The Infection Control Risk Assessment (ICRA) Leads the Way:

Birth of the New Safety Risk Assessment (SRA) Process for Design and Construction

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Special Acknowledgement and Thanks to:

Ellen Taylor, AIA, MBA, EDAC – Director of Research, The Center for Health Design

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Learning Objectives

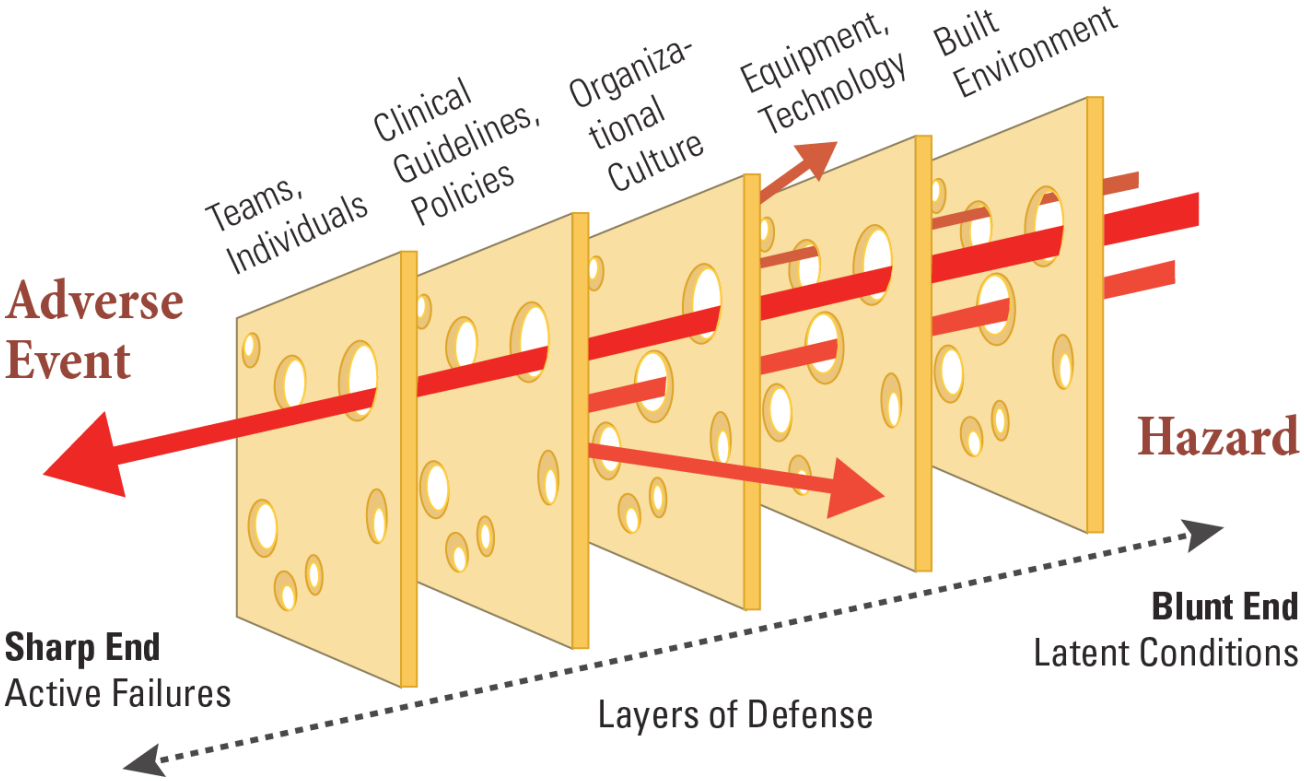
Describe the purpose, scope, and value of the SRA for a health care organization, and specifically the value for infection prevention

Illustrate how the SRA may be conducted through the use of an electronic tool to help guide discussion through logical steps to reach conclusions about design and construction priorities

Provide a pilot project case study of use of the SRA in action, which describes the end results that made the process beneficial

An accident causation model

The Swiss Cheese Model



Adapted from Reason,1991

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Complex Systems: Complex Solutions

" Every system is perfectly designed to achieve exactly the results it gets."

-Dr. Paul Batalden

Professor Emeritus, The Dartmouth Institute for Health Policy and Clinical Practice

The Healthcare Context

Never Events

Active Failures & Latent Conditions

Fundamental Shifts

Facility Design

HEALTH CARE INDUSTRY

'Global Trigger Tool' Shows That Adverse Events in Hospitals May Be 10 Times Greater Than Previously Measured

David C. Classen et al., *Health Affairs*, April 2011

"This study evaluated the incidence of adverse events for inpatients at three hospitals, using several methods of detecting adverse events: retrospective record review (working backward from patients' medical charts) using the Institute for Healthcare Improvement's Global Trigger Tool; each [illegible] Error Reporting and Prevention Index for Categorizing Errors.

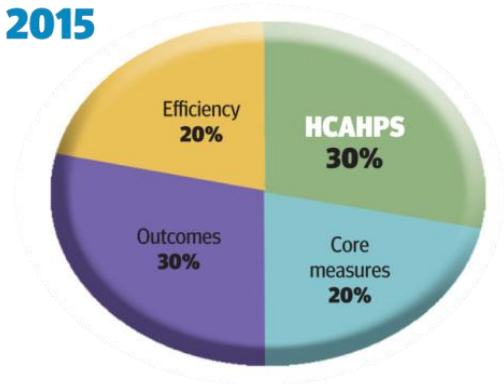
[The study] also conducted a detailed review at hospital A to evaluate the sensitivity of each method (the degree to which it accurately identified patients who had [illegible] adverse events) as well as each method' [illegible] it accurately identified [illegible] events). Based [illegible] Trigger [illegible] to

Overall, adverse events occurred in 33.2% of hospital admissions (range: 29–36%) or 91 events per 1,000 [illegible]tient days (range: 89–106%). Some patients experi[illegible] than one adverse event; the [illegible]

The Healthcare Context

2010 Patient Protection and Affordable Care Act

- FY 15 Hospital Value Based Purchasing (VBP)
  - Further tie HACs to reimbursement
- HACs included in VBP:
  - Adverse Drug Event (medication errors)
  - Catheter-Associated Urinary Tract Infections
  - Central Line Associated Blood Stream Infections
  - Injuries from Falls and Immobility
  - Surgical Site Infections
  - Ventilator-Associated Pneumonia
- Each year measures added, many targeting hospital-acquired conditions/patient safety indicators



