

# Academy of Architecture for Health On-line Professional Development

## Patient Safety Fundamentals for HC Architects – Part 2 HC 101 Series

Tuesday, February 14, 2017

2:00 pm – 3:00 pm ET

1:00 pm – 2:00 pm CT

12:00 am – 1:00 pm MT

11:00 am – 12:00 pm PT

### Presenter

**John Kreidich**

McCarthy Building Companies

### Moderator

**Brenna Costello**

Smith Group JJR



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Academy of Architecture  
for Health

Driving positive change  
through the power of design.

# Academy of Architecture for Health On-line Professional Development

The Academy is dedicated to advance design that supports community and personal wellness, and facilitates diagnosis and treatment of acute and chronic disease or physical injury. Synthesis of function, art, science and technology into a built environment benefiting humanity and nature requires orchestrated effort by many specialists. The Academy's multi-channel on-line approach provides emerging professionals, journeymen, and master professionals with convenient and economical opportunities to develop their chosen area of interest.



# HC 101 Series Webinars

The Academy of Architecture for Health wants to cultivate interest and career development in this specialized field. HC 101 Series sessions are web-based 60 minute seminars tailored to provide budding healthcare design professionals with conceptual and practical primer-level knowledge.

The HC 101 Series is a cost effective option for those lacking the time and money to attend a conference or other Academy event.

Series topics include: Master planning; Programming; Ambulatory care; Clinical support services; Emergency; ICI-acute care; Imaging; Long-term care; Maternal care; Mental health; Surgery.



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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.



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Follow the link provided:

- **in the Chat box** at the conclusion of the live presentation;
- **in the follow-up email** you (*or the person who registered your site*) will receive one hour after the webinar.

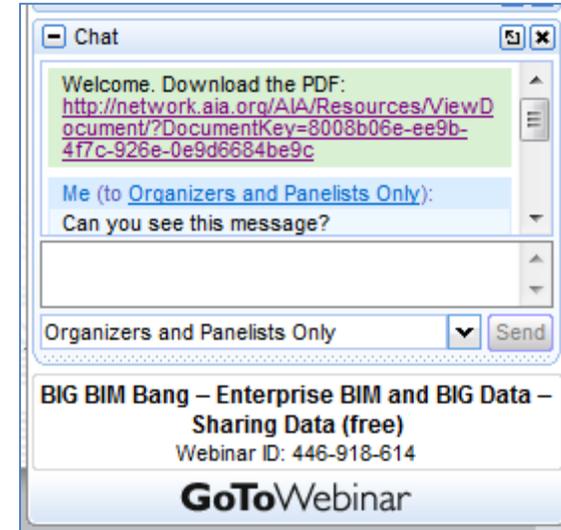


# Questions?

Submit a question to the moderator via the chat box.

Content-related questions will be answered during the Q&A portion at the end as time allows.

Tech support questions will be answered by AIA staff promptly.



# Patient Safety in Acute Care Hospital Design

## Presenter

**John Kreidich, AIA, CHC, LEED AP B+C**

McCarthy Building Companies



# Patient Safety in Acute Care Hospital Design

## **There are two areas of primary concern:**

1. Life-Safety – assuring that occupants in the event of a fire are protected from smoke as well as fire – an exit stair is of no use to a bedridden patient.
2. Environmental Safety – assuring that occupants are not exposed to materials posing a threat to life or health.

**Today we will focus on the second area of concern – Environmental Safety and specifically Infection Control.**



# Environmental Safety Learning Objectives

## Enable attendees to:

- Understand role of the built environment in preventing HAIs
- Identify design professionals' role in the ICRA process
- Be aware of I.C. design considerations for
  - Med-Surg patient rooms
  - “P.E.” and “A.I.I.” isolation rooms
  - Surgical Suites

