The Noise Pollution Solution

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Purpose and Goals

Decrease noise pollution at night in the intensive care unit (ICU) in order to increase patient satisfaction.
Background

Sleep disturbances can lead to:\(^1\)
- Slower healing
- Increased pain perception
- Increased need for pain medications/sedatives
- Poorer immune response
- Delirium\(^1-2\)
Background

- Exposure to sounds at 85 decibels (dB) or greater without ear protection for 8 hours may cause hearing loss, and exposure to sounds at 112 dB for less than 1 minute also may lead to hearing loss.$^3$
- Staff working in a noisy environment are vulnerable to exhaustion, burnout, depression, and irritability.$^4$
Factors That Disrupt Sleep in an ICU

- Work routines
- Environmental factors
- Mechanical ventilation
- Use of benzodiazepines
- Frequent safety/nurse checks
Sleeping in a Noisy Environment

More than 80% of ICU nurses perceived the patient to be sleeping if:

- Patient’s eyes were closed
- Vital signs decreased
- Patient slept moderately well
- Noise predominant factor affecting sleep

\(^5\)
Sleeping in a Noisy Environment

- It takes 90 to 100 minutes to complete non-rapid eye movement and rapid eye movement cycles to reach restful states.\(^5\)
- Hospital environmental noises contribute to sleep disturbance.
- Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) scores were low (July 2012 to January 2013): 0% to 66.67%.\(^6\)
Activities and Key Dates

- July 24, 2013, and July 25, 2013
  - Introduce AACN CSI Academy team members and brief introduction to project
- July 29, 2013
  - Pretest
  - In-service
  - Posttest
- August 5, 2013
  - Kickoff
- February 2, 2014, and February 11, 2014
  - In-service
Short-Term Goals

Staff Buy-In

- Collect baseline data
  - dB levels
  - Nursing assessment
- Educate nursing and ancillary staff at in-service (50% attendance)
Intermediate Goals

Establish champions for each ancillary department
- Respiratory Therapy
- Environmental Services
- Dietary
- Clinical Assistants
- Nurses
- Physicians
Long-Term Goals

- Increase HCAHPS scores, specifically Hospital Environment/Quiet (currently 0% to 66.67%) to 78.21% by May 2014
- Increase patient loyalty scores to consistently stay higher than 80
- Decrease length of stay (LOS)
Action Plan

- Planned and developed educational in-service
- Collected baseline sound meter data in the ICU
- Recruited ancillary department champions
- Surveyed staff’s knowledge
- Placed door signs
- Slowed door hydraulics to prevent door slamming
Action Plan

Purchased sleep-promoting devices
- Earplugs
- Eye masks
- White noise machines
- Fans
- Compact disc players
Sustainability

- Re-education targeting day shift
- Interpersonal relationships
- Follow-up with champions
- Team handoff from shift to shift
Sustainability

- Equipment tracking
- Query inventory
- Restock eye masks, earplugs, and plan of care stickers
Sustainability

Positive Reinforcement

- Peer coaching
- Prize incentives
  - Badge pulls
  - Buttons
  - Cookies
  - K-cups
  - Candy
  - Sharpies
  - Gift cards
  - Reusable bags
Project Tools

 In-service poster board
 Noise levels for everyday sounds
 Plan of care sticker
 Pretest/posttest
 In-service handout
 ICU pamphlet
 Door signs: “Shhhh ... healing in progress”
<table>
<thead>
<tr>
<th>Problem, keyword, and outcome</th>
<th>Plan</th>
<th>Plan of care prioritized/reprioritized</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>KEY WORD:</strong></td>
<td>Teach patient to communicate with staff</td>
<td>H M L Date Time Initials</td>
</tr>
<tr>
<td>Sleep Deprivation</td>
<td>If staff if noise is a problem.</td>
<td>δ δ δ ___ ___ ___</td>
</tr>
<tr>
<td><strong>PROBLEM:</strong></td>
<td>Teach patient verbally or by pamphlet about</td>
<td>δ δ δ ___ ___ ___</td>
</tr>
<tr>
<td>ICU environmental noise keeping</td>
<td>Noise reduction interventions available (fans, CD,</td>
<td>δ δ δ ___ ___ ___</td>
</tr>
<tr>
<td>patient from quality restful sleep</td>
<td>players, earplugs, white noise maker).</td>
<td></td>
</tr>
<tr>
<td><strong>OUTCOME:</strong> patient will achieve</td>
<td>Educate patient about the facts about a more</td>
<td>Problem resolved (choose one):</td>
</tr>
<tr>
<td>quality restful sleep</td>
<td>Quiet, calm environment promotes healing and adds to pain reduction</td>
<td>δ during stay δ on discharge OR</td>
</tr>
<tr>
<td></td>
<td>Date Time Initials</td>
<td>δ Handed off to next provider of care</td>
</tr>
</tbody>
</table>
Shhh...healing in progress
Information Dissemination

