HFG architecture

PEC PROFESSIONAL ENGINEERING CONSULTANTS, P.A.

# Session 4: Interiors & FGI

Oklahoma Association of Healthcare Engineers

## 2019 Fall Regional Event

October 11, 2019

# Interior Design & FGI

## *How good Interior Design can support FGI while enhancing your project*

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- Director of Interior Design for HFG Architecture's Oklahoma Region
- LEED Accredited
- Associate member of the International Interior Design Association, and member of the Association for Continuing Higher Education

# Implementing evidence based interior design practices that are informed by FGI requirements with a focus on:

Mitigating Fall Risk

Acoustics



Infection Control

# Primary Causes for Falls in the Built Environment

1. Floor Material/Finish (Slip Resistance)
2. Floor Transitions
3. Poor Visibility
4. Access to Support (grab bars, handrails, etc.)
5. Patient Environment Planning

# Types of Falls in the Built Environment

## Slips

Occur when there is too little friction of traction between the feet and the walking surface


## Trips

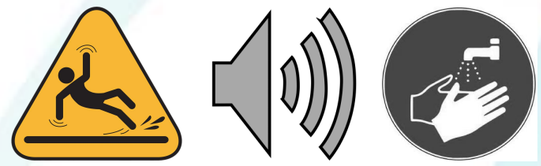
Occur when the foot strikes an object (or obstruction), and the momentum throws one off balance

## Falls from Elevation

While standing on a chair, from ladders or stairs, from non-moving vehicles, etc.

## Same-Level Falls

While walking or working, from a chair while sitting, tripping up stairs, etc.



# Data on Falls in the Built Environment

## 11,000

Fatal Falls occur in the Hospital Environment per Year

## 25%

Of fall injuries are preventable according to CMS estimates

Nanda, U. Achieving Ebd Goals Through Flooring Selection & Design. The Center for Health Design.

The Joint Commission Requires Healthcare Organizations to Track Patient Falls and Injuries and Devise Programs to Reduce the Number of Occurrences.



Nanda, U. Achieving Ebd Goals Through Flooring Selection & Design. The Center for Health Design.

MITIGATE FALL RISK

# Mitigate Fall Risk:

## FGI Regulates

1. Functional Program Fall Risk Assessment
2. Thresholds & expansion/seismic joints & covers
3. Grab Bars
4. Handrails
5. Flooring & Wall Base

## ADA Considers

1. Floor Transitions
2. Floor Incline
3. Floor Stability
4. Floor Firmness
5. Floor Slip Resistance

## Interior Design Strategies

1. Light levels
2. Floor Finish Slip Resistance
3. Transitions between materials
4. Padded flooring with weldable top |Softens Falls
5. Low contrast between colors of flooring
6. Low Gloss Flooring
7. Contrast of wall base to floors for differentiation
8. Roll-In Showers with Barrier-Free transitions
9. Patient Mobility & Access to Personal Items

## Other Organizations & Agencies

1. ANSI - American National Standards Institute
2. ASTM - American Society for Testing and Materials
3. TCNA - Tile Council of North America
4. OSHA – Occupational Safety & Health Administration

## Flooring Characteristics that Impact Fall Risk:

### Flooring Considerations

1. Floor Pattern
2. Floor Transitions
3. Slip Resistance

### Flooring Slip Resistance Factors

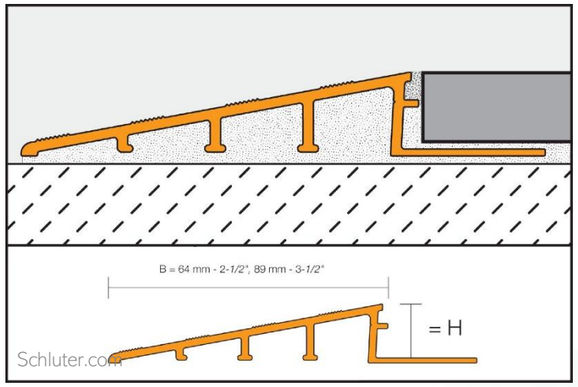
1. Friction between the floor and the shoe
2. Presence of suitable fine aggregate
3. Hardness of the floor
4. Applications for sealing floors during installation
5. Later modifications on the floor such as inappropriate varnishing/sealing/polishing

Nanda, U. Achieving Ebd Goals Through Flooring Selection & Design. The Center for Health Design.

## Mitigate Fall Risk:

### Floor Finish Transitions

1. Same Height Flooring Options
2. Barrier- Free Ramp Transitions
3. Floor Leveling Compound
4. Minimizing Types of Floor Materials





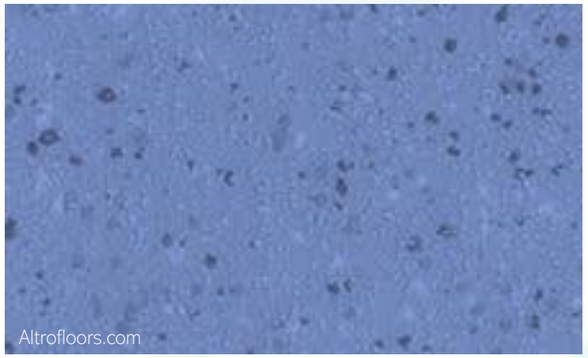

## Mitigate Fall Risk:

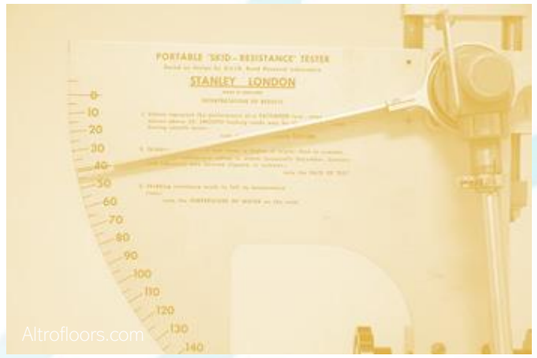
### Floor Finish Selections

1. Vinyl Composition Tile
2. Luxury Vinyl Tile
3. Sheet Vinyl
4. Sheet Carpet
5. Carpet Tile
6. Ceramic Floor Tile

### Floor Finish Slip Resistance

1. **Safety Flooring** | Wear Layer, Fine Aggregate
2. **Tile Flooring** | Honed or Unpolished
3. **Rubber & Resilient Flooring** | Embossing