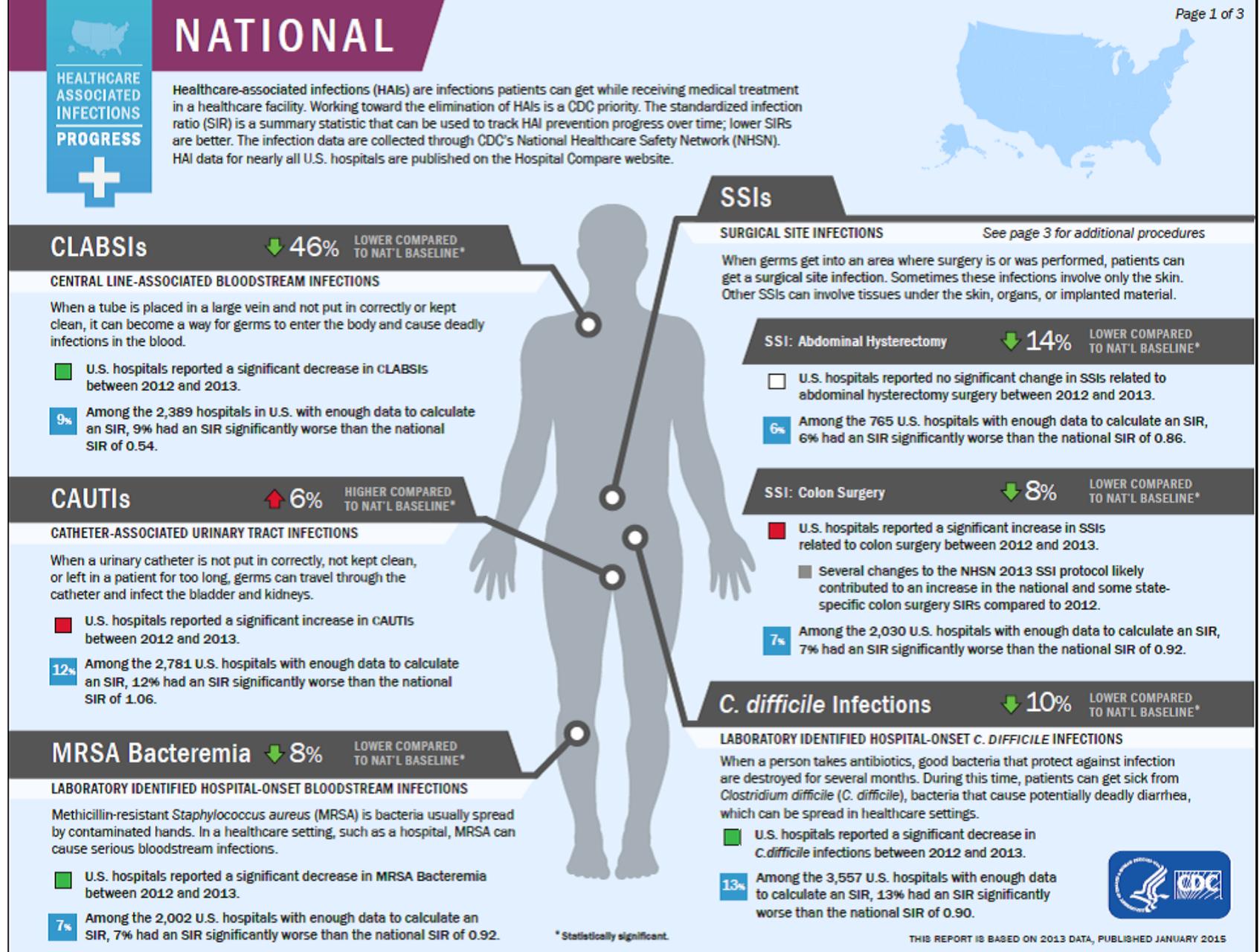


# HAI Progress Per CDC

Note that -

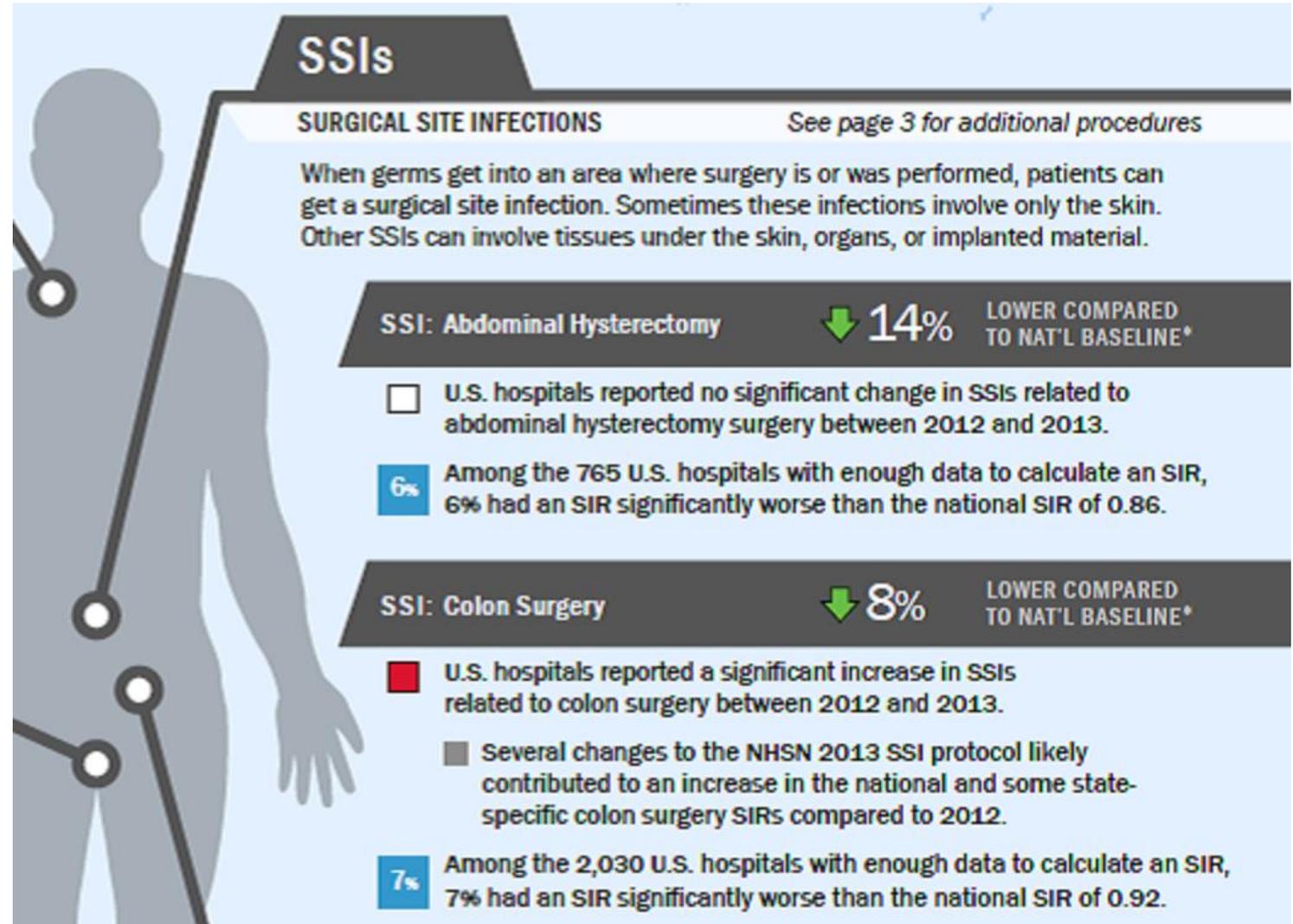
- CLABSI
- CAUTI
- MRSA
- C. DIFFICILE

Are not directly related to the built environment



# Healthcare Associated Infections - SSIs

Some (not all) Surgical Site Infections (SSIs) can be built-environment related



# HIA Prevention – Contact Transmission



Source: americanpregnancy.org

Healthcare workers' hands are believed a common vehicle for HAI-transmitting pathogens

The main barriers to hand washing compliance are high occupancy, poor staffing levels, inappropriately placed hand gels and hand washing sinks

There is now technology that logs staff hand washing 24/7 in real time.



# HAI Prevention – Airborne Transmission

## Airborne Precautions

Apply to patients known or suspected to be infected with a pathogen that can be transmitted by airborne route; these include, but are not limited to:



