Hospital Noise and the Patient Experience:

Seven Ways to Create and Maintain a Quieter Environment

Abstract

Current hospital environments remain characterized by auditory clutter: technologies, larger patient/visitor populations, and physical spaces that are, themselves, noisy. This white paper provides an overview of noise-related risks and outcomes and outlines seven improvement strategies from case studies that have resulted in improved patient outcomes by reducing the negative impact of noise.

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Where we begin…

Florence Nightingale, in her seminal work, *Notes on Nursing*, wrote, "Necessary noise is that which damages the patient." Pushing the issue further still, she added, "Unnecessary noise is the cruelest absence of care." (Nightingale, 1859). As confronting as her words were at the time, they summarize the findings of empirical research that would come over 150 years later.

While there may be a case regarding mid-19th century auditory standards being unrealistic in a 21st century world of highly advanced institutional care, if she were here, Nightingale would most likely be even more emphatic. She may well have confirmed that, even with these considerations, the impact on patients has not nor will ever change. She would have been unrelenting in her lack of tolerance for noise or any other environmental stressor so obviously hostile to the recovery process. Furthermore, if she were here today, she might pointedly ask why noise has become the norm for patient care while quiet remains the exception.

Your Hospital: Can you hear the healing?

Assuming your hospital's nurses are of the highest competence and your physicians' skills are without dispute, that your organization is efficient and effective, that your technologies are the best and newest, and, further, that each capital campaign reaches for exemplary architecture and interior design, the question remains: How does the hospital sound? Ask yourself if these same high standards are reflected in the sounds that resonate throughout your rooms and corridors and in the words heard and overheard by suffering patients and frightened families. Are the highest standards of caring *heard* as well as *seen*? Declaring a commitment to provide exemplary care has yet to guarantee that all facets of the patient experience are optimal.

In a 2008 study of noise on the intensive care unit, patients were disturbed and distracted mainly due to noise from the nurses' station, visitors, and other non-clinically relevant events. (Akansel N, 2008) In another study that looked at obstacles to nurses' providing the best care, noise was listed among other environmental stressors. (Gurses & Carayon, 2009) The fact is that noise is damaging and hospital noise that serves no purpose, whether the result of people or technology, is, at the least, uncaring and without regard to the patient whose suffering and discomfort is worsened. At the worst, hospital noise is an added risk factor for your patients and staff.

One-size fits anyone?

By the very nature of institutional care, hospitals are designed to be "one-size-fits-any-and-all" kinds of places. As a result, the clinical character of a healthcare facility can feel generic and impersonal. Nonetheless, while the hospital is most commonly thought to be about beds, walls, windows, floors, ceilings, and technology, it is also about people, clutter, and noise. In fact, according to patient satisfaction surveys, the quality of the healthcare experience is often evaluated according to the hospital's dynamic environment, those circumstantial and changeable components that are caused and impacted by people, change throughout the day, and are within the control of the staff.

Whether inadvertent, unavoidable, or accidental, noise is one of the most invasive aspects of the hospital environment. (Joseph, 2006) The sounds of suffering and trauma, of machines and technologies, that are overheard through thin walls and curtains, become the context in which patients and their families undergo their own healthcare experiences. Press-Ganey has found that patients complain about noise two times more often than about anything else in a hospital, including the food. (Fick and Vance, 2000)

Acuity vs. Capacity

When patients' acuity is high, their adaptive capacity is low, resulting in heightened sensitivity to many kinds of environmental stressors. Far from benign, erratic sounds that create apprehension and can contribute to the need for restraints, requested pain medication, and nursing assistance calls. The negative effects of noise "may arise as a direct consequence of exposure to noise or may be mediated by reactions to noise such as annoyance and dissatisfaction…The evidence suggests that negative subjective reactions to noise predict health outcomes over and above the prediction available from noise exposure itself." (Job, 1996)

Both casual and confidential conversations between and among patients, staff, and visitors, as well as the sounds of slammed doors, carts that are in need of repair, phones, beepers, buzzers, and paging…make up the "sound environment." Here is where stress, competence, caring, compassion, and concern are qualitatively demonstrated. Therefore, leaving the sound environment to chance—or allowing it to be a random consequence of institutional care—places at risk the outcomes that help determine the quality of healthcare. Further, the higher the level of acuity, accuracy of perception declines and with it, cognition. (Schneider, 2000, pp. 156-157) This speaks to the ineffectiveness of assuming that patients understand what they are hearing and why, basically hoping to mitigate institutional practices and interpret sounds that are annoying or distracting to them through comprehension.