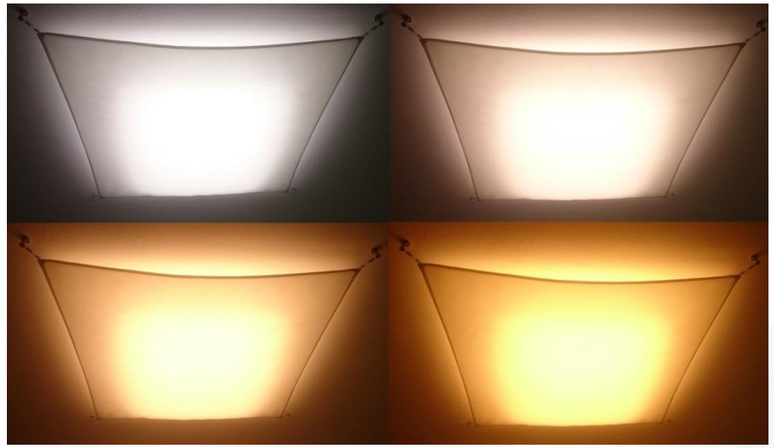

# Visibility:

## Lighting Considerations

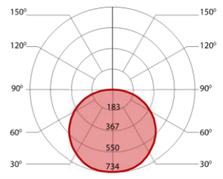
1. Visible Contrast in Floor Material Changes
2. Visibility of Floor Material Patterns & Textures
3. Visibility of Barriers & Obstacles
4. Visibility of Supports/Handrails

## Lighting Design Supports

1. Provider Task Performance
2. Telemedicine
3. Fall Risk Mitigation



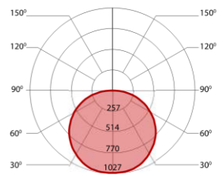
**2500 LUMEN AT 80CRI - LOW OUTPUT**




PERFORMANCE

| LED output | Color Temp | Watts | Nominal Delivered Lumens | Efficacy LPW |
|---|---|---|---|---|
| low output | 2700K | 23 | 2500 | 108 |
| low output | 3000K | 22.5 | 2500 | 111 |
| low output | 3500K | 21.5 | 2500 | 115 |
| low output | 4000K | 21 | 2500 | 118 |
| low output | 6500K | 20 | 2500 | 125 |

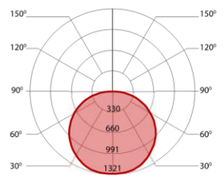
**3500 LUMEN AT 80CRI - MEDIUM OUTPUT**




PERFORMANCE

| LED output | Color Temp | Watts | Nominal Delivered Lumens | Efficacy LPW |
|---|---|---|---|---|
| medium output | 2700K | 33.5 | 3500 | 104 |
| medium output | 3000K | 32.5 | 3500 | 107 |
| medium output | 3500K | 32 | 3500 | 110 |
| medium output | 4000K | 30.5 | 3500 | 114 |
| medium output | 6500K | 29 | 3500 | 120 |

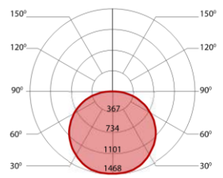
**4500 LUMEN AT 80CRI - HIGH OUTPUT**




PERFORMANCE

| LED output | Color Temp | Watts | Nominal Delivered Lumens | Efficacy LPW |
|---|---|---|---|---|
| high output | 2700K | 44.5 | 4500 | 101 |
| high output | 3000K | 43.5 | 4500 | 104 |
| high output | 3500K | 42 | 4500 | 107 |
| high output | 4000K | 41 | 4500 | 110 |
| high output | 6500K | 39 | 4500 | 116 |

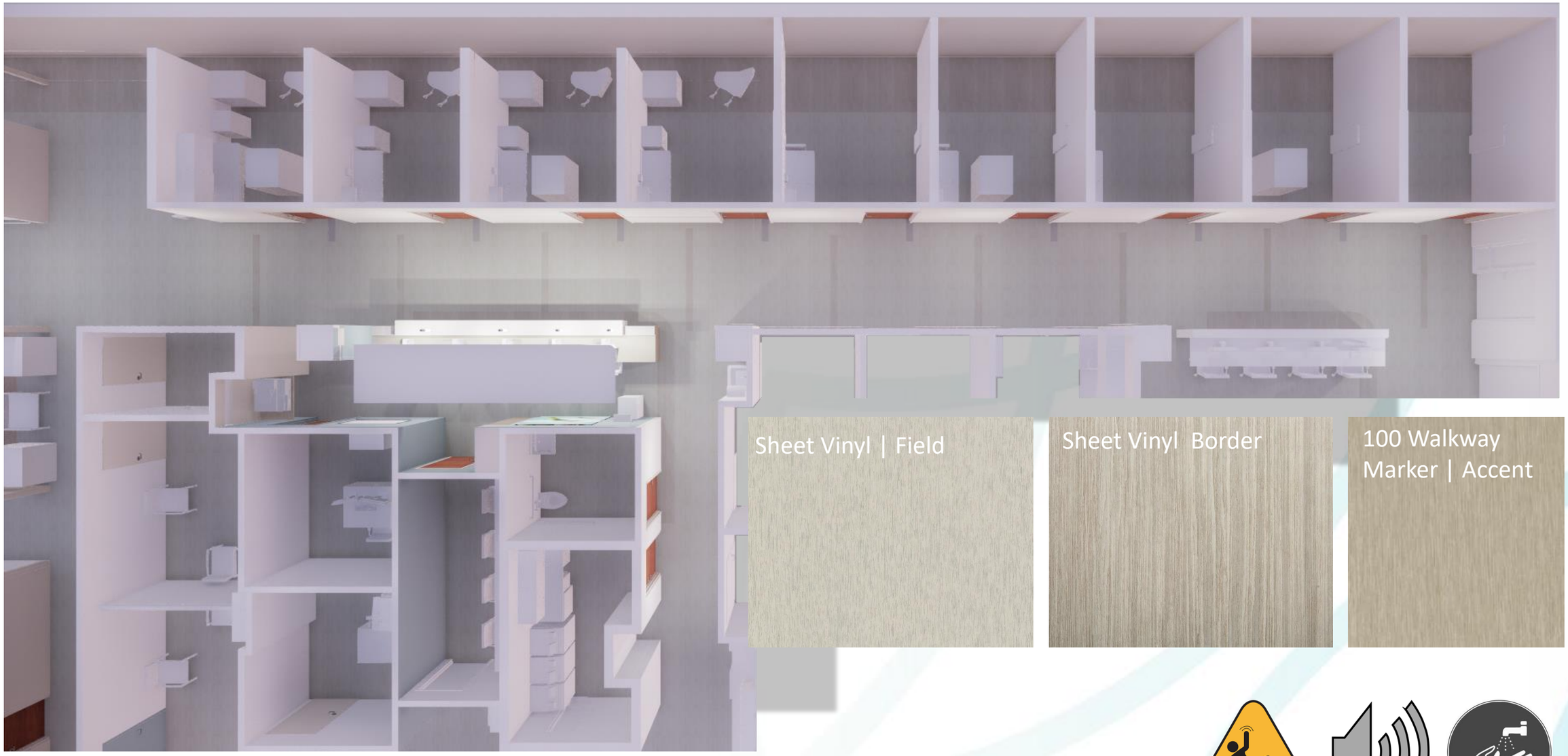
**5000 LUMEN AT 80CRI - ULTRA HIGH OUTPUT**




