Nursing, Noise, and Norms:
Why Nightingale is Still Right

By Susan E. Mazer, MA
President & CEO
Healing HealthCare Systems

Abstract

While Florence Nightingale identified noise as a risk factor over 150 years ago, current hospital environments remain characterized by auditory clutter: technologies, larger patient/visitor populations, and physical spaces that are, themselves, noisy. While nurses are neither the sole cause of unacceptable noise, Nightingale established as a primary task of nursing, that the control over patient environment, the "sick room," is within the domain of nurse control. 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.

HEALING HEALTHCARE SYSTEMS™

Nursing, Noise, and Norms: Why Nightingale is Still