staff satisfaction and mitigate the risks and harm associated with today's complex health care systems.

References Cited in Table 2

Fisher, S. R., and Y. Kuo. "Early Ambulation and Length of Stay in Older Adults Hospitalized for Acute Illness." *Archives of Internal Medicine* 170 (21) (November 22, 2010): 1942–43.

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About the Author

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