PERFORMANCE

| LED output | Color Temp | Watts | Nominal Delivered Lumens | Efficacy LPW |
|---|---|---|---|---|
| ultra high ouput | 2700K | 51 | 5000 | 98 |
| ultra high ouput | 3000K | 50 | 5000 | 100 |
| ultra high ouput | 3500K | 48.5 | 5000 | 103 |
| ultra high ouput | 4000K | 46.5 | 5000 | 107 |
| ultra high ouput | 6500K | 44.5 | 5000 | 112 |

## Mitigate Fall Risk: Floor Finish Visible Contrast



Sheet Vinyl | Field

Sheet Vinyl  Border

100 Walkway Marker | Accent

## Key Fall Risk Mitigation Factors:

1. Floor Finish Selection
2. Floor Transitions
3. Visibility
4. Patient Environment Planning

# Primary Acoustical Concerns

1. Patient Privacy (HIPAA)
2. Alarm Fatigue
3. Provider Distraction
4. Patient Sleep/Rest
5. Medical Errors
6. Telemedicine

## Acoustics in the Built Environment:

### FGI Regulates

1. Minimum Design Room Sound Absorption Coefficients
2. Maximum Design Criteria for Noise in Interior Spaces Caused by Building Systems
3. Design Criteria for Minimum Sound Isolation Performance Between Enclosed Rooms
4. Design Criteria for Speech Privacy for Enclosed Rooms & Open-Plan Spaces
5. Maximum Limits on Floor Vibration Caused by Footfalls in Health Care Facilities
6. Interior wall and floor/ceiling construction (Table 1.2-6)
7. Speech privacy (Table 1.2-7)
8. OITC - Outdoor–Indoor Transmission Class
9. STC – Sound Transmission Class

### Interior Design Strategies

1. Space Planning, Room & Door Positioning
2. Wall, Ceiling and Floor Finishes
3. Visual Privacy - Sight Lines, Patient Information

# Acoustics in the Built Environment:

## Center for Health Design– Evidence Based Design Strategies

### The Center for Health Design Recommends

"Sound control for improved outcomes in healthcare settings" | The Center for Health Design

1. Use High Performance Sound Absorbing Ceiling Systems
2. Wall Finish Treatments & Panels
3. Plan for private  spaces on the unit for family discussion
4. Providing Single Patient Rooms

# Acoustics in the Built Environment:

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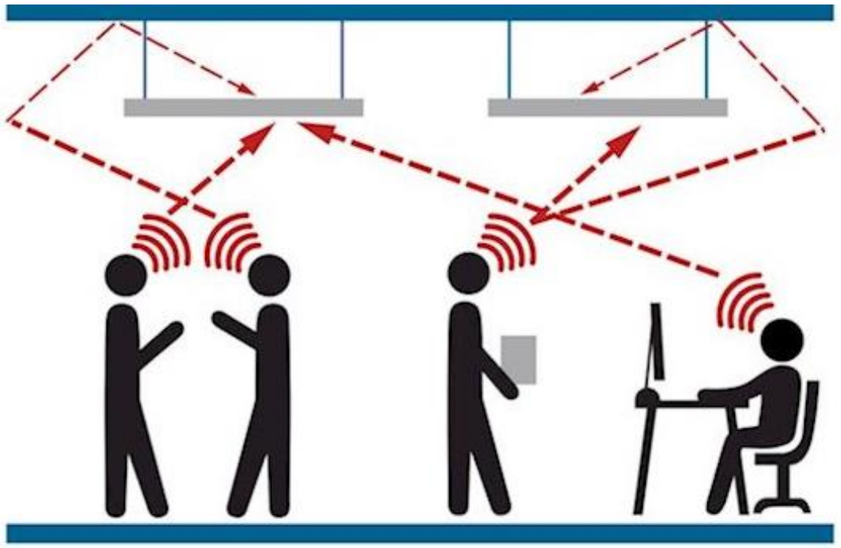
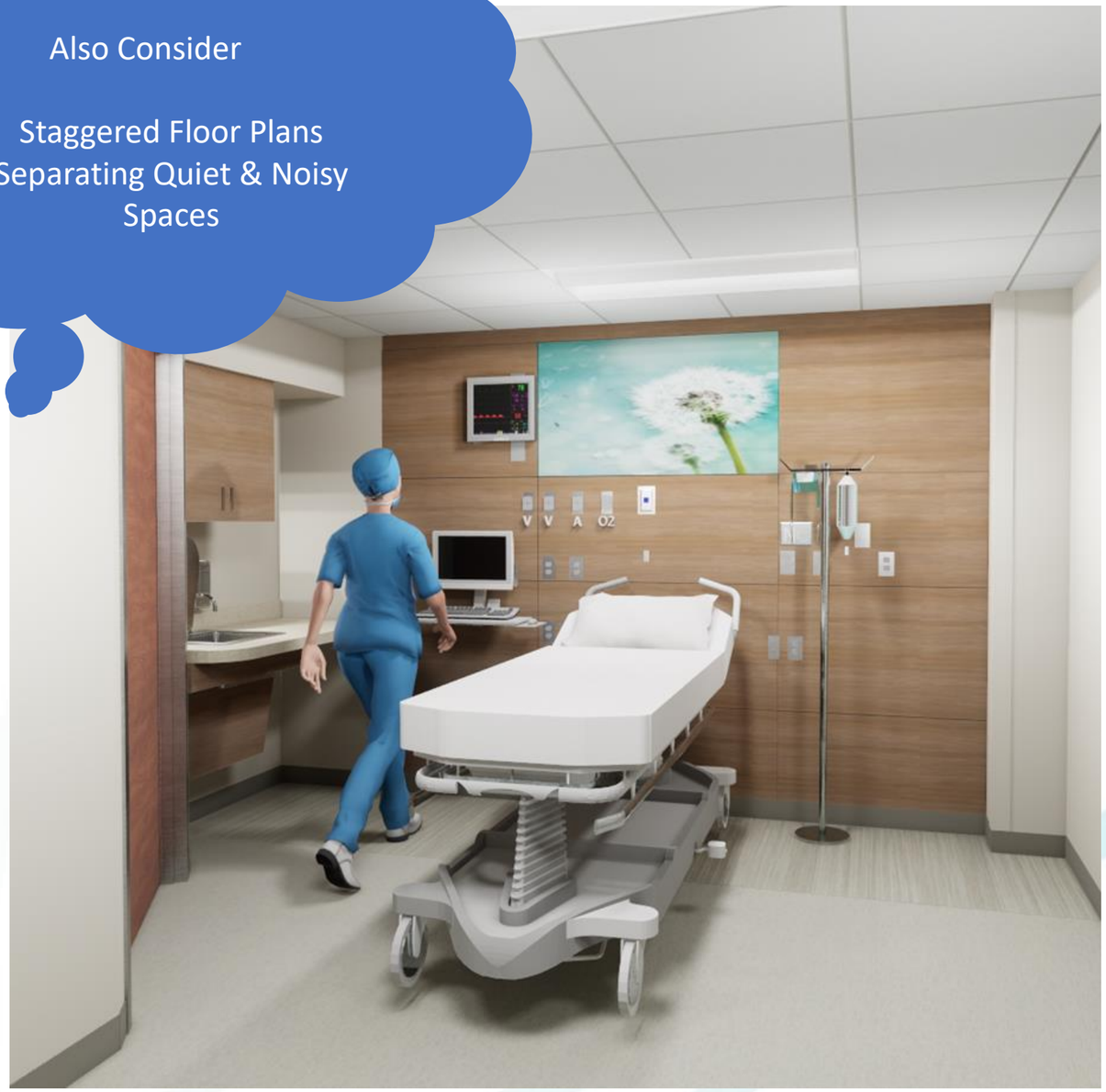