Sentinel Events (outcome: death/ permanent loss of function)	TJC ('04-2Q '13) RCA : Sorted by Top Environment Root Cause		
	Env. RCA events (may be multiple)	Total (N): 2004-2012 (2Q) (top 5 bordered)	% Environment RCA (top 5 highlighted)
1. Suicide (Psych Injury)	329	775	42.5%
2. Falls	229	620	36.9%
3. foreign object	192	875	21.9%
4. delay trtmnt	140	903	15.5%
5. med equip	132	213	62.0%
6. Criminal events (Security)	110	332	33.1%
7. wrong pt/site/proc	96	1037	9.3%
8. post-op complication	87	796	10.9%
9. Medication errors	70	416	16.8%
10. Elopement (Security)	58	88	65.9%
11. restraint	47	121	38.8%
12. fire	43	107	40.2%
13. perinatal	47	274	17.2%
14. Infection	29	166	17.5%
15. ventilator	26	46	56.5%
16. Abduction (Security)	21	28	75.0%

http://www.jointcommission.org/assets/1/18/Root_Causes_by_Event_Type_2004-2Q2013.pdf

The Implications

Falls

- Operational costs for fallers with serious injury **$13,316** more than controls; LOS **6.3 days longer** than non-fallers

Patient Handling

- Mean cost of devices: **$53,571** vs. mean savings in workers' compensation costs associated with patient-transfer injuries: **$71,822/yr.;** mean payback = **15 mos.**

Early Ambulation/Immobility

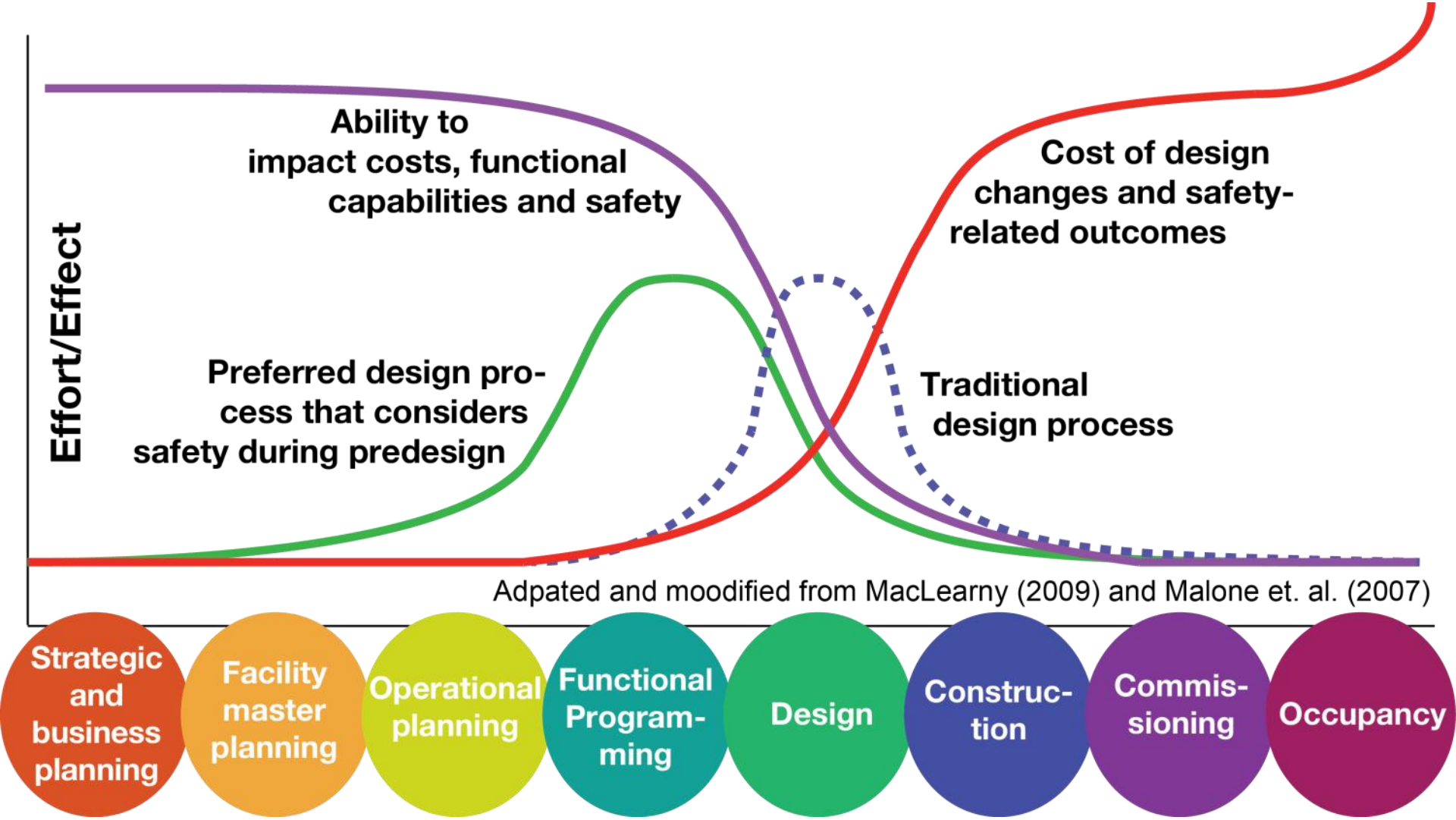
- Patients who increased walking by at 600 steps from 1st to 2nd 24-hour day were discharged **2 days earlier** than those who did not

HAIs (infections due to medical care)

- A patient with studied infections cost **$43K** more to treat than non-infected patients ; ALOS **19.2 days longer** than patients without infections