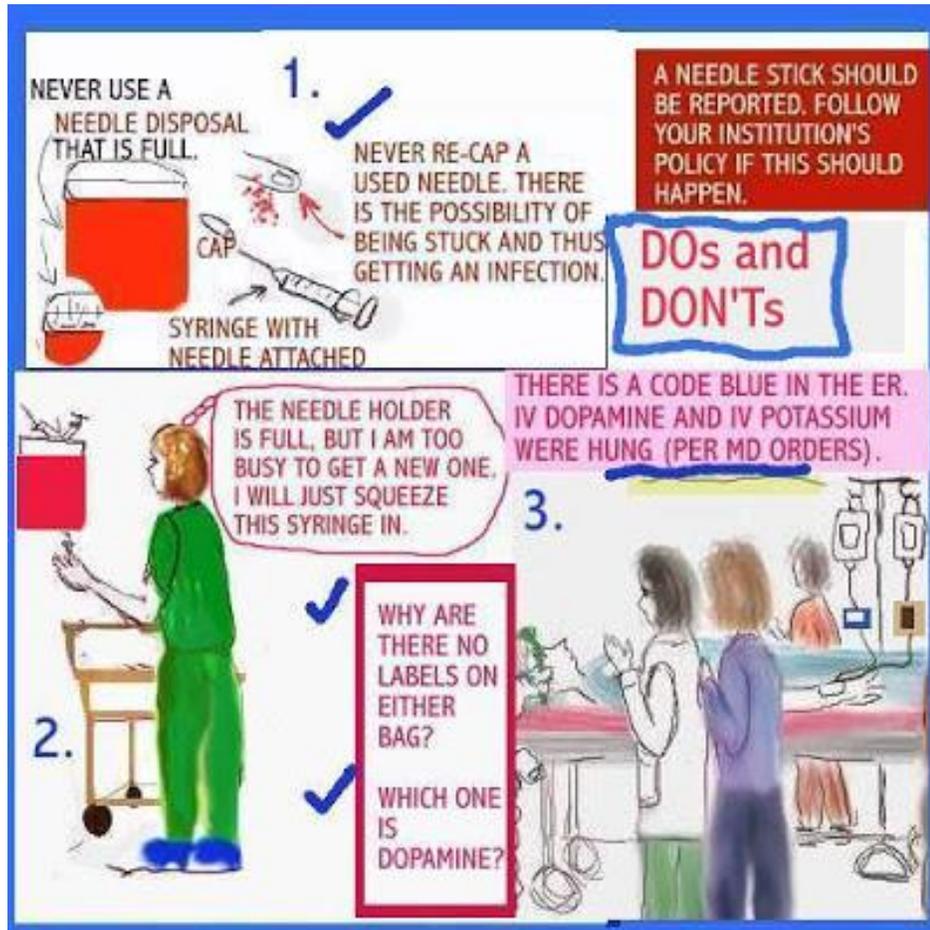
Source: social-contact-network-disease-transmission

*Tuberculosis; Measles; Chickenpox (until lesions are crusted over); Localized or disseminated herpes zoster (until lesions are crusted over)*

These patients require an airborne infection isolation room (AIIR)



# HAI Prevention – Nurse Needle Stick



Source: SESSIONS 28-PHARMACOLOGY FOR NURSES

It is estimated that there are 600,000 to 800,000 work-related needle stick injuries each year in the United States

Design of the patient room with location of sharp boxes for disposal of uncapped needles and other sharp devices and location of contaminated supply disposal units would likely decrease the incidence of such injuries