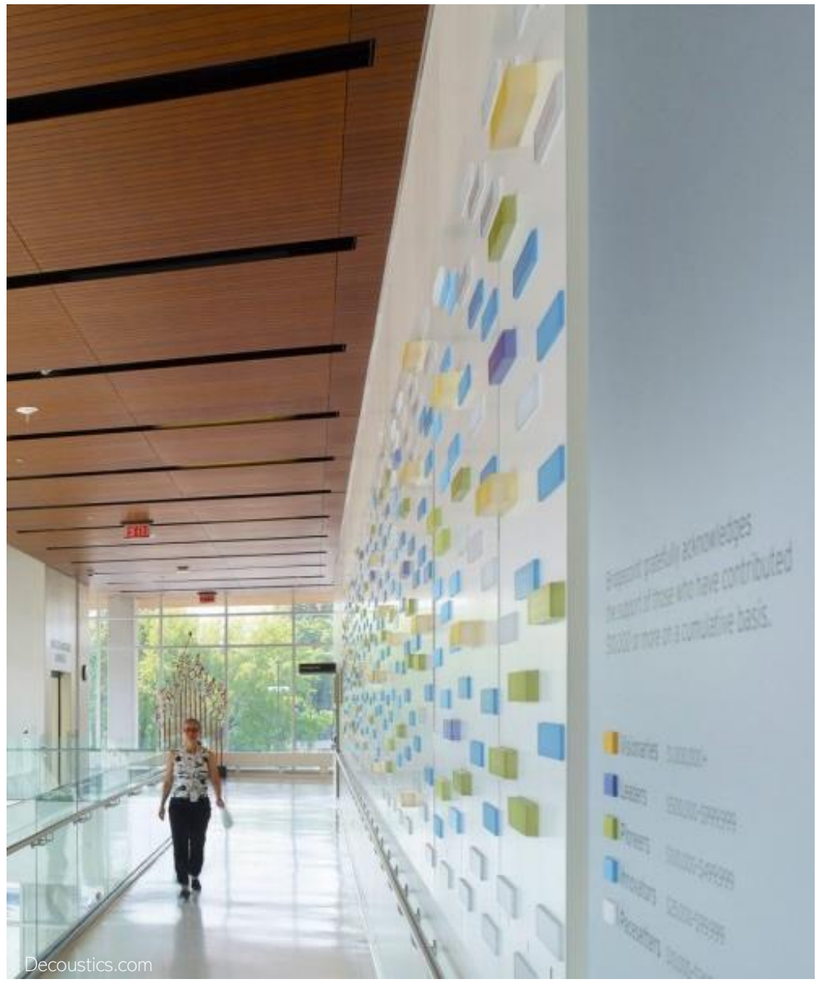
Also Consider

1. Staggered Floor Plans
2. Separating Quiet & Noisy Spaces



# Acoustics in the Built Environment:

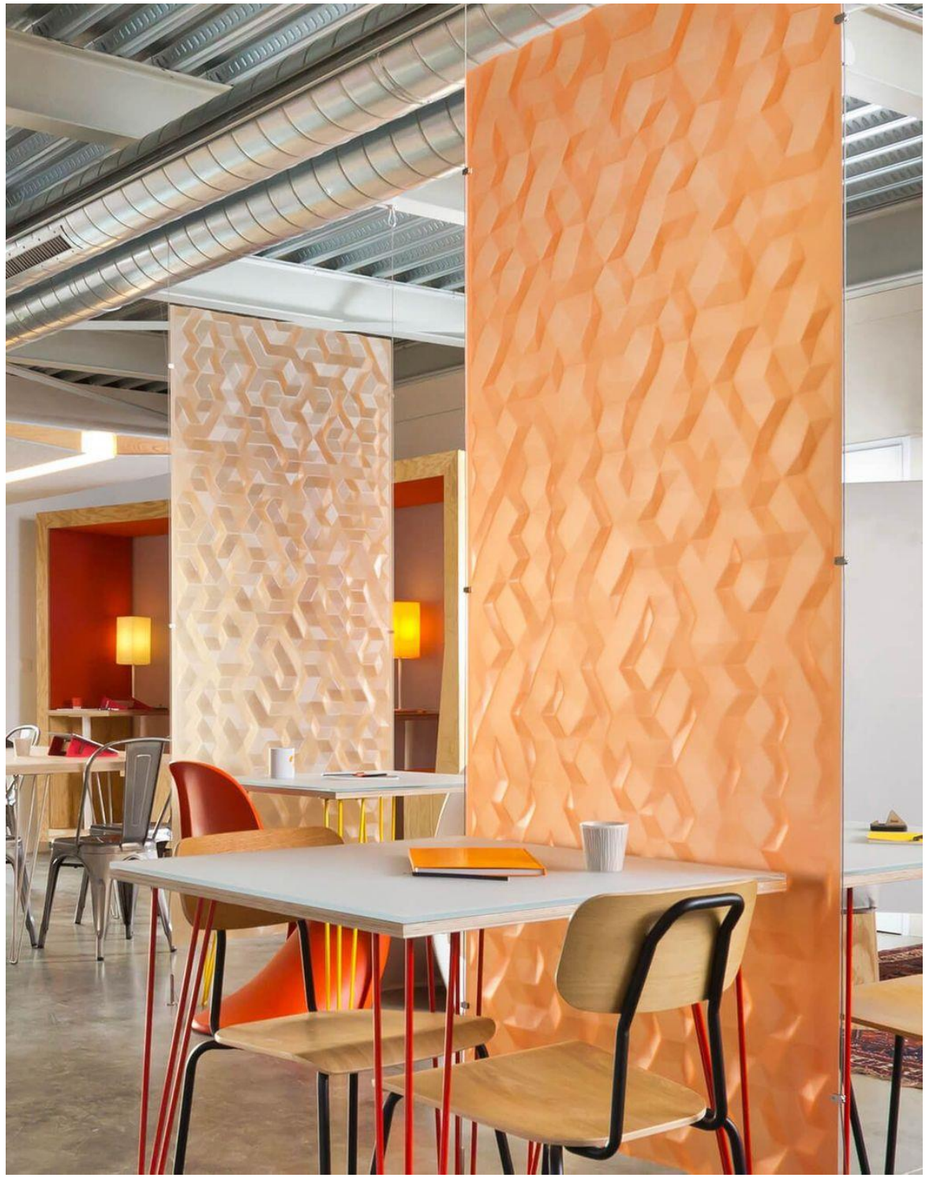
## Acoustical Clouds and Ceilings





# Acoustics in the Built Environment:

## Sound Absorbing Wall Finishes



# Acoustics in the Built Environment:

## New Sound Absorbing Products on the Market

Consequence of Poor Sleep:

- Impaired Attention and Reaction Times
- Decreased Memory and Concentration
- Worse Mood, Depression
- Impaired Task Completion
- Psychosocial Difficulties