Falls: Wong, Recktenwald, et al. 2011; PH: Garg and Kapellusch, 2012

EA: Fisher, Kuo, et al. 2010; HAIs: Lucado, Paez, et al. 2010



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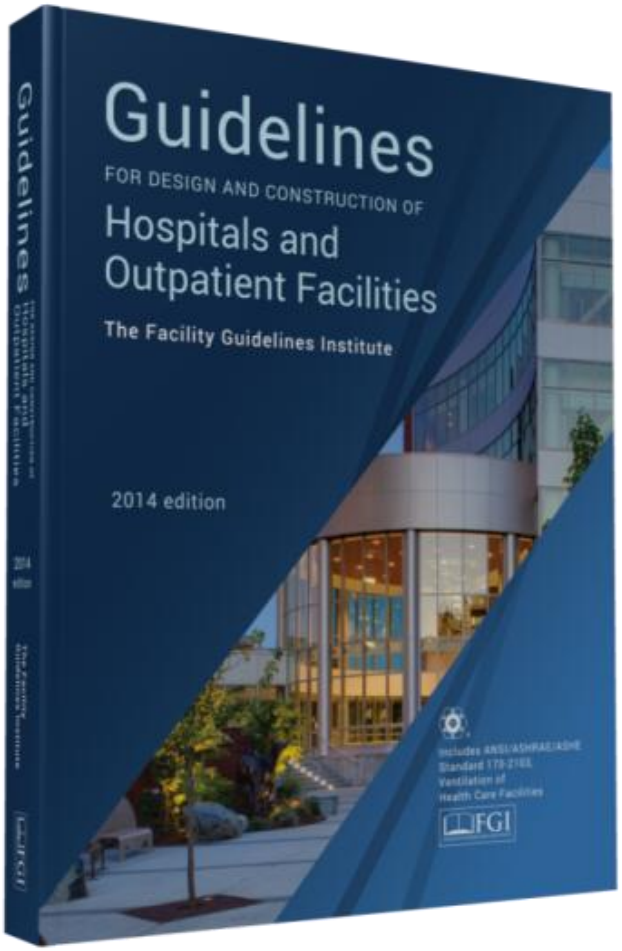
Designing for safety: The Guidelines

An umbrella for safety

- Infection Control (ICRA)
- Patient Handling (PHAMA)
- Psychiatric injury
  - (formerly in specialty hospitals)
- Medication safety
- Falls
- Security
- Immobility



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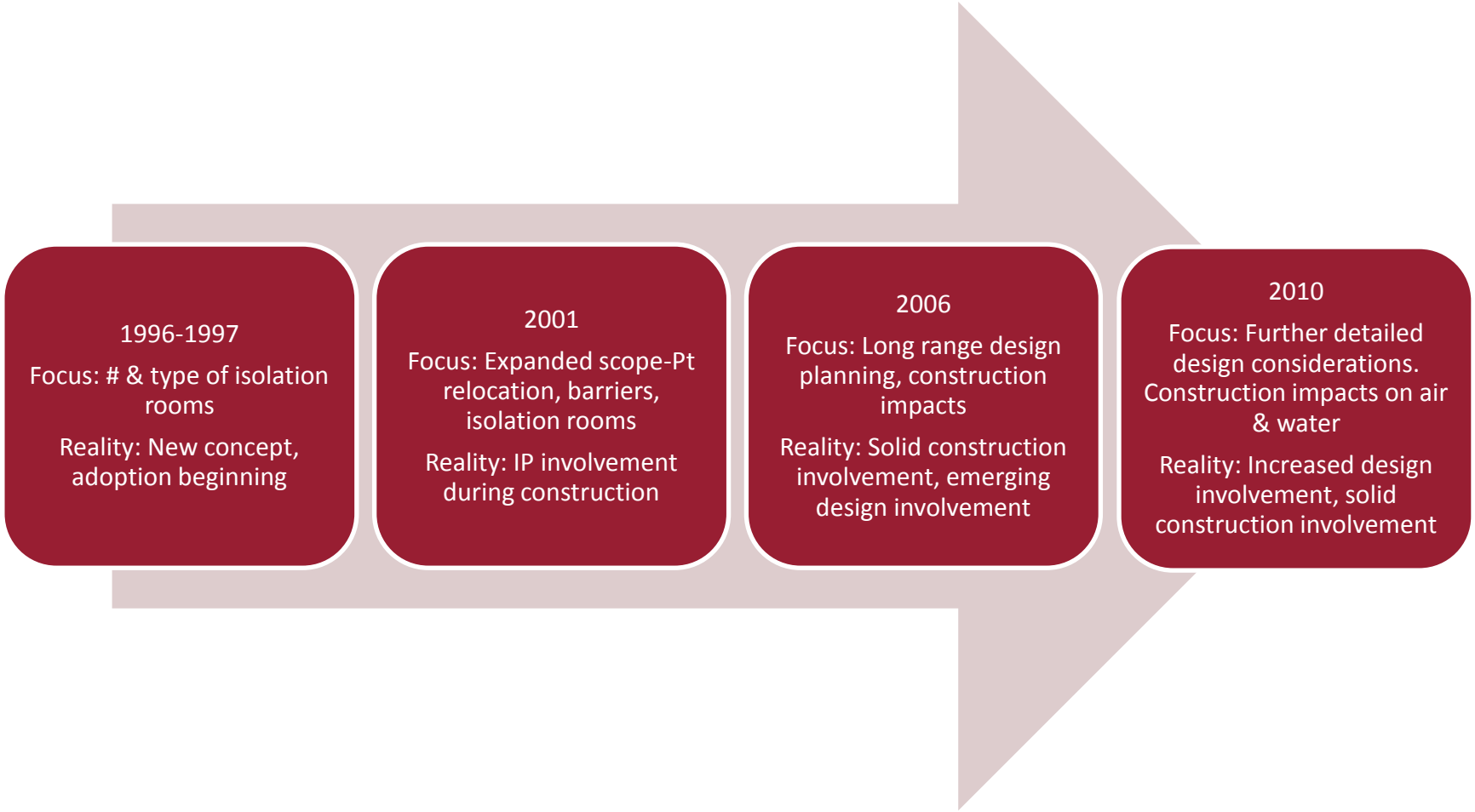
The Model: ICRA History



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The SRA IN THE GUIDELINES

*1.2-3 Safety Risk Assessment (SRA)

1.2-3.1.1 SRA Requirement

1.2-3.1.1.1 All health care facility projects shall be designed and constructed to facilitate the safe delivery of care.

1.2-3.1.1.2 To support this goal, an interdisciplinary team shall develop a safety risk assessment

The SRA IN THE GUIDELINES

*A1.2-3 Safety risk assessment (SRA). The SRA is a multidisciplinary, documented assessment process intended to proactively identify hazards and risks and mitigate underlying conditions of the built environment that can contribute to adverse safety events. These adverse events include infections, falls, medication errors, immobility-related outcomes, security breaches, and musculoskeletal or other injuries. The SRA process includes evaluation of the population at risk and the nature and scope of the project; it also takes into account the models of care, operational plans, sustainable design elements, and performance improvement initiatives of the health care organization. The SRA proposes built environment solutions to mitigate potential risks and hazards.