# Upcoming Break for Questions and Comments

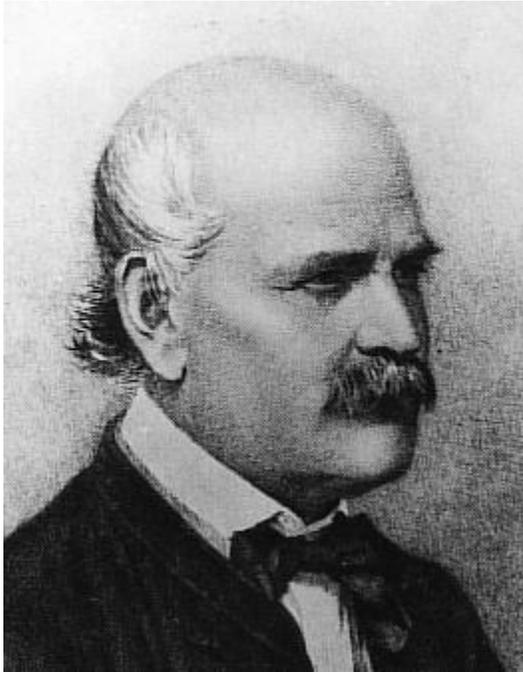


Source: agilecoach.ca, July 16, 2015

What are your thoughts on the role of the built environment in preventing Healthcare Associated Infections?



# We have been here before



Dr. Ignaz Semmelweis, aged 42 in 1860  
copperplate engraving by Jenő Doby  
Source: robbrooks.net

Ignaz Semmelweis, Hungarian physician in 1847 noted that women giving birth in a hospital where medical students assisted with deliveries immediately after performing autopsies, had higher rates of infection, and that women who gave birth at home had even lower rates of infection.

Semmelweis concluded providers must wash hands regularly to protect patients, and that best way to avoid HAI is to stay out of the hospital altogether.



# Florence Nightingale's Influence on Design

Driven by conditions she observed while caring for soldiers during the Crimean War, Florence Nightingale insisted that “The very first canon of nursing . . . is this: TO KEEP THE AIR HE BREATHES AS PURE AS THE EXTERNAL AIR, WITHOUT CHILLING HIM” (1860).

She is responsible for the first hospital design standard for HAI prevention – the “Nightingale Ward”.



St. Thomas Hospital - Source: <http://rs144.pbsrc.com/albums/r163/linschoten/hospital>



# Break for Questions and Comments



What are your thoughts on the role of the built environment in preventing Healthcare Associated Infections?



# ICRA process for design professionals



Source: ikorcc.com



Source: hospitalnews.com



Source: morainecorp.blogspot.com



Source: icprofessor.com

Whether you are going to remodel an existing OR suite or build a new one, an Infection Control Risk Assessment (ICRA) is required per FGI Guidelines.

An ICRA checklist need address these considerations:

- Project Team
  - Construction Period
  - **Project Phasing\***
  - **Space\***
  - **Mechanical System\***
- \* Primary areas for design professional participation*



# ICRA Project Phasing Documents

All steps required to phase the project must *be clearly defined in documents* provided to the contractor.



Source: carpenters.org

For each phase, dust-tight barrier walls that separate the construction zone from the surgery must *be clearly defined in phasing documents*.

Means for providing negative pressurization is not to be left to the contractor, but *shown on the phasing documents*.



# ICRA Project Phasing Documents



Source: epicresponse.com

For each phase, traffic patterns for patients, visitors, staff and materiel must *be clearly defined in phasing documents.*

Acceptable methods for protecting patient, visitor, staff, or materiel traffic that pass through the construction zone must *be clearly defined in phasing documents.*

Methods for disposing of demolition debris must also *be clearly defined in the documents.*



# ICRA Project Phasing Documents



Source: 2014/09/Element-Environmental-Solutions ICRA-Consulting

For each phase, assurance of clean to dirty air flow must *be clearly defined in the documents*.

For each phase, the unrestricted, semi-restricted, and restricted surgical areas, as defined in the FGI Guidelines, must *be clearly defined*.

For each phase, provisions must be made for accommodating infectious patients prior to surgery, and following surgery



# ICRA Space considerations



Source: hospitalnews.com

Yves Crehore (left) and Suman Bahl review construction drawings in one of the areas currently under renovation at Markham Stouffville Hospital.

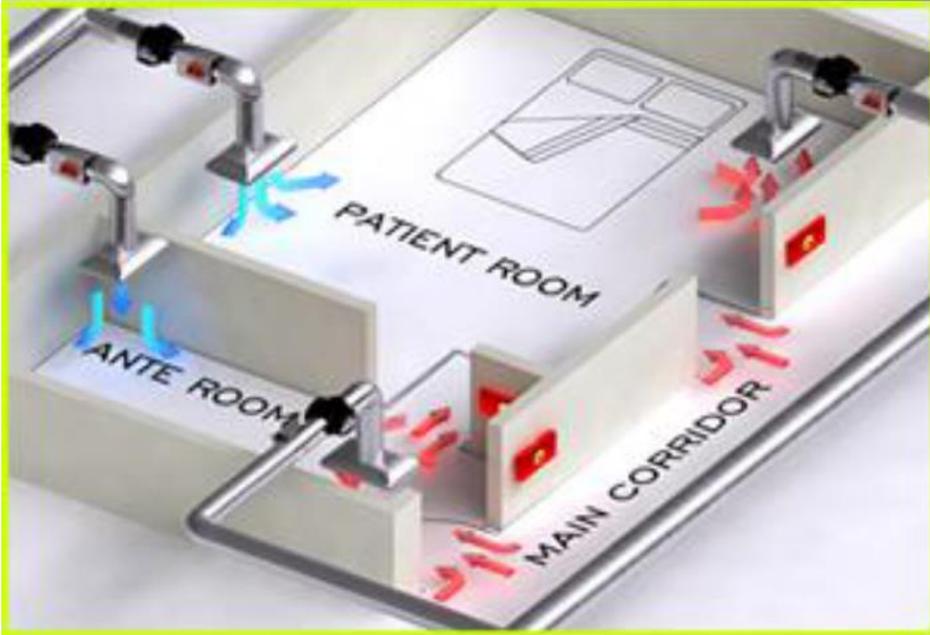
Hand washing sinks to be shown on project documents in all rooms where needed or required (may be need more rooms w/ sinks than the Guidelines, or your state health codes, require).

