Managing Noise in the Patient Care Environment

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Director of Acoustic Practice
Sparling
Three Components of Managing Noise

- Design
- Staff Training
- Equipment Procurement

Operational
Who's Benefit?

Patients
• Elevated Blood Pressure
• Sleep disturbance
• Decreased oxygen saturation
• Higher Incidents of rehospitalization
• Neonatal intensive care patients have increased heart & respiration rates

Staff
• Emotional exhaustion and burnout
• Increased stress and annoyance
• Lower job satisfaction in noisy environments
• Effect on verbal communication
• Alarm fatigue due to constant ringing of alarms

Hospitals
• Patients in noisy hospitals were less satisfied with the level of care they received
• Medical Errors

Design

Training

Equipment Procurement
What?

<table>
<thead>
<tr>
<th>Noise</th>
<th>Speech Intelligibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speech Privacy</td>
<td>Sound (Music)</td>
</tr>
</tbody>
</table>
Noise

Unwanted
- Intermittent noise
- Tonal noise
- Medical equipment alarms

Wanted
- Traditional building masking noise
- Medical equipment alarms
Speech Intelligibility and Privacy

<table>
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<td>Sound (Music)</td>
<td>Privacy</td>
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</table>
Speech Privacy

1996
- HIPAA was passed by Congress

2003/2004
- WEDI-SNIP Speech Privacy definition

2007
- Interim Sound and Vibration Guideline for Hospitals and Healthcare Facilities

2010
- Facilities Guideline Institute 2010 Edition
Speech Privacy

Information Desk
Check in
Admit Area
Nurse Stations
Pharmacy
Hallways?
Others
# Sound (Music)

### How they felt before hearing the music

<table>
<thead>
<tr>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 89% of staff felt tired, busy, stressed pressured</td>
<td>Helped them relax, feel happier, more positive, more energized</td>
</tr>
<tr>
<td>• 21% patients felt down, dejected, sad, depressed</td>
<td></td>
</tr>
</tbody>
</table>

### Their impression of the hospital. The most common impressions

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<th>After</th>
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<tr>
<td>• Good hospital 16%</td>
<td>• Positive impression of the hospital 48%</td>
</tr>
<tr>
<td>• Dull or boring 10%</td>
<td>• Calmer hospital 4%</td>
</tr>
<tr>
<td>• Busy 5%</td>
<td>• Happier place 3%</td>
</tr>
</tbody>
</table>
Music

Noise
Speech Intelligibility

Speech Privacy
Sound (Music)
Design Guide

FGI Guidelines

Field Observation/Feedback

Research
Sound & Vibration Design Requirements for Hospitals & Healthcare Facilities

1. Site Noise
2. Acoustical Finishes
3. Room Noise Levels
4. Sound isolation Performance for Construction
5. Paging & calling systems, Critical Alarms, Masking Systems & Sound reinforcement
6. Building Vibration
FGI Challenges

Requirement of STC 35 between Patient Room and Hallway

- Presently is a challenge to meet with sliding glass doors (with and without bottom sweeps)
- Intent of the Guideline is being met – Speech Privacy and Noise reduction
- Working with door manufacturers on improving their doors
- Will be providing comments during the open comments period
FGI Challenges

Floor Vibration limit of 4000 micro-inches per second
Swedish Orthopedic Institute
Nurse Station

Patient Rooms

Courtesy of NBBJ
Studio 216
Norton Sound Regional Hospital
Admitting Area

sliding glass doors

sound absorption

Courtesy Mahlum Architects
Norton Sound Regional Hospital Admitting Area

Courtesy Mahlum Architects

Courtesy Mahlum Architects
After Design
Staff Training

- Understanding the Issues
- Awareness / Education
- Suggestions for Behavioral Adjustments
- Physical Changes
Understanding the Issue
Toilet Flushing

Door Closing

45 dBA - 100% of the time
50 dBA - 77% of the time
60 dBA - 7% of the time

WHO

~35 minutes (2100 seconds)
Awareness /Educational

- Purpose behind the training
- Overview of noise and noise reduction
- Identify specific events and behaviors that are causing noise
Behavioral Adjustment
Behavioral Adjustment

Noise Level Alert Systems
Help Create a Culture of Acoustic Courtesy!

- Limit idle chatter near patient rooms
- Use an office for extended conversations
- Avoid using a speakerphone in a cubicle
- Visitors use cell phones in the lobby
- Encourage your peers to shhh...

Help create a culture of acoustic courtesy.
Behavioral Adjustment
Physical Changes

Noise levels ranged between 66 dBA to 74 dBA
<table>
<thead>
<tr>
<th></th>
<th>45 dBA</th>
<th>50 dBA</th>
<th>60 dBA</th>
</tr>
</thead>
<tbody>
<tr>
<td>As is, door open</td>
<td>100%</td>
<td>77%</td>
<td>7%</td>
</tr>
<tr>
<td>With Panels, door open</td>
<td>57%</td>
<td>16%</td>
<td>2%</td>
</tr>
</tbody>
</table>
Before Remediation
# Noise Sources

<table>
<thead>
<tr>
<th>Patient Room</th>
<th>Hallway</th>
</tr>
</thead>
<tbody>
<tr>
<td>TV</td>
<td>Talking is hallways</td>
</tr>
<tr>
<td>Doors opening and closing</td>
<td>Carts</td>
</tr>
<tr>
<td>Monitors alarms</td>
<td>Footsteps</td>
</tr>
<tr>
<td>Call bells</td>
<td>Cell phones</td>
</tr>
<tr>
<td>Phone ringing</td>
<td>Cleaning</td>
</tr>
<tr>
<td>Awakened by nurses</td>
<td>Talking at nurse station</td>
</tr>
<tr>
<td>Others</td>
<td>Others</td>
</tr>
</tbody>
</table>
Ideas to Reduce Noise

- Eliminate or reduce paging except for emergencies
- Use a wireless paging device
- Limit conversations in hallways
- Nurse call and patient telemetry systems
- Nurses in soft sole shoes
- Beepers on vibrate
- Control volume on phone ringers
- Identify designated areas for cell phone conversations
- TV noise - headphones or pillow speakers
- Cart wheels...........
Carts

Rubber

Pneumatic
Medical Equipment
Equipment Alarms

- Manufacturers build alarms into their product to sound at the slightest hint of discrepancy –
  - driven by legal liability
- Burden on medical equipment manufacturer to provide options
- Technology – wireless communication devices
- Improve the signal accuracy that would typically cause and alarm to reduce nuisance alarms
- Label sounds for Patients and give them a rational for necessary sounds (this assumes the control of unnecessary sounds/alarms)
Managing Noise in Hospitals

- Design
- Staff Training
- Equipment Procurement
Questions?

Thank You!