The SRA in the Guidelines

The governing body shall provide an assessment of the potential harm to patients and identifying the following:

- Specific hazards
- Hazard based on historical data and/or national industry patient and caregiver safety trends
- A prioritization of the degree of potential harm to patients and/or caregivers from the hazards identified

SRA Process (Guidelines Framework)

Based on location, identify hazards: Physical obstacles and underlying conditions that may directly or indirectly contribute to harm

Location

Data

Identify vulnerability, based on past data (recognizing past performance does not guarantee future results)

Prioritize the degree of potential harm from the hazards identified

Harm

Mitigation

Identify features that contribute to risk and strategies to reduce mitigate or eliminate risks (e.g. visibility, light, noise)

SRA Components

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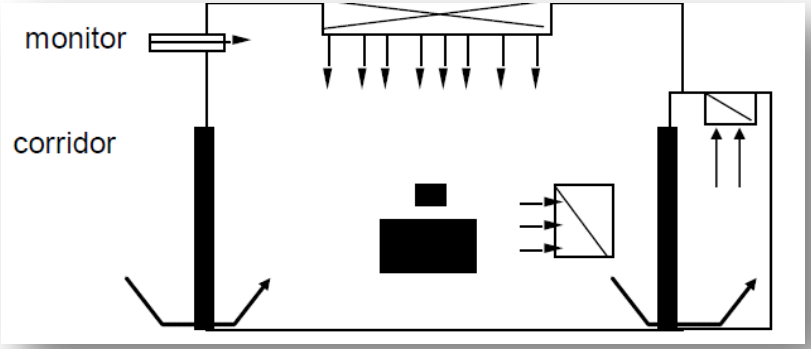
Infection Control

Programming



Schematic Design

Design Development

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Security

All hazards approach to design

Protection in layers

Zones of protection

Think natural disasters and pandemics

Medication Safety

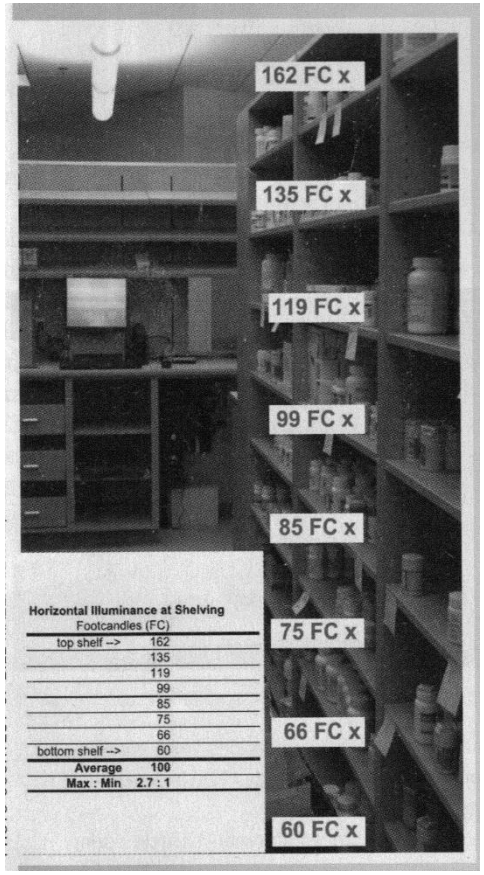
Illumination

Interruptions and Distractions

Sound and Noise

Physical Design and Organization of Work Space

Medication Safety Zones



United States Pharmacopeial Convention's National Formulary (2010),Chapter 1066, *Physical environments that promote safe medication use*
http://www.usp.org/sites/default/files/usp_pdf/EN/USPNF/gc1066PhysicalEnvironments.pdf

Bates, J.S. (2013). Pharmacy lighting reduces errors. *HFM Magazine*, February, p. 28
Picture by Bill Mazerkiewitz

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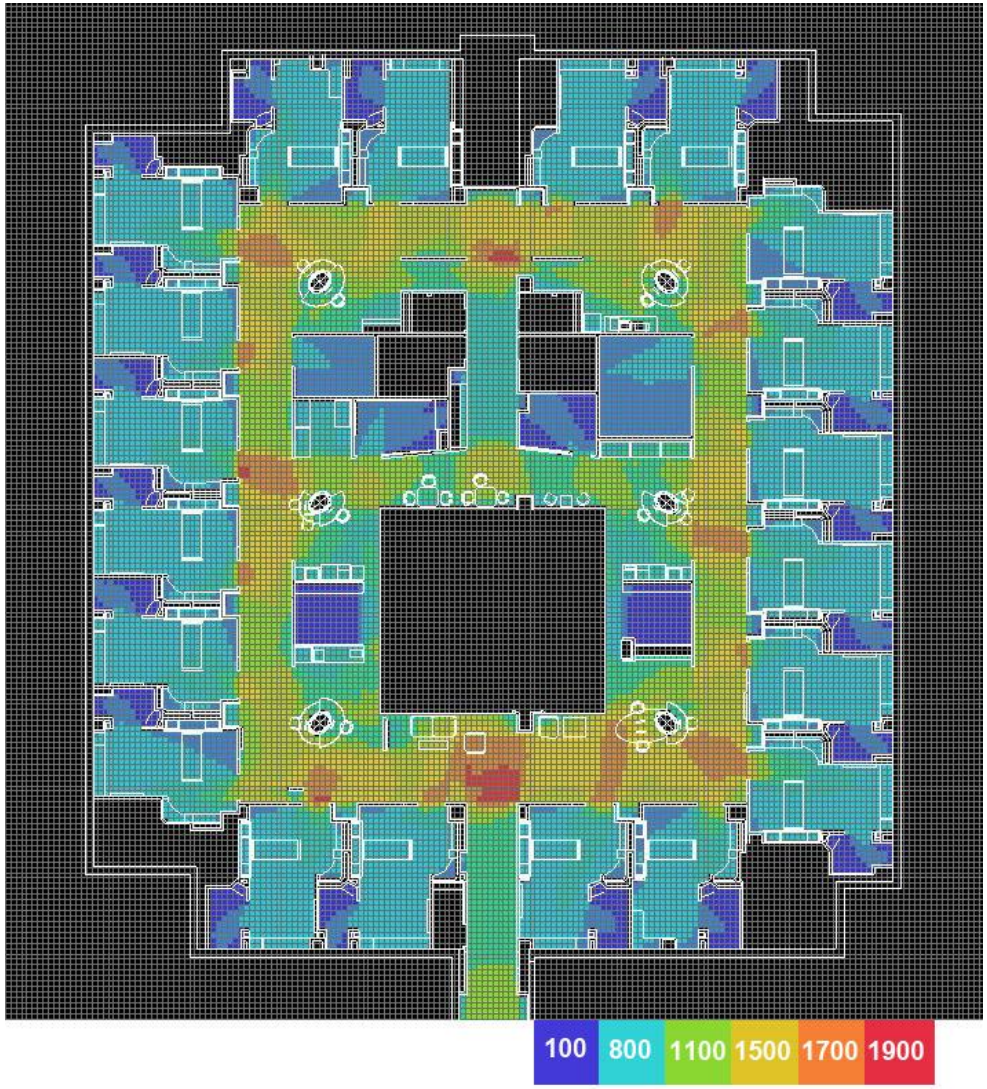
Visibility and Falls