**Insufficient or Disordered Sleep**

- Increased Consumption of Healthcare Resources

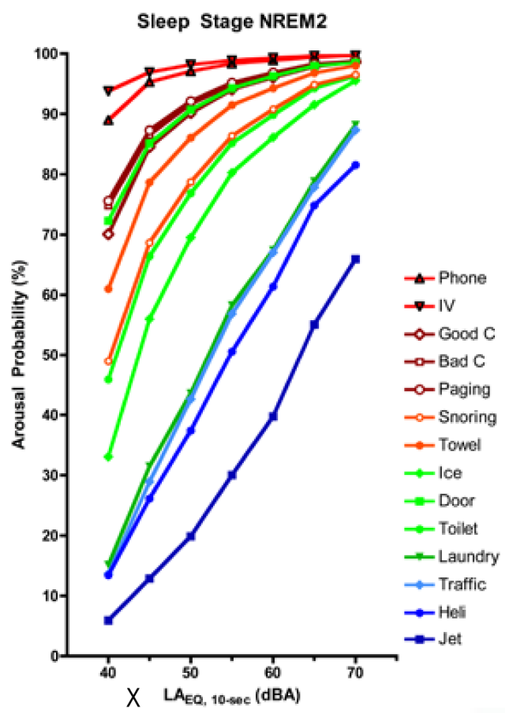
- Risk of Injuries, Falls
- Increased Incidence of Pain
- Weight Gain
- Diabetes Inflamation
- Cardiovascular Disease

Solet, J., Evidence-Based Design Meets Evidence-Based Medicine: The Sound Sleep Study. The Center for Health Design.

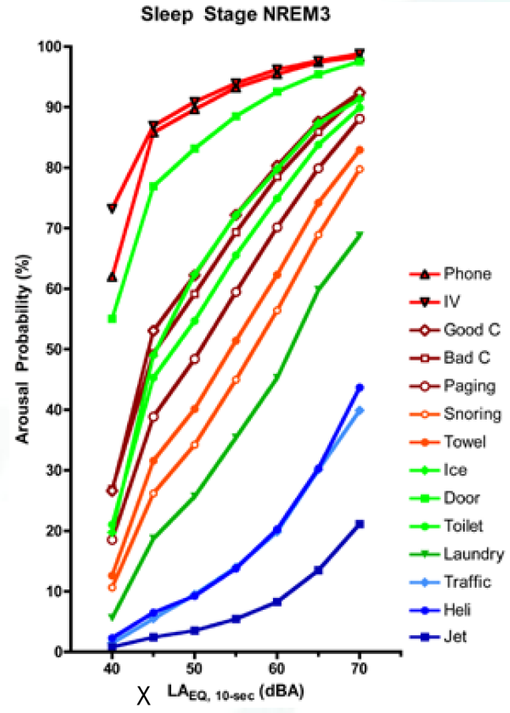
## Sources of Noise to Consider

1. Door
2. Helicopter
3. Ice Machine
4. IV Alarm
5. Jet
6. Laundry Cart
7. Phone
8. Snoring
9. Toilet
10. Traffic
11. Towel Dispenser (electric)
12. Bad Conversation
13. Good Conversation
14. Paging