Whether by accident or incident, the accumulation of noise, gossip, and unwanted distraction adds up to stress, anxiety, and, in total, an unacceptable, unsatisfying, and risk-laden health experience. So, how can the auditory environment of hospitals be improved, specifically at the bedside? The following steps are a good starting point and serve as an on-going strategy for maintenance.

1. Get Everyone Involved: Establish a sound quality committee

The sound environment is uniquely expansive, including not only the sounds at the bedside, but also sound from outside the patient room. Because nurses are performing duties, both inside and outside of the patient rooms, they are in the best position to assess the circumstances surrounding the patient and family. Establishing a multi-disciplinary Sound Quality Committee driven by nursing and including representation from the facility management staff, housekeepers, volunteers, administration, and ancillary staff, effectively spreads the accountability for the sound environment of the facility to those who have direct contact with patients. Physicians should also be included despite the fact that they spend the least time with the patient.

The challenge with teaching hospitals, however, centers during Grand Rounds. Tribes of physicians and residents move through the halls and patient rooms with little regard to the auditory impact they have on the environment. The benefit for physicians, nonetheless, is felt directly with better patient outcomes.

Patients who would otherwise be sleep deprived, agitated, or confused fare far better in an environment that is directly supportive of their needs over the full 24-hour day in ways beyond medication and evaluation. Therefore, including representation from the physicians and residents will draw them into the fold more than might be anticipated.

Not to leave out facilities management and as a critical update to comprehensive protocols regarding hospital noise, as of January, 2010, the Facilities Guideline Institute (FGI) ratified and published new acoustic standards for HIPAA compliance that are relevant in considering not only noise standards, but also speech privacy. New editions of FGI Guidelines & LEED HC culminated 10 years of work on HIPAA 'oral communications' policy—criteria included in the new national guidelines for noise, sound, and vibration. These new standards and mandates bring further weight to the critical nature of not only hospital noise, but finally links the issue to operations and regulatory compliance standards. (Note: To download *Sound & Vibration 2.0* (the reference standard), visit the Acoustics Research Council website.)

While the standards deal specifically with the physical plant, the outcome is based on the interface between the built environment and those who live, work, and heal within in.

2. Assess the Sound Environment: How noisy is it?

Once established, the committee should determine a protocol for initial assessment of the sound environment. Including details regarding the sources of noise and contributing factor is critical to the committee's work.

The Sound Quality Committee at Northside Hospital in Atlanta, Georgia, decided that the best way to measure how "loud was loud" was to use digital decibel meters to measure the sound levels in specific areas of the hospital at different times of day. All in all, they measured the decibel levels of 238 pieces of equipment, including their complete fleet of 59 heavy rolling carts.

The long and diverse list of small and large equipment included doors, cabinets, monitors, floors, communication devices, chairs, ice machines, overhead paging, and anything that significantly contributed to the complex orchestration of the sounds impacting patients and staff. Equipment noises were measured at distances relative to the listener.

The investigators grouped sound levels according to dB ratings, indicating the time of day at which they occurred and distance from the sound source. For instance, at 1 p.m., they found the pneumatic tube and paging system rated at over 80 db (and often increased past 90dB, equivalent to the volume of a hair dryer next to our ears). In the afternoon, they found monitors, the nurses' station, food carts, groups of five people with pagers, and other typical scenarios to vary between 70-79 dB. Late in the evening, after 9 p.m., they found that printers, elevator buzzers, trash carts rolling at high speed, and the ice machine were louder still.

In addition to looking at the quantitative measure of sounds, they looked at the perception of noise by patients and families. Specifically, they reviewed their patient satisfaction scores relating to noise to get a baseline of patient experience.