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Safe Patient Handling

Injury: Behavioral Health

One Option: The CHD SRA Toolkit

The AHRQ Grant Timeline

2013	2014	2015
Safe Design Roadmap & SRA Tool Development	**SRA Tool Validation & Integration**	**SRA Toolkit Dissemination & Evaluations**
Seminar MedStar Institute for Innovation (June 2013)	*Seminar Kaiser Permanente's Garfield Innovation Center (May 2014)*	*Dissemination and training at ASHE PDC Summit (March 2015)*

With additional seminar funding from:

FGI FACILITY GUIDELINES INSTITUTE

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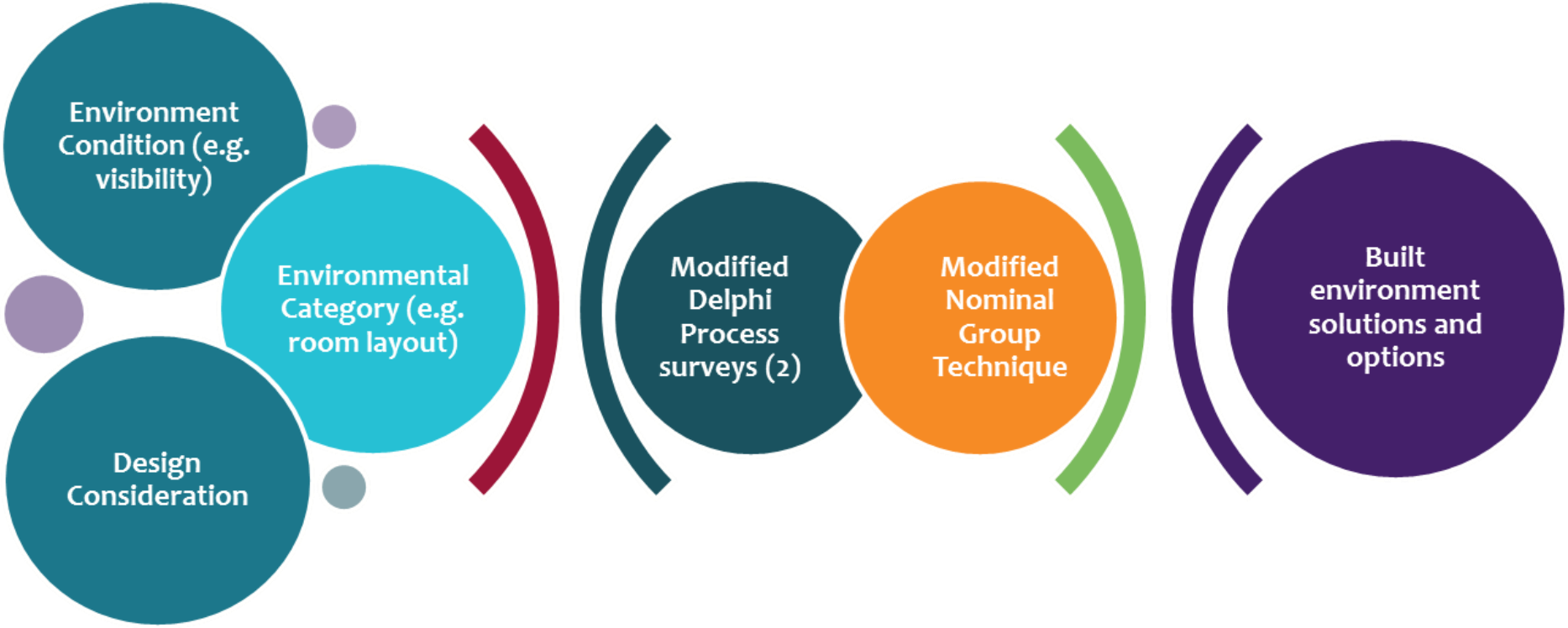
Toolkit Development



Literature Review (6 risk components):
Research, literature reviews, expert opinion, consensus document

Consensus (70%)