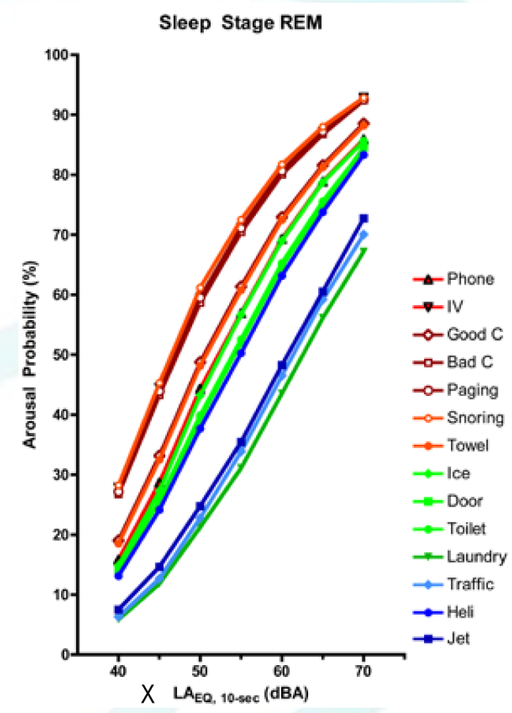
### Light Sleep




### Deep Sleep

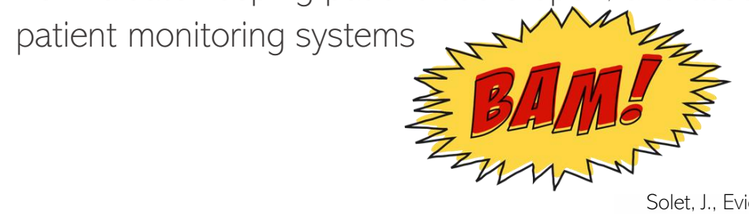



### REM Sleep




## Sleep Study Findings

1. Phone & IV Alarms Resulted in the Greatest Disruption
    a. Answer Alarms Promptly
    b. Reduce Telephone Volumes to Limit Transmission Distance
    c. Limit Number of Telephone Rings
2. Staff Conversations & Paging Resulted in Hight Disruption
    a. Select Surfaces to Limit Sound Transmission in Staff Areas
    b. Provide Private Spaces for Staff Conversation near Nursing Stations
    c. Implement Visual Indicators as a “Quiet Cue”
3. Stimuli with Shifting Contours (dispensers, doors, toilets, ice machines, etc) were found to be more disruptive than those with Continuous Contours (traffic, carts, etc.)
    a. Locate/Isolate Noisy Equipment from Patient Areas
    b. Install Quite/Low-Tech Dispensers
    c. Install Sound Mitigating Doors & Hardware
    d. Re-Evaluate keeping patient doors open, and associated staffing & patient monitoring systems




Solet, J., Evidence-Based Design Meets Evidence-Based Medicine: The Sound Sleep Study. The Center for Health Design.

"Design and Construction Mandates Related to Acoustics can be Expected to Enhance Performance…"

1. More Accurate Communication
2. Increased Speech Privacy and HIPAA Compliance
3. Lowered Staff Stress Levels
4. Decreased Medical Errors
5. Limited Patient Sleep Disruption

Solet, J., Evidence-Based Design Meets Evidence-Based Medicine: The Sound Sleep Study. The Center for Health Design.

# Primary Infection Control Concerns

1. High Touch Areas
2. Highly Durable Finishes
3. Designing Cleanable Millwork
4. Room Design for High Risk Areas

## Infection Control in the Built Environment:

### FGI Regulates

1. Infection Control Risk Assessment (ICRA)
2. Durable Finish Selections
    a. Floor, Wall, & Ceiling Materials
    b. Wall Base Materials & Heights
3. Cleanable Millwork Design
    a. Casework Materials
    b. Backsplash Heights
4. Room Design for High Risk Areas
    1. Handwash Sink Locations
    2. Hand Sanitizer Locations


### Interior Design Best Practices

1. Choosing the Best Monolithic Flooring for Your Project
2. Handwash Sink Positioning | Splash Prevention
3. Considering High Touch Surfaces
4. To Err is Human

## Infection Control in the Built Environment:

### Choosing the Best Monolithic Floor Your Project

1. Heterogeneous Sheet Vinyl Vs. Homogeneous.
2. Stain Resistance
3. Puncture Resistance
4. Point and Rolling Load Characteristics
5. Integrated Wall to Floor Transitions

### Monolithic Flooring Options

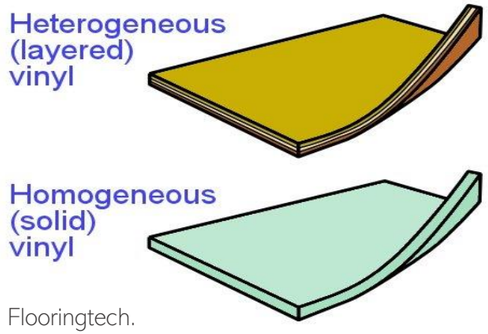
1. Epoxy
2. Sheet Vinyl
3. Terrazzo Tile- Epoxy Sealed
4. Rubber Flooring


## Infection Control in the Built Environment:

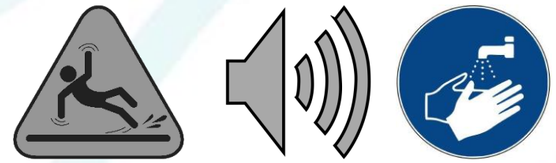
### Choosing the Best Monolithic Floor Your Project

### Monolithic Flooring Options

1. Epoxy, Sheet Vinyl


Flooringtech.com/au



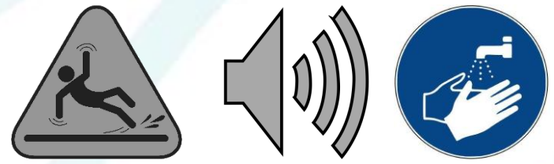
# Infection Control in the Built Environment:

## Choosing the Best Monolithic Floor Your Project

### Monolithic Flooring Options

1. Terrazzo, Tile- Epoxy Sealed, Rubber Flooring





## Infection Control in the Built Environment:

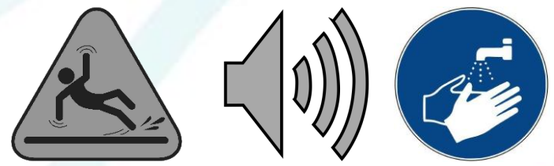
High Touch Areas

Antimicrobial & Microbial Resistant Finishes

# Do your Research!



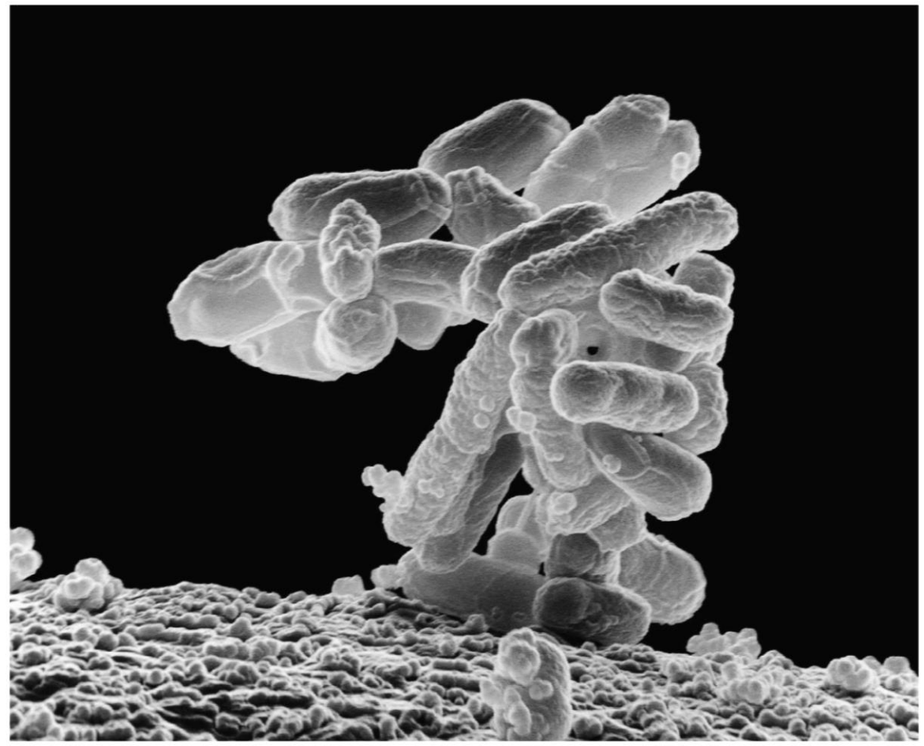




# Infection Control in High Risk Areas

## Klebsiella Oxytoca (Klebsi) ICU Outbreak Assessment

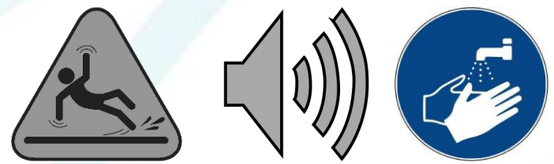
1. Surfaces Initially Tested
    a. Shared Equipment
    b. Solutions used in Bronchoscope Areas
    c. Glucometers
    d. Hand Creams
    e. Lubricating Gels
    f. Disinfectant Swabs



## The Outbreak Persisted

2. Sinks & Tap Water were Tested
    a. Disposal of Body Fluids in Handwash Sinks
    b. Sinks were Cleaned & Left Unused for 48 hours with Disinfectant Standing in Traps
    c. Month-long trials of cleaning with bleach and foaming hydrogen peroxide

## The Outbreak Persisted



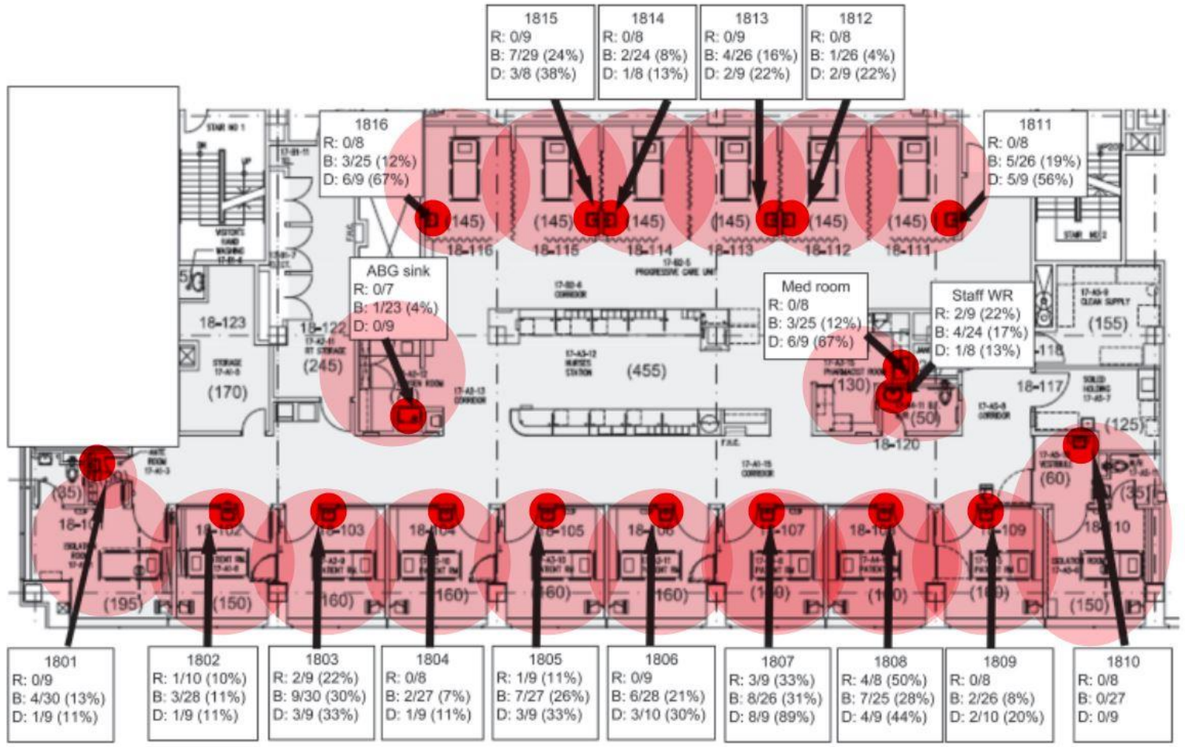
Lowe, C., Outbreak of Extended-Spectrum B-Lactamase-producing *Klebsiella oxytoca* Infections Associated with Contaminated Handwashing Sinks. The Centers for Disease Control and Prevention.

