Evaluation of a Behavioral Intervention to Reduce Noise in a Medical Intensive Care Unit

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Background

Exposure to noise in medical intensive care units (MICUs) can disrupt patient sleep and delay recovery.

World Health Organization (WHO) recommendations:

< 35 A-weighted decibels (dBA) during the day

< 30 dBA during the night

There are many sources of noise in MICUs including monitor alarms, intercoms, conversations and televisions.

Hospital noise exceeds WHO recommendations. Studies report noise levels are consistently above 45-50 dBA.

Objectives

1) To evaluate the effectiveness of a behavioral intervention to reduce noise exposure in patient rooms of a MICU.

2) To evaluate the determinants of those noise exposures.

Methods

Selected 8 patient rooms (2 rooms in each of 4 pods; one nearest and one farthest from nurses' stations)

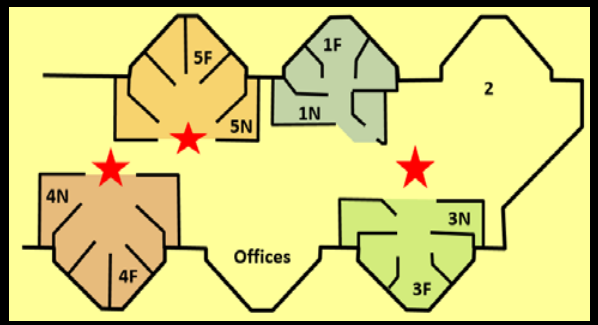
Measured one-minute noise with sound level meters (dBA, slow response) near head of patient for 24 hours over:

8 weeks - PRE intervention

6 weeks - behavioral intervention with one-on-one training of nurses and display of posters to educate MICU staff on adverse health effects of noise and ways to reduce noise in daily activities

8 weeks POST intervention

MICU layout with sampled rooms shown as near (N) or far (F), nurses' stations are identified by red stars

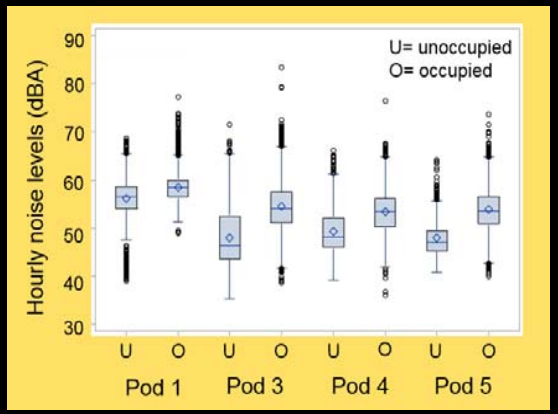


Results

Hourly noise levels (dBA) by intervention phase

	Day (goal: < 55 dBA)		Night (goal: < 50 dBA)	
Quantile	PRE (n=7446)	POST (n=8673)	PRE (n=3661)	POST (n=4315)
5%	46.3	45.7	43.9	42.8
50%	55.2	55.0	52.6	52.4
95%	63.0	62.2	60.2	60.2

Hourly noise levels (dBA) by pod and occupancy

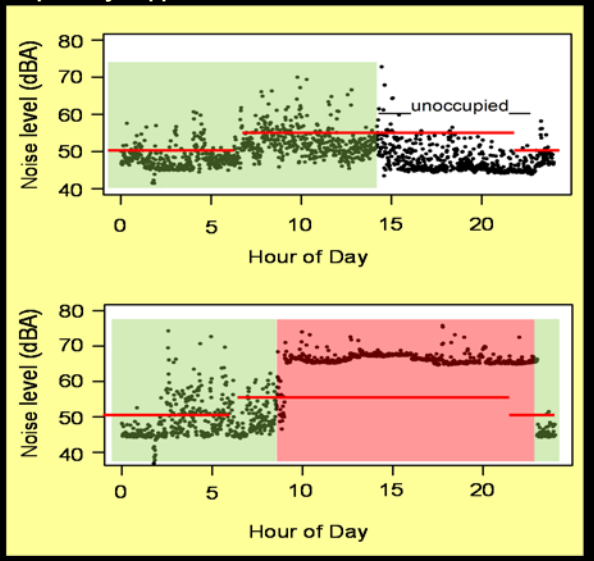


Noise in Pod 1 unoccupied rooms higher than occupied rooms in all other pods.

Pod 1 has oldest HVAC system of all the pods.

Results, *continued*

One-minute noise measurements over full days with respiratory support devices in use



Days identified as having >10 hours of noise >60 dBA were flagged.

The same room, one day prior to the flagged day, was used as a comparison.

Respiratory support devices included oxygen delivery systems such as face mask, nasal cannula (NC), CPAP, and BiPAP with flow rates ranging from 1 LPM to 40 LPM.

High-flow devices (≥10LPM) are shown in red. Low-flow (<10 LPM) are shown in green. Red lines indicate study goals for noise levels (<50 dBA 11pm-7am; <55 dBA 7am-7pm).

Conclusions

Behavioral intervention ineffective

HVAC system and high-flow respiratory support devices identified as main determinants

Future Research

Fully characterize noise from high-flow respiratory devices

Design controls for high-flow respiratory devices

Address noise from HVAC system

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