Final Content

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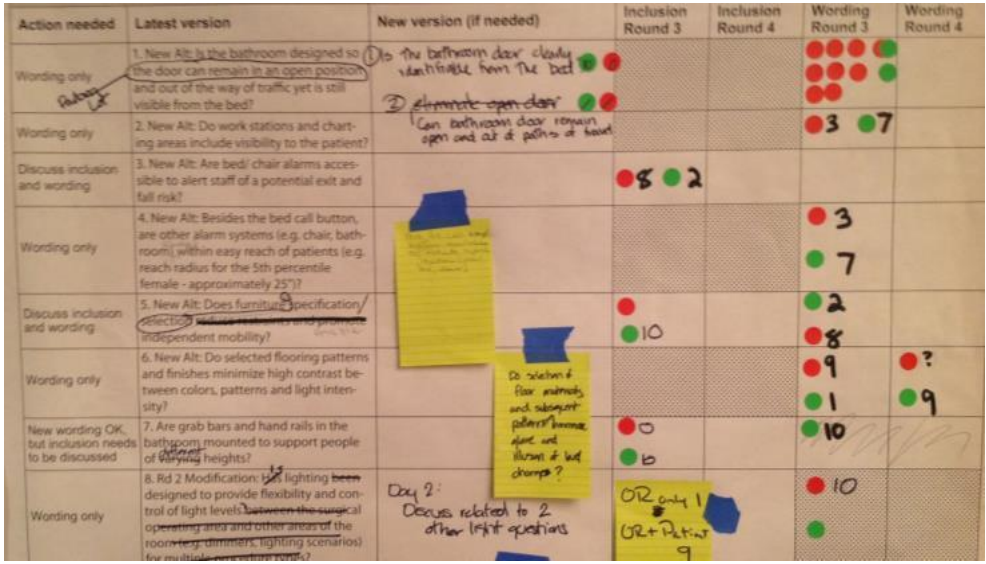
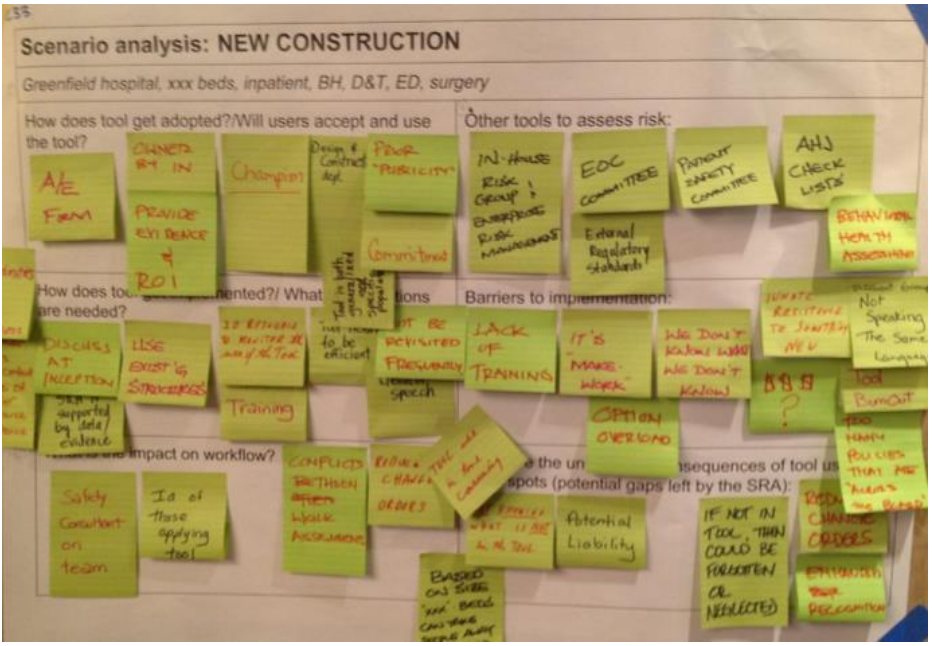
Unresolved content brought to seminar for consensus



Action needed	Latest version	New version (if needed)	Inclusion Round 3	Inclusion Round 4	Wording Round 3	Wording Round 4
Wording only	1. New Alt: Is the bathroom designed so the door can remain in an open position and out of the way of traffic yet is still visible from the bed?	① Is the bathroom door clearly visible from the bed ② ~~eliminate open door~~ Can bathroom door remain open and out of paths of travel				
Wording only	2. New Alt: Do work stations and charting areas include visibility to the patient?				3 7	
Discuss inclusion and wording	3. New Alt: Are bed/ chair alarms accessible to alert staff of a potential exit and fall risk?		8 2			
Wording only	4. New Alt: Besides the bed call button, are other alarm systems (e.g. chair, bathroom) within easy reach of patients (e.g. reach radius for the 5th percentile female - approximately 25")?				3 7	
Discuss inclusion and wording	5. New Alt: Does furniture specification/ selection ~~[illegible]~~ independent mobility?		10		2 8	
Wording only	6. New Alt: Do selected flooring patterns and finishes minimize high contrast between colors, patterns and light intensity?	Do selection of floor materials and subsequent patterns become glare and illusion of level changes?			9 1	? 9
New wording OK, but inclusion needs to be discussed	7. Are grab bars and hand rails in the bathroom mounted to support people of ~~varying~~ different heights?		0 6		10	
Wording only	8. Rd 2 Modification: Is lighting ~~been~~ designed to provide flexibility and control of light levels ~~between the surgical operating area and other areas of the room~~ (e.g. dimmers, lighting scenarios) ~~for multiple procedure rooms~~?	Day 2: Discuss related to 2 other light questions	OR only 1 OR + Patient 9		10	



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Year 2: Tool Testing

Multiple scenarios at the Garfield Center for Innovation with expert workgroups
3 pilot sites: Barnes-Jewish Hospital, UC Irvine Medical Center, MSK Cancer Center

The CHD SRA Goals

It is intended to be:

- Proactive through early use
- Systematic, to focus on safety
- A discussion tool and prompt

With the potential for:

- Feedback loops
- Priority goal-setting

It is not intended to be:

- Prescriptive
- A checklist or score
- A “one and done”
- Absolute truth, but a starting point for verification

Important to understand

What you put in influences what you get out

- This tool is not intended to be a guarantee of a safe environment; the environment is one part of a safety solution that includes operational policies and procedures and behavior of people.
- The toolkit is intended for use with collaborative input of project and facility-based expertise.
- This tool is also not a comprehensive list of guideline requirements but provides an overview of certain considerations and their relationship to safety

Using the CHD SRA Tool

Cover/Copyright*

Volunteers

Home page

Safe Design Roadmap

Project data

Risk Component links

Risk data and design considerations

- 100: infection control
- 200: medication safety
- 300: falls
- 400: patient handling
- 500: behavioral health/psychiatric injury
- 600: security

Glossary

References

*A PDF is available free through CC license; the Excel version is restricted to use by Affiliate Plus members of The Center for Health Design

Safety Risk Assessment (SRA)

for healthcare facility environments

This toolkit has been created through a consenus process of experts in the safety risk areas. The Center for Health Design extends its gratitude to all the volunteers that supported content development and testing. The Center also thanks the three pilot sites who made their project teams available for testing : Barnes-Jewish Hospital, University of California Irvine Medical Center, and Memorial Sloane Kettering Cancer Center.

Click Here

Let's Go!

Links to Home page

DISCLAIMERS: This tool is not intended to be a guarantee of a safe environment; the environment is one part of a safety solution that includes operational policies and procedures and behavior of people. It is intended for use with collaborative input of project and facility-based expertise. This tool is also not a comprehensive list of guideline requirements but provides a high-level overview of certain considerations and their relationship to safety.

This toolkit has been created with support from the Agency for Healthcare Research and Quality (AHRQ) Grant R13HS021824 and the Facility Guidelines Institute (FGI). The content is solely the responsibility of the authors and does not necessarily represent the official views of the Agency for Healthcare Research and Quality.