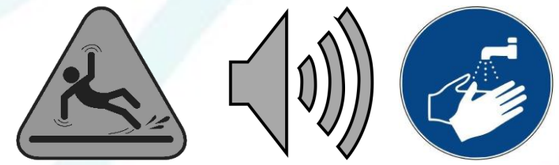
## Infection Control in High Risk Areas – Case Study

### Klebsiella Oxytoca (Klebsi) ICU Outbreak Assessment

1. Sink Culture Screens Found
    a. Rims Had the Lowest Yield
    b. Basins Had Some Yield
    c. Drains Had the Highest Yield
2. A 3x/day cleaning/disinfecting of sinks was implemented

**The Outbreak Decreased but Persisted**



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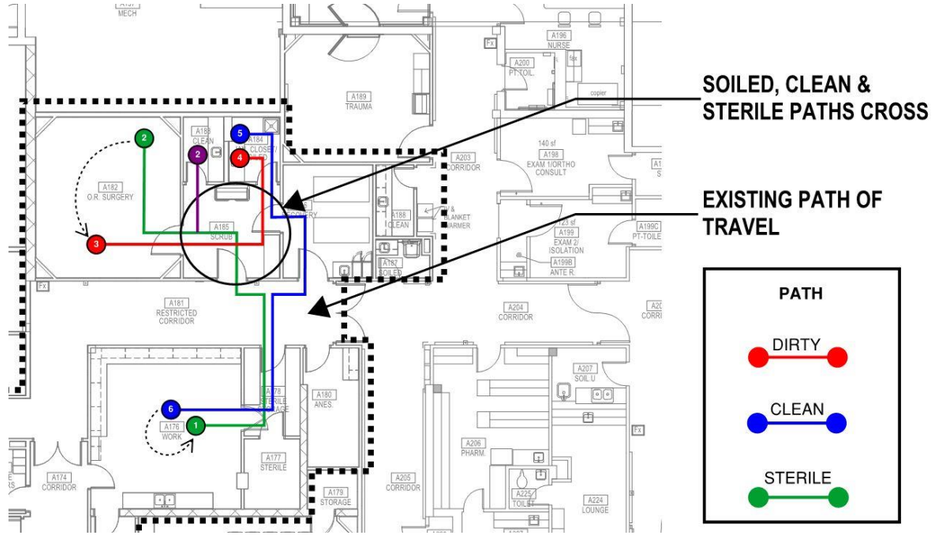
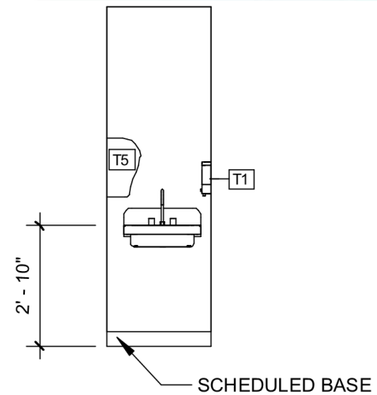
# Infection Control in High Risk Areas – Case Study

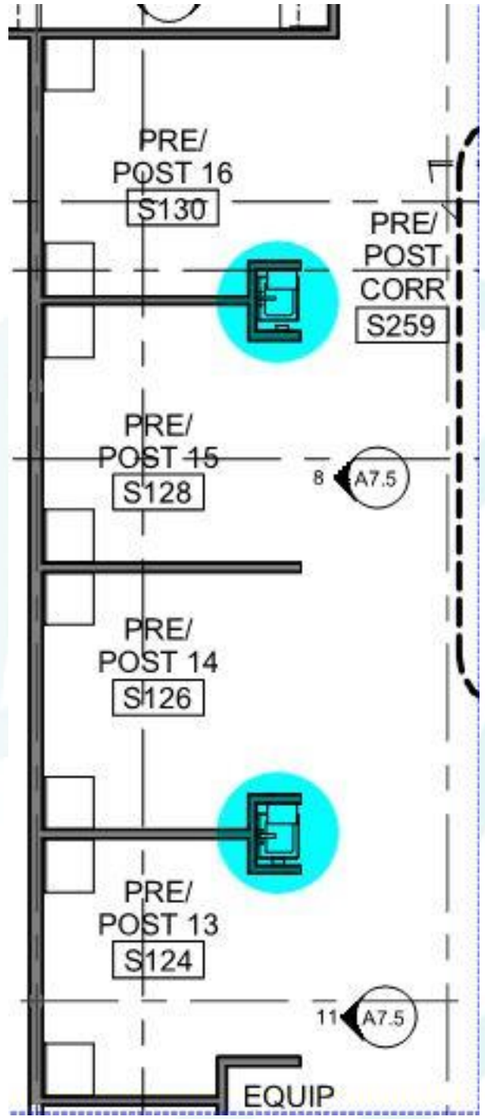
## Klebsiella Oxytoca (Klebsi) ICU Outbreak Assessment

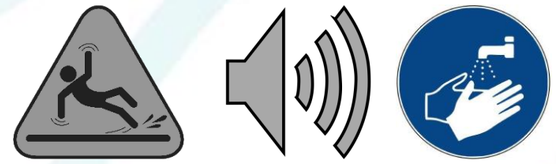
1. Study Findings
    a. Handwashing sinks may act as a reservoir for infection
    b. Person-to-person transmission may occur
    c. Increased sink cleaning reduced clinical isolates
    d. Structural & plumbing changes reduced the outbreak
    e. Biofilm formation may have been a factor in the persistence of the K. oxytoca outbreak
    f. Staff/Patient flow & access to soild/boi-hazard storage areas was a factor in the spread of infection




24 S145- SINK ALCOVE
1/4" = 1'-0"



Lowe, C., Outbreak of Extended-Spectrum B-Lactamase-producing *Klebsiella oxytoca* Infections Associated with Contaminated Handwashing Sinks. The Centers for Disease Control and Prevention.

*"Sinks should be considered potential reservoirs when clusters of infection caused by K. oxytoca are investigated."*

A multifaceted approach to infection control may include:

1. Reinforcement of infection control policies
2. Clear delineation of intended sink use
3. Intensified cleaning of sinks
4. Structural changes to sinks
5. Antimicrobial stewardship

Lowe, C., Outbreak of Extended-Spectrum B-Lactamase-producing *Klebsiella oxytoca* Infections Associated with Contaminated Handwashing Sinks. The Centers for Disease Control and Prevention.

## Infection Control in the Built Environment:

### To Err is Human

1. We All Make Mistakes!
2. Plans Systems so that it is difficult to do the WRONG thing.
    a. Direction of Staff Flow in Clean and Dirty Areas
    b. Making Handwash Sinks and Soiled Storage Convenient
    c. Separating Handwash Sinks from Available Clean Surfaces

The Institute of Medicine published "To Err Is Human: Building a Safer Health System," in 1999 which highlighted the startling statistic that 98,000 Americans were dying every year due to medical errors. Annual patient mortality due to medical errors has since risen steadily to 440,000 lives, which brings medical errors into the country's third-leading cause of death.

-healthleadersmedia.com, To Err is Human

#1 Heart Disease #2 Cancer #3 Medical Error