Other factors that should be looked at include functional noise levels of all mobile equipment, door-closures, paging system volume levels (both frequency of use and intelligibility), medical monitors, and other technological sound sources. Include speech privacy to your criteria. Listen to what you are hearing and decide whether it is appropriate. You are listening for audibility, intelligibility, and appropriateness.

3. Establish Sound Standards

After the data has been collected, the Sound Quality Committee should establish qualitative sound standards that can be measured and maintained. These should not be one-size-fits-all. Rather, each specific unit should have its own auditory pacing and definition of homeostasis, when the unit is at an appropriate sound level.

Sound levels vary, with the "noise floor" being the level of continuous sound that characterizes an area at any given time. Other sounds, to be perceived, must rise above this "floor." If a sound increases to 30dB above the noise floor, it can cause a "startle response." However, if the sound level is too quiet, conversations and unavoidable sounds become distractions. Therefore, when goals are set, both the optimum continuous volume level (recommended average at 50dB) and the maximum level for incidental sounds must be taken into account.

Enhancing the sound environment with music is a viable option if used appropriately. As shown in other industries, foreground music can mask other irrelevant sounds and maintain an appropriate noise floor. In hospital settings, music combined with images of nature has been shown to reduce the amount of requested pain medication and/or improve its analgesic effect. In addition, when used appropriately, music acts as an effective audio-anxiolytic, improving restfulness and the quality of sleep, and inducing relaxation.

A great alternative to hospital television is offering relaxation programming for use by patients and staff. When considering this type of programming select a product with music and imagery that crosses the age, gender, and cultural boundaries. Distinct musical content used to create night and day programming is also a plus, as well as a 24-hour minimum of non-repetitious play.

The leading product on the market today is The C.A.R.E. Channel. This highly effective therapeutic tool combines music with nature images and contributes to improved satisfaction and patient outcomes.

Custom-distributed sound systems designed to optimize the experience for the patient, the quality of music, and personalize the listening parameters, can also be installed. Henry Ford Hospital in Detroit, Michigan, St. Charles Medical Center in Bend, Oregon, Oconomowoc Cancer Center in Oconomowoc, Wisconsin, and Sacred Heart Center of Eugene, Oregon, have invested in such systems to provide music in alignment with their mission of healing. These systems are parallel to, but distinct from, their emergency paging systems; are of higher quality; offer full-frequency; and are acoustically designed to support listening over many hours. They bring comforting "intention" into otherwise impersonal corridors.

4. Establish Equipment Maintenance & Purchasing Standards

Once standards or goals have been set, recommendations should be made for modifying equipment, changing staff practices, and altering purchasing policies. In addition, repair and maintenance policies should be reviewed to respond to a higher quality of functionality that includes quieter operation. Though not currently standard, developing an auditory impact specification for each piece of equipment will provide a measurable means of managing noise generating. This should include expected sound levels to the user and to the patient. This may involve setting comparative goals that respond to the known decibel levels of equipment, clinical areas, and times of day. A level of acceptability, i.e., one at which the equipment has only a benign impact on the environment, should be determined. This new specification should be listed on all RFP's.

Much of the noise caused by the auditory predators in the hospital environment can be significantly reduced by mechanical adjustments, maintenance, or purchasing new equipment where possible. The auditory impact of equipment can be reduced by changing wheels, applying padding, repairing or replacing door bumpers, using thicker carpeting, and installing effective acoustic ceiling tiles.

Purchasing new equipment based not only on function and price but also on this new auditory impact specification is another possible approach. Biomedical engineering departments that evaluate all patient care equipment prior to its use should test for its auditory impact, as well as for safety and operation. For maintenance equipment, such as floor buffers and vacuum cleaners, decibels should be measured and their operation schedules coordinated with the nursing staff to ensure that the auditory disturbance to patients is minimized.

5. Be the Patient Advocate: Make decisions about patient-appropriate equipment

For patients who need them, checking and adjusting monitors to avoid unnecessary alarms will undoubtedly reduce unnecessary noise exposure and distraction. Similarly, evaluating the patient's capacity to manage auditory stimuli will help improve the environment. Judiciously using barriers, such as doors and curtains, to provide both visual and auditory protection will begin the process of controlling sounds that resonate from one area to another.