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Home

It may seem overly simple to indicate a list of safety features that can improve safety, but patient safety begins with an awareness of safety features maintained within the facility. Poorly designed and operated healthcare environments contribute to adverse events and subsequent patient harm, such as healthcare associated infections, medication errors and patient falls.

The goal of this tool is to provide guidance to consider the underlying (latent) conditions that can lead to harm. This tool supports the requirement for a safety risk assessment (SRA) found in the 2104 *FGI Guidelines for Design and Construction of Hospitals and Outpatient Facilities.*

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

There are six components of consideration: infection control, patient handling, medication safety, falls, behavioral health, and security. You may want to get started by looking at some high-level concepts and considerations in the ***Safe Design Roadmap*** .

Links to safe design roadmap

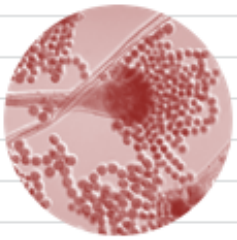
Skip the Safe Design Roadmap: Get Started with Project Information

Take Me to the Safe Design Roadmap

Links to project data

I'm ready to go directly to the risk data and design considerations

Infection Control



Patient Handling

Falls

Medication Safety

Behavioral Health

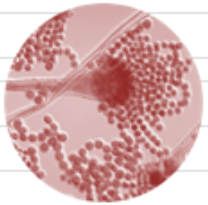
Security

Links to one of six SRA components

Home

Risk Components

Infection Control



- Infection Control Risk and Historic Data
- Infection Control Design Considerations
- Infection Control Risk Assessment (ICRA) Matrix of Precautions (tab in file)

Falls

- Falls Risk and Historic Data
- Falls Design Considerations
- CDC report - Slips, Trips, and Falls: [illegible] Workers (outside link)

Patient Handling

- Patient Handling Risk and Historic Data
- Patient Handling Design Considerations
- Patient Handling and Assessment White Paper (outside link)

Behavioral Health

- Behavioral Health and Psychiatric Injury Risk and Historic Data
- Behavioral Health and Psychiatric Injury [illegible]erations
- [illegible]oral Health Facility [illegible]tside link)

Medication Safety

- Medications Safety Risk and Historic
- Medication Safety Design Considerations
- USP General Chapter <1066> Physical Environments (outside link)

- [illegible]nd Historic Data
- Security Design Considerations
- IAHSS Security Guidelines information (outside link)

Link to risk component data page to evaluate risk level

Link to risk component design page to asses design

Link to other relevant information

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Home	Design Considerations: Medication Safety	Project Data	Safe Design Roadmap	The Risk Component Links	Glossary/Definitions

Infection control includes airborne, surface and water transmission issues. The CDC and Patient Safety & Quality Healthcare sites including National Nosocomial Infections Surveillance (NNIS) -provide information about statistics and the implications of infections. Risks for specific HAI's are associated with multiple factors including building construction type, healthcare service types, and patient populations.

For at-risk populations, identify potential harms and areas within the proposed project associated with those potential harms. Consider the patient risk groups (spaces) to be affected and the potential outcomes, including during construction. Is the likelihood rare or almost certain? Is the consequence negligible or minor injury or a sentinel event?

The degree of potential harm related to HAI's may vary across at risk populations and other factors. An organization may invest more resources in areas associated with relatively higher degree of potential harm. A panel of experts created a generic level of risk, but this should be considered with respect to your own organization and patient demographic. You might consider a typical "heat r
throughout your decision process. A sample is sho

Estimate risk based on location and population

Consequence	Likelihood: Rare	Unlikely	Possible	Likely	Almost Certain
Sentinel event					
Partial Disability					
Medical Treatment					
First aid					
No injury or disability					

See the ICRA Matrix of Precautions for Construction & Renovation for assessing risk consequence and likelihood.

Evaluate historical data to ascertain all conditions (e.g. construction type, service type, patient populations) that contribute to HAIs in both inpatient and outpatient areas in your facility.

Past performance does not guarantee future re
identify the likelihood of events, specific to the
there patterns of vulnerability?

Fill in historical data to ascertain all conditions that contribute to safety risks

Infection Type	Location/Unit Type	Rate	Subject Matter Expert Consulted (Name)	Title/Role	Data Source