*Location of hand washing sinks promote hand washing by staff and patients.*

Typically provision is made in final design for isolation of infectious patients prior to surgery.



# ICRA Space considerations



Source: Grumman/Butkus Associates 2014-03-25 ASHRAE Seminar Isolation Room HVAC Design

When isolation rooms are required for preoperative holding, provide quantity and type consistent with expected quantity and type of infected patients.

Provision must be made in final design for isolation of infectious patients following surgery

*(Guidelines do not require an isolation room in PACU).*



# ICRA Space considerations



Source: Joe Bryksa / Winnipeg Free Press

HSC nurse Lori Fleetwood shows personal protective equipment that would be used in an isolation room.

Provision must be made in the final design for the isolation of infectious patients following surgery (*the Guidelines do not require an isolation room in the PACU*).

If isolation rooms are provided in PACU, the quantity and type provided must be consistent with the expected quantity and type of infectious patients.



# ICRA Space considerations

Anterooms must be provided for airborne infectious isolation (negative pressure) rooms (AIIR). The Guidelines do not require anterooms, but state health code, or ICP may require them.

Anterooms must be provided for protective environment (PE) rooms.

Anterooms must allow passage of equipment without having both door sets open at the same time.



Source: rayatbahrahospital.com



# ICRA Mechanical System

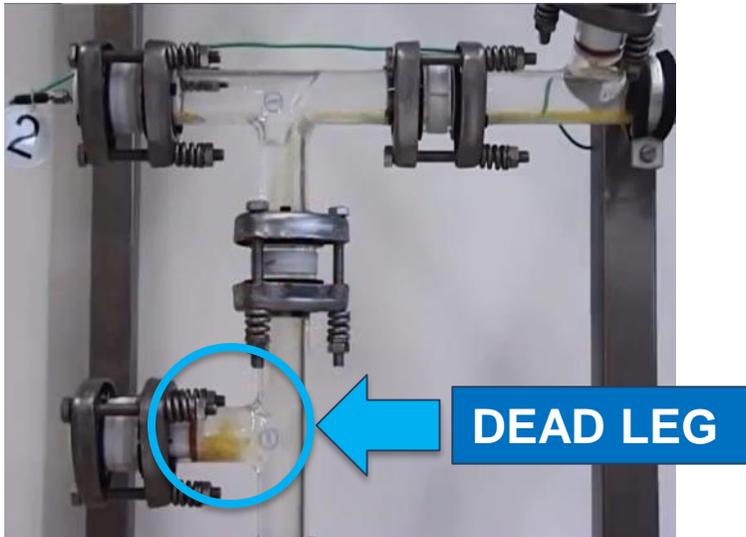


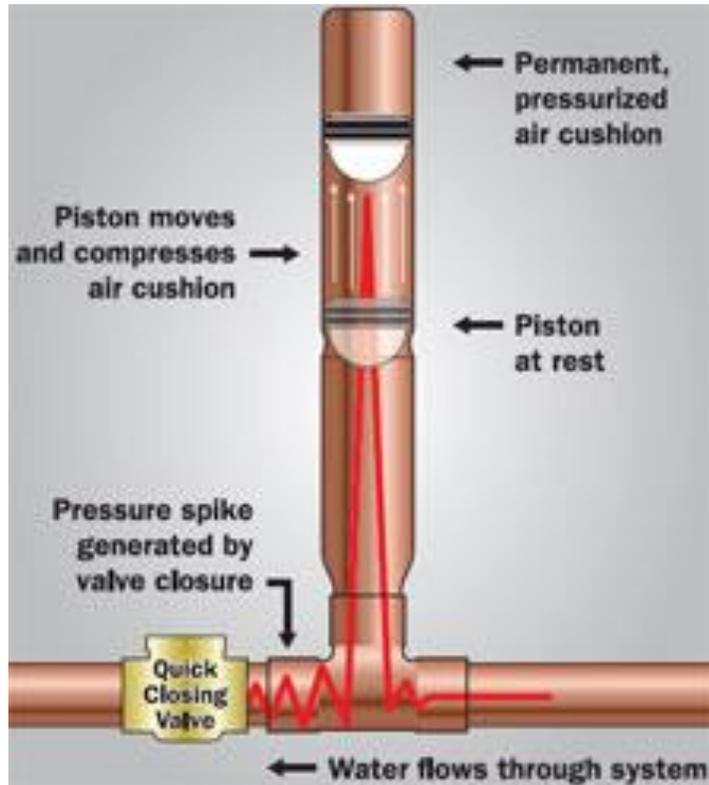
Image Source: YouTube "CIP horizontal dead leg"

No unused segments of existing water piping will be left in place following the project as such segments can harbor legionellae.

The plumbing documents require domestic water pipe placement that minimizes the potential for conditions (long lengths of pipe, dead legs, or dead ends) that could harbor legionellae or enhance its growth.