At Northside Hospital (Atlanta), for example, the sonorous sound of the pneumatic tube system (an old and still functional technology) caused alarm to nearby ICU patients. The decibel level was brought down to 50dB (over 400% quieter) by the careful use of padding. And of course, any kind of padding or acoustic material used must conform to fire and infection control regulations.

6. Educate Staff: Model sound-sensitive behavior

Staff education, as well new employee orientation, should establish accountability for maintaining an appropriate sound environment. This does not mean policing the staff. Rather, it means that patients are at risk in a noisy environment and staff is at risk of errors…and the list continues. This is not optional; this needs to be moved up the ladder of priorities.

While mandating staff behavior has long been known to be the least effective method of managing noise, behavioral standards should nevertheless be modeled and extended organizationally. This includes standards governing private or confidential discussions that take place in public areas; use and methods of paging; and use of cell phones, nurse call systems, and the telephone. At the same time that standards are introduced, empower all of your staff members to contribute to the information and needs basis of this committee. Provide a means for them to contact you with issues they find compelling and acknowledge receipt of their suggestions. Pro-active participation among your staff is critical for long-term success. You may want to set up a separate email address for the committee such as soundcommittee@yourhospital.org. This can be forwarded to the head of the committee without naming anyone.

Concord Hospital (Concord, New Hampshire) produced an effective educational video that demonstrated the best and worst behavioral examples regarding noise, conversations, and the use of pagers, beepers and, cell phones. Without a doubt, seeing and hearing from the standpoint of the patient is an effective teaching tool.

There are also kinder, gentler methods to give the message to visitors. Longmont Hospital in Longmont, Colorado greets staff and visitors with a picture of a child in a colorful nursing uniform holding one finger to her lips and saying "Shhh!" Northside Hospital created signs and buttons saying "Quiet Please: Healing in Progress," reinforcing the awareness that a hospital needs first and foremost to be a place of recovery.

7. Measure Results

The process of measuring results is similar to that of the initial assessment. However, here patient and staff outcomes should be considered: quality of patient sleep and staff stress, for example, should be included in reviewing the effectiveness of steps taken. Use both quantitative and qualitative measures—decibel levels, patient satisfaction surveys, amount of pain and sleep medication needed—and make a comparative analysis to determine how far you have come and which aspects of the sound environment have yet to reach the established goals. Some survey organizations offer customized questionnaires that specifically focus on the environment of care. Noise, however, is dealt with in an overall question, not specific to its impact, which is comprehensive. Before and after baseline data is the most helpful.

In measuring your results don't ignore speech privacy as a direct outcome of the sound environment. Providing a balanced sound environment means one that is either too noisy or too quiet. Speech privacy is obviously an outcome of a good sound environment and best practices.

After two years of diligent work, Northside Hospital improved its patient satisfaction levels on noise by 10%. The Sound Quality Committee has been discharged and noise control responsibility has been turned over to the individual department heads, holding them accountable for sustaining a therapeutic sound environment, including all of its various components.

Conclusion

When Florence Nightingale took on the task of defining nursing, she had little technology to manage or depend on. Rather, it was the environment, the "sick room", that was the most effective protocol and provided both challenges and solutions to patient morbidity and mortality. Today, we can add nursing and medical errors to the list of risks posed by a noise-laden environment. Sound-alike drugs become almost indistinguishable when amassed with auditory clutter.

The auditory environment must exemplify the highest and most compassionate standards of patient care. Setting sound standards for equipment, technology, and design makes it possible for a patient to move through the healthcare system, from department to department, and experience the same standards of care.

Nursing excellence addresses the whole patient, the medically mandated care and the patient experience. Aim for more than auditory neutrality as the myth of "do no harm" when it comes to noise and distraction, by providing music and nature, fountains, or other pleasant sound sources that can improve the quality of the healthcare experience. Go back to your own hospital and listen. What you hear should reflect the same values and standards as the clinical care you provide.

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