esearch	onsensus	Opinion	est Item #	Sort #	What is being discussed? (Design Consideration)	Generic Risk	Your Risk Estimate	Your Priority	Cost agnitude	Why should this be considered? (Rationale)	How is this done? Explanations/Clarifications (how accomplished, reasons against)	ocation	Building category	FGI
X			1	101	Include physical separation/isolation methods (e.g. separate soiled workroom, supply chain flow separation) **in unit layout** to prevent contamination of clean supplies and equipment.	Med-High				The contamination of linen and other supplies increase the risk of infections. Physical separation (e.g. a separate soiled workroom) is an important method of preventing the transfer of pathogens from soiled to clean linen, equipment and other supplies.		G EN	Unit Layout	B
X			2	102	Include physical separation/isolation methods **in rooms** to prevent cross-transmission between patients (e.g. single room, appropriate physical distance/separation between roommates if multi-bed rooms are used).	Med-High				Direct and indirect contact constitute a major route of pathogen transmission between patients (Chang & Nelson, 2000). Reducing the chances of direct/indirect contact between patients through physically separating and isolating patients, especially the provision of single-bed patient rooms, has been associated with significantly lower risks of HAI's and better health outcomes (MacKenzie et al., 2007; McManus, Mason, McManus, & Pruitt, 1992)		G EN	Room Layout	B
X			3	103	Include adequate number of negative isolation rooms for air-borne infectious patients in patient care areas based on projected number of such patients during normal and contingent surge operations.	Highest				Contaminated air flowing from rooms where air-borne infectious patients stayed was reported to increase the risks of infections among patients and staff in nearby spaces (Gustafson et al., 1982; Hutton, Stead, Cauthen, Bloch, & Ewing, 1990). Research strongly suggests that air-borne infectious patients should be isolated in negative-pressured rooms to minimize the risk of cross-contamination by preventing contaminated air flowing from isolation rooms to nearby spaces (Sabulster & Chiang		G EN	Unit Layout	B
X			4	104	Include adequate number of positive-pressure isolation rooms for high-risk immuno-compromised patients in the patient care areas based on projected number of such patients during normal and contingent surge operations.	Highest				Immunocompromised patients are particularly vulnerable to infections. Research strongly suggests that immunocompromised patients should be isolated in positive-pressured rooms to minimize the risk of contracting air-borne pathogens by preventing potentially contaminated air from flowing from nearby spaces into the isolation rooms (Sabulster		G EN	Unit Layout	B
X			14	105	Provide a sufficient **number of** hand hygiene devices to support convenient use by staff, patients and families. (This consideration is also relevant under the following category: room layout)	Highest				Hand hygiene is considered the single most important method of infection prevention because pathogens are often transferred via the unwashed hands of staff, patients and families. The number of hand hygiene devices is an important factor significantly impacting hand hygiene performance. More sinks, gel dispensers, and other hand hygiene devices likely make it easier for staff, patients and families to gain access to the devices and clean their hands when needed (Kaplan &		G EN	Unit Layout	B
	X		5	106	Designate a single-patient use bathroom for each patient for the duration of their stay on the unit.	Highest				Shared bathrooms may serve as reservoirs of infectious pathogens discharged from one patient and contribute to the transmission of the pathogens to other patients who use the same bathroom during the same time period. Even in bathrooms less frequently used by patients, pathogens could be brought in through staffs hands or used equipment and supplies. Single-patient bathroom may help reduce cross-contamination and improve environmental cleanliness		G EN	Room Layout	B
X			12	107	Design room layout to allow easy visual and physical access to hand hygiene devices (such as sinks, alcohol hand rub dispensers, etc.).	Highest				Hand hygiene is considered to be the single most important method of infection prevention because pathogens are often transferred via the unwashed hands of staff. Well located hand hygiene devices may make it easy for staff and other individuals to see and use the devices to clean their hands.		G EN	Room Layout	B
X			13	108	Position **sink location** so that splashes from the sinks cannot reach the patient zone or clean supplies.	Med-High				Water splashes from sinks to nearby patient care areas have been found to increase risk of contamination and infection transmission of water-borne pathogens. Research has found that the location and orientation of hand hygiene devices are important factors that impact the possibility of water being splashed from sinks reaching nearby patient care area (Hota et		G EN	Room Layout	

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Your estimated risk, priority, and cost magnitudes

Sources of design considerations

Item #

Explanatory text in comments

CHD: This is the generic priority, as estimated by the expert workgroups. It may change, based on your population

Research	Consensus	Opinion	Sort #	What is being discussed? (Design Consideration)	Generic Risk Estimate	Your Risk Estimate	Your Priority	Cost Magnitude	How is this done? Explanations/Clarifications (How Accomplished, Reasons Against)	Location	Building category	FGI
X			101	Include physical separation/ isolation methods (e.g. separate soiled workroom, supply chain flow separation) in unit layout to prevent contamination of clean supplies and equipment.	Med-High					GEN	Unit Layout	B
X			102	Include physical separation /isolation methods in rooms to prevent cross-transmission between patients (e.g. single room, appropriate physical distance/separation between roommates if multi-bed rooms are used).						GEN	Room Layout	B
X			103	Include adequate number of negative isolation rooms for air-borne infectious patients in patient care areas based on projected number of such pa op						GEN	Unit Layout	B
X			104	Inc isolation rooms for high-risk, immuno-compromised patients in the patient care areas based on projected number of such patients during normal and contingent surge operations.	Highest					GEN	Unit Layout	B

CHD: Direct and indirect contact constitute a major route of pathogen transmission between patients (Chang & Nelson, 2000). Reducing the chances of direct/indirect contact between patients through physically separating and isolating patients, especially the provision of single-bed patient rooms, has been associated with significantly lower risks of HAI's and better health outcomes (MacKenzie et al., 2007; McManus, Mason, McManus, & Pruitt, 1992).

Rationale shown as comments to design considerations

Field for explanations

Location, building category filters

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301	Design unit layout to maximize ability for staff to easily see the patient head in all rooms from work stations or a routine circulation pattern (i.e. no hidden rooms in the corners).	Med-Low	Highest	Select ▼	Select ▼
302	If direct visibility is not possible through unit layout, consider availability of additional patient monitoring (e.g. video surveillance, alarms). Also see 306. (This consideration is also relevant under the following category: technology integration.)	Med-Low	Select ▼ Highest Med-High Med-Low Lowest	Select ▼	Select ▼

Your estimated risk, entered by a drop-down menu – the selection will color code; this is independent of what is feasible

	ff to work no	Med-Low	Highest	Select ▼	Select ▼
	layout, consider availability of additional patient monitoring (e.g. video surveillance, alarms). Also see 306. (This consideration is also relevant under the following category: technology integration.)	Med-Low	Select ▼	Select ▼ H:+++ M: ++ L: + Limited by N/A	Select ▼

Your estimated priority – it may be limited by site specific conditions; this is also color coded

	ff to work no	Med-Low	Highest	H:+++	M: $$
	layout, consider availability of additional patient monitoring (e.g. video surveillance, alarms). Also see 306. (This consideration is also relevant under the following category: technology integration.)	Med-Low	Select ▼	Select ▼	Select ▼ H: $$$ M: $$ L: $ N/A

Your estimated cost magnitude; this will also color code

Discussion and Questions

patient
control
lift
found
components
Security
facilities
plan
building
activities
space
SRA
risk
medication
Health
devices
levels
caregivers
spaces
New
physical
e.g
bed
safe
assistance
including
mechanical
team
construction
location
fall
services
tasks
accommodate
movement
elements
use
needed
need
level
specific
General
and/or
Assessment
within
zones
handling
identify
systems
body
equipment
used
may
governing
process
prevention
scope
characteristics
Table
renovation
also
floor-based
areas
See
recommendations
based
address
care
related
water
air
include
lifts
design
area
information
Elements
surfaces
safety
project
assessment
ensure
required
infection
conditions
A1.2-3.3.2.2
planning
immobility
health
includes
contribute
provide
falls
high-risk
following
hazard
mitigation
functional
Design
details
rooms
environment
features
facility
fixed
appropriate
room
PHAMA
limited
support
Section
system
renovations
materials
considerations
units
toilet
security
emergency
included
part
type
storage
evaluation
mitigate
protection
ICRA
clinical
number
requirements
track
HVAC
locations
unit
barriers
needs
Safety
staff
program
Infection
Medication
improve
impact
risks
patient-handling
mobility
well
A1.2-3.3.2.1
treatment
minimal

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