- E-mail
  - Instructions on how to find equipment
- Prize winners included in managers’ weekly updates
- Included in new staff orientation
Results

SMCW ICU noises

Thresholds
- 40 dB: WHO Level
- 62 dB: ICU Empty Room
- 85 dB: Hearing Loss Occurs
Results

Kickoff

- Staff attendance (53%) and champions (80%)
- Ancillary staff in attendance
  - Respiratory Therapy
  - Physicians
  - Environmental Services
  - Clinical Assistants
- Increase in staff knowledge by approximately 68%
Comparison Pre and Post Intervention Sound Level Overnight

Times
- PM report times
- 8:00 PM
- 12:00 AM
- 2:00 AM
- 4:00 AM
- AM report times

Pre intervention
Post intervention

 decibel level (db)
Use of Sleep Deprivation Plan of Care

% of compliance per 10 charts audited

Months charts were reviewed
Use of Sleep Deprivation in COMPASS Charting

% of compliance per 10 charts audited

Months charts were reviewed

January | February | March | April | May | June
Metrics related to ICU Quiet Scores

Patient Loyalty Score goal = 80
HCAHPS goal = 78.21

LOS goal decrease from 6.2 day
Results

Post-Project Evaluation

- 93% of staff thought the education was helpful.
- 65% experienced positive outcomes for patients.
- 75% will continue to use the plan of care.
Testimonials

Staff Statements

▪ “Teaching about noise pollution and sleep deprivation was very helpful (good job, Soumaly and Lisa). Now it is part of her assessment for every patient (was not before), and she utilizes the noise machine, earplugs, eye masks, etc.”

- Comment from nursing supervisor as a result of associate rounding
Testimonials

“Ever since your in-service, I have been more aware of how the noise affects my patient’s sleep. I didn’t even think about it before. I now think about it in my assessment and do it in my charting. Thank you so much for letting me know.”

“Kudos to this team and to all of you for making this work. I interviewed a patient today. I asked him if he was getting enough sleep. He informed me that 2 nights ago, he was given earplugs and a fan, and that it has helped him sleep! AWESOME JOB.”
Testimonials

Patient Statements

- “I wasn’t sleeping well, because of the noise and light. Ever since I got earplugs and an eye mask I have slept a lot better. Thank you so much for offering them to me.”
- “This is the quietest ICU I have ever been in, and I took care of my dad in another place.”
Fiscal Outcomes

- Unable to show correlation between interventions and survey scores due to low number of patients surveyed
- Other factors may have contributed to low scores and increased LOS
- A challenging topic to correlate to fiscal benefits
Potential Savings

- The HCAHPS change from 66.67% to 78.21% metrics could mean $3000/year in improved financials.\(^5\)
- Average LOS from 6.21 days (July 2012-March 2013)
- Average cost per patient day from October 2013 to December 2013 was $963.03.
- If we decrease LOS by 0.5 day, savings will be $175,752.98 per year.
Key Challenges

- Change in project topic
- Change in teammates
- System-wide changes
- New staff
- Losing inventory and having to replenish
- Equipment left with patients who transferred to different floor
Key Challenges

- Motivation
  - Team members motivated each other

- Meetings
  - Large number wanted to attend
  - Narrow time frame in which to attend
  - Some team members unable to attend meetings

- Time
  - Scheduling conflicts
Obstacles

- Difficult to reflect impact on HCAHPS and LOS
  - Low denominator
- Access to grant money
- New noises
  - Computer battery alarms = 73
  - Chair alarms = 90 dB
Positive Outcomes

- Overwhelming interdepartmental support
  - Environmental services
  - Respiratory therapy
  - Clinical assistants
  - Physicians
- Medical/surgical unit adopting portions of project
- Patient loyalty scores consistently at goal
Special Thanks

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- David Garza, RT Manager
- Linda Sulla, RT
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References

Study data were collected and managed using REDCap (Research Electronic Data Capture) tools hosted at Beth Israel Deaconess Medical Center, Boston, Massachusetts.  

REDCap is a secure, Web-based application designed to support data capture for research studies, providing 1) an intuitive interface for validated data entry; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages; and 4) procedures for importing data from external sources.