PHILIPS

Clinical Services

Make alarms meaningful
Clean up noise pollution

Can a culture of quiet mean a culture of safety? A constant onslaught of sounds and alerts have proven to be increasingly relevant for patients, their families and for staff.

Hospitals are getting **louder**

The amount of noise in hospitals has been steadily rising for the last 30 years.[1] In 1960, average daytime hospital sound levels were 57 decibels. Today, they are 72 decibels, while average nighttime levels have jumped from 42 to 60.

The WHO recommends 35 decibels as a top sound level for patient rooms, but in a Mayo Clinic study, some hospitals were found to have noise over 100 decibels at night—as loud as a chainsaw.[2]

Furthermore, to compete with other alarms and background noise, many hospital units increase the volume on patient monitors so they can be heard. This can be self-defeating: The decibel level on many units is loud enough to drown out any new alert, which can lead to missed or delayed reactions to an actionable situation. High levels of sound have negative physical and psychological effects on patients, disrupting sleep, increasing stress and decreasing patients' confidence in the competence of their clinical caregivers.[2]

The consequences of excess noise

Sound affects: the impact on patients

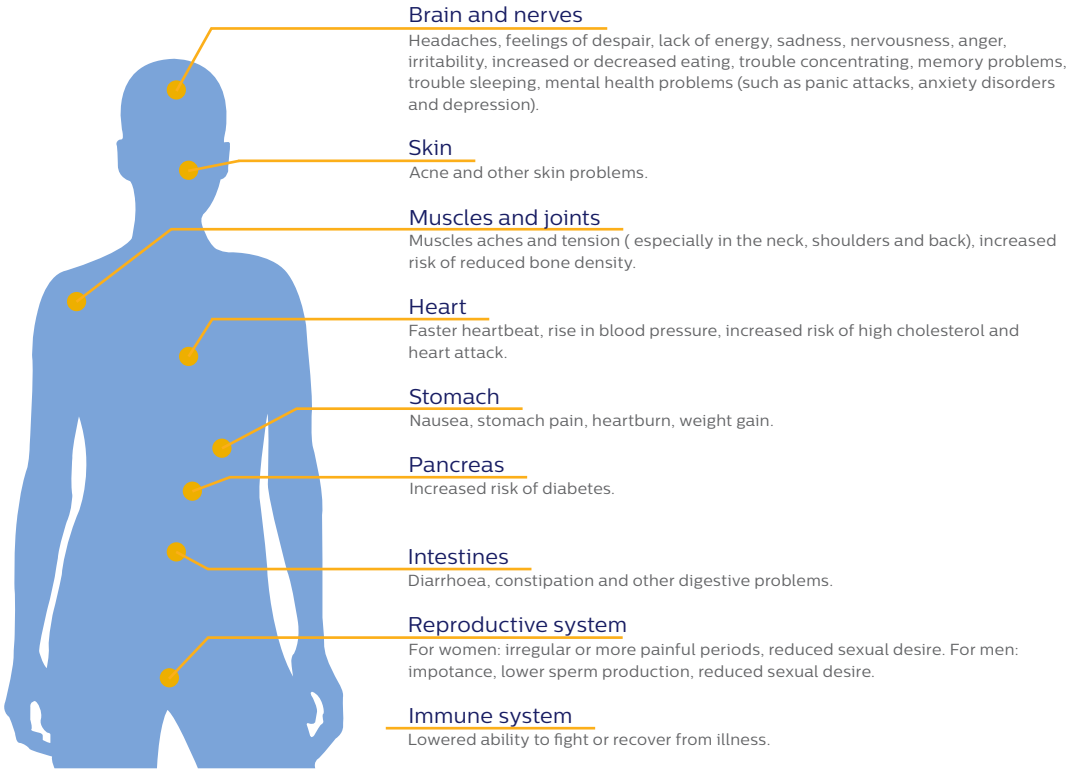
High noise levels negatively affect patient outcomes. An article in the Journal of Biomedical Informatics notes that noise interrupts patients' sleep, leading to sleep deprivation and a depressed immune system.[3]

A high-noise care environment can cause:

- Altered blood pressure and heart rates.[4]
- Negative effects on the immune system.[3]
- Slower healing and increased length of stay.[3]
- Lower patient satisfaction.[5]
- Delirium.

A 2012 study also found that reductions in noise in ICUs had positive effects on patient outcomes.[5] Patients had better oxygen saturation, blood pressure, heart rate and overall satisfaction. Noise pollution increases patients' stress, interrupts sleep and delays recovery.[6]

Action item: improvements to the sound environment have been shown to improve patient sleep[13] and decrease incidence of re-hospitalization



Sound affects: the impact on staff

Alarm signals can contribute substantially to environmental noise in critical care units, to the degree that nurses in these units have reported headaches and burnout.[7]

A 2016 study found that burnout in ICU nurses is associated with reduced quality of care, lower patient satisfaction, increased number of medical errors, higher rates of health care associated infections and higher 30-day patient mortality rates.[8]

According to the AAMI,[9] a high-noise care environment can:

- Increase occupational stress (irritation, fatigue, and tension headaches).
- Reduce staff work performance (quality of work, concentration, vigilance), work satisfaction and health outcomes.
- Delay recognition of and response to medical device alarm signals, which affects patient safety.
- Affect oral communication and increase errors, which has a direct impact on patient safety.

Action item: less noisy work environments can reduce burnout, stress symptoms, hearing damage and combat decreased mental efficiency and short-term memory.

Sound affects: the impact on hospitals[14]

For a hospital, poor alarm management has both direct and indirect consequences. Clinicians often prioritize workflow over unreliable alarms, which can result in missed tasks and reduced productivity. In a 2012 study,[10] 70% of nurses indicated they would choose to not respond to alarm signals in order to not interrupt workflow.

When nurses respond to an alarm, it requires attention and specific actions, even if the alarm's cause is non-actionable.

Lost nursing time is expensive. It's estimated that nurses spend an average of 10% of their total working day on responding to alarms that are not clinically relevant.[11] By extension, ~10% of all spending on nursing salaries, training and benefits is consumed by non-actionable alarms.

Nurse burnout is expensive. While burnout can result from many causes, the result is the same: incurred costs from recruiting and training. In the UK, the NHS spends GBP £600-700K per month on agency staff, and the cost to recruit 12 international nurses is GBP £76K.[12]

A high-noise environment may cause:

- Litigation.
- Unreimbursed care costs resulting from adverse events.
- Unanticipated transfers to the ICU and delayed recoveries.
- Extended overall length of stay.

Action item: improvements to the sound environment correlate with improvements in staffs' psychosocial environment and staff member perceptions of noise.

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