# ICRA Mechanical System



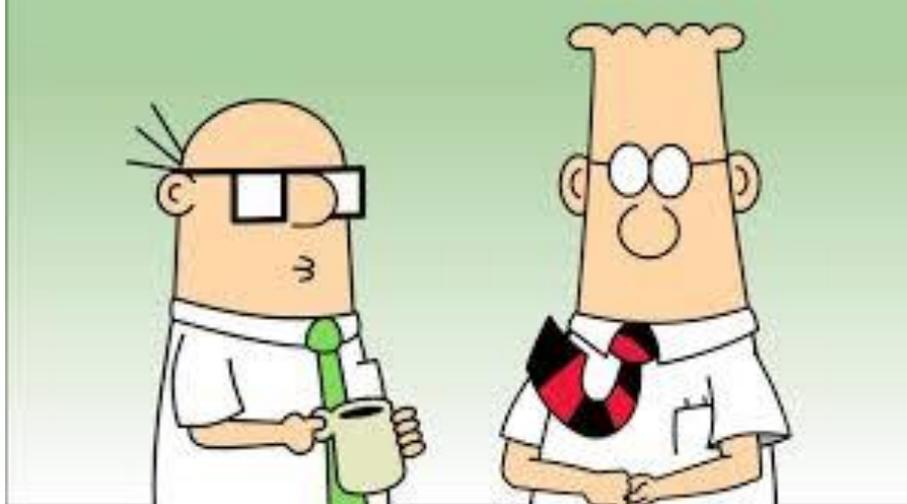
Source: plumbingmart.com

A system is in place for reporting dirty water observed in plumbing fixtures during construction. This dirty water can be an indicator that scale, biofilm and other contaminants have been loosened in the pipes by vibration.

The plumbing design requires provision for the control of water pressure shock to reduce the potential for the spread of legionellae contamination.



# Upcoming Break for Questions and Comments on:



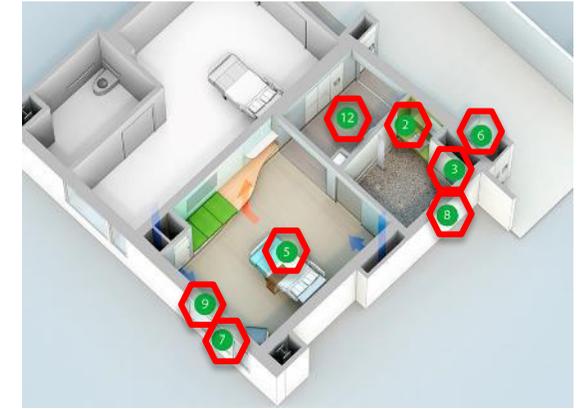
<http://www.businessinsider.com> , Courtesy of Scott Adams

- ICRA process for design professionals
- IC (infection-control) design considerations



# IC Design Features – Patient Room

1. Replace door knobs with wave sensors
2. Touch-free faucets & hand dryers
3. Built-in enclosed bedpan washers
4. UV-sanitized tablets
5. Separate duplicated overbed table
6. Storage alcoves
7. Replace cubicle curtain with electrochromatic glass
8. Inboard bathrooms
9. Added vapor barriers and insulation
10. Shoe cover dispensers
11. Contaminated supply disposal unit
12. Auto hand washers & dryers at entry
13. LED color-change hand-wash indicator

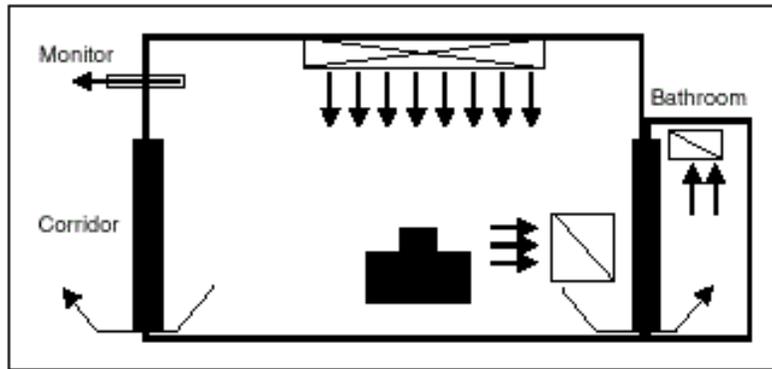


Source: [Kerianne Graham](#) Architect, NBBJ



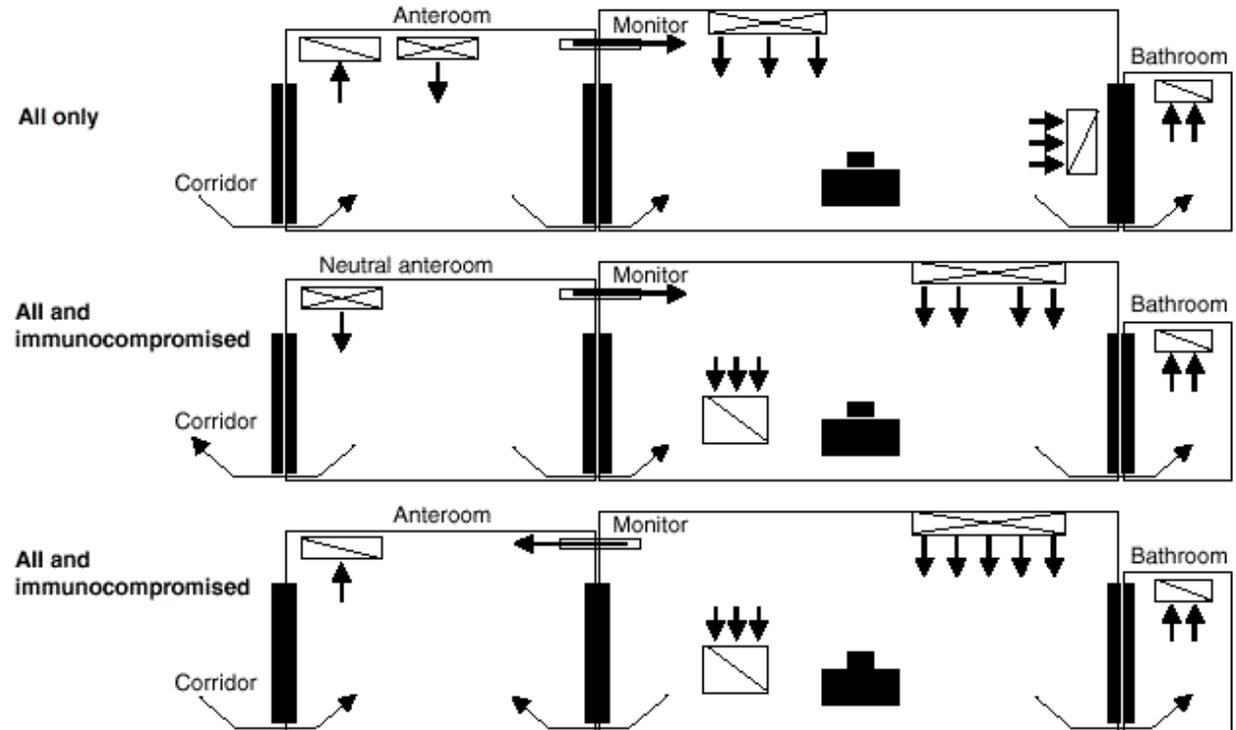
# IC Design Features – Isolation Facility

**FIGURE 1. Example of positive-pressure room control for protection from airborne environmental microbes\*†**



**Source:** Adapted from Heating/Piping/Air Conditioning (HPAC) Engineering, October 2000, Penton Media, Inc.

**FIGURE 2. Example of airborne infection isolation (All) room with anteroom and neutral anteroom\***

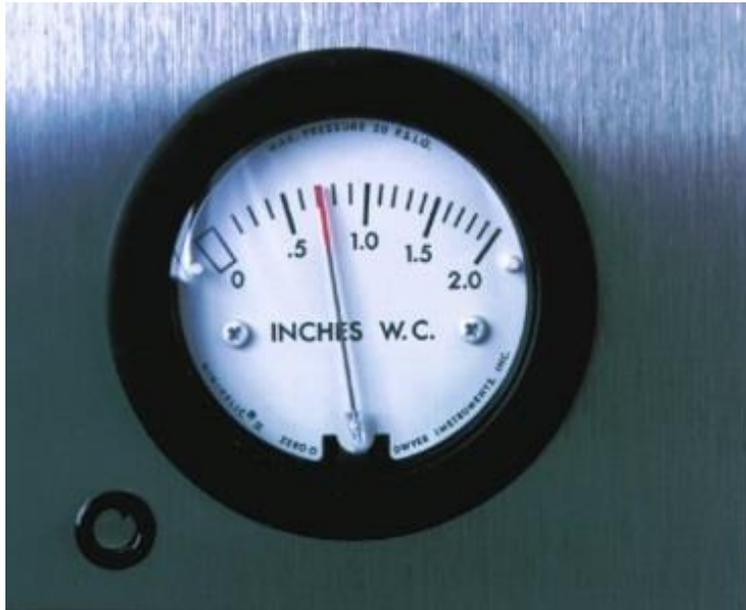


**Source:** Used with permission from Andrew J. Streifel, M.P.H., University of Minnesota.

<https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5210a1.htm> 6/



# IC Design Features – Isolation Facility



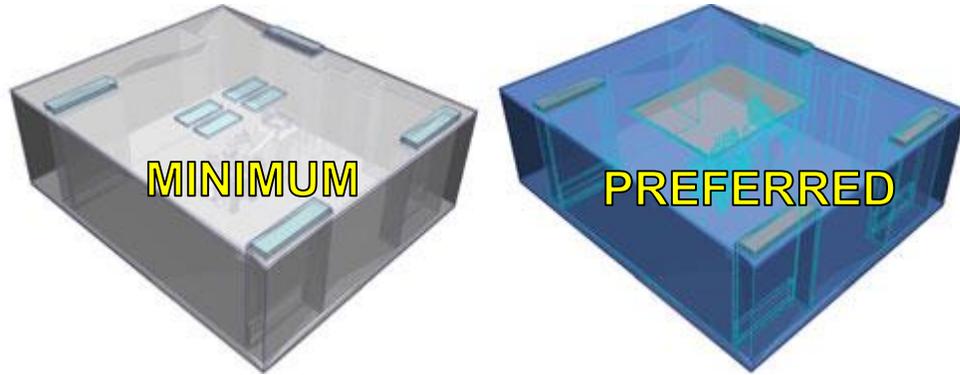
Source: biologicalcontrols.com

Airborne Infectious Isolation (negative pressure) rooms require air flow from where staff enter, to and over the patient.

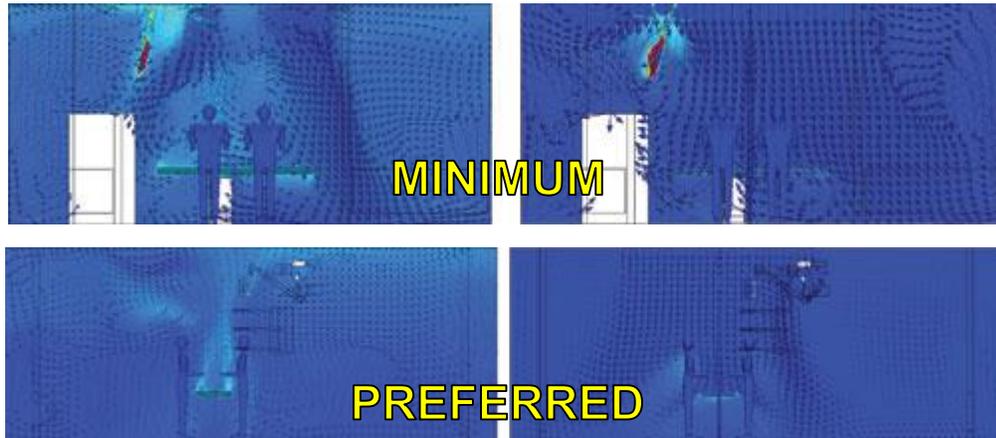
Isolation rooms must include pressure monitoring devices that provide visual indication of the pressure differential and that set off an alarm when the differential falls below a set level.



# IC Design Features – Surgical Suite



Laminar Flow array turbulence , Min. vs. Preferred



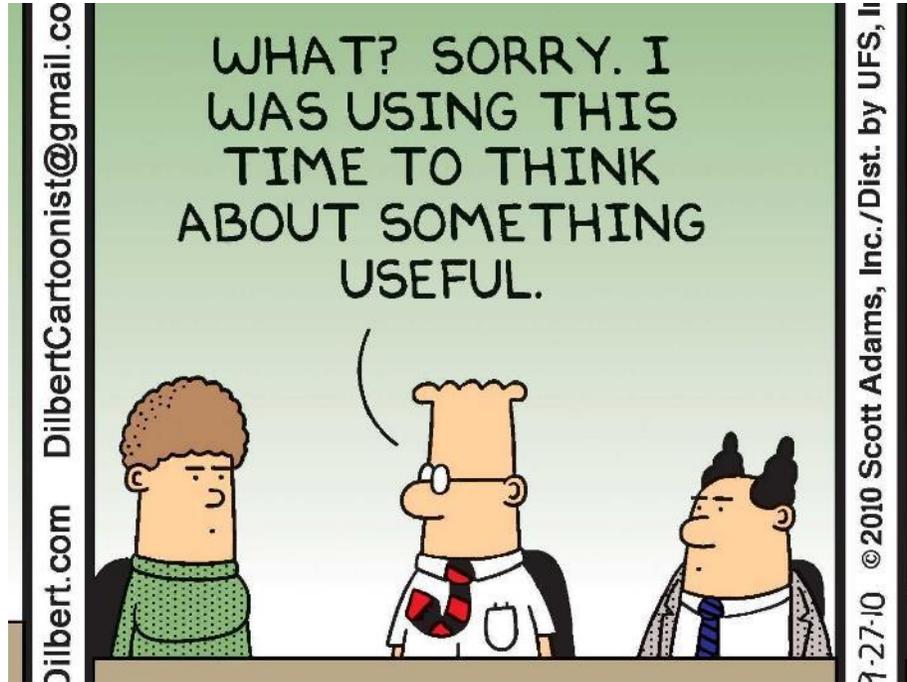
<http://ortoday.com/rethinking-the-operating-room-to-prevent-surgical-site-infections/>

Operating rooms are among the most infection-sensitive environments in health care. Surgical procedures increase patient vulnerability to pathogens from surgical personnel, surgical equipment, the air and a patient's own skin flora.

Cleanroom technology and design practices are already used by critical-process manufacturers facing similar consequences in a different context.



# Last Chance for Questions and Comments on:



- ICRA process for design professionals
- IC (infection-control) design considerations
- Any more on the role of the built environment in preventing Healthcare Associated Infections



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Attendees at your site can submit for credit by individually completing the webinar's survey and report form. **The survey closes Friday, February 17, 2017 at 12:30 am EDT.**

The URL to the webinar survey/form <http://bit.ly/2iEhT4M> will be emailed to the person who registered your site.

More continuing education questions? Email . . .  
[knowledgecommunities@aia.org](mailto:knowledgecommunities@aia.org).



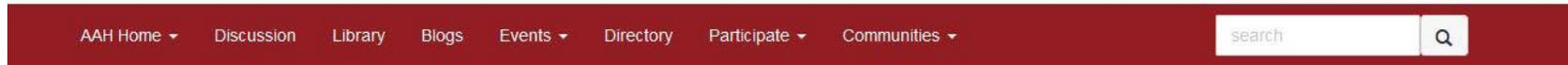
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# Upcoming Webinars\*

Date	Series	Topic
3/21	Master Studio Series	Post Occupancy Evaluation – Dublin Hospital
4/11	Master Studio Series	Lean Inpatient Design Strategies
5/9	HC 101 Series	Building Enclosure Fundamentals – Air Barriers for Hospitals

\*Dates and topics are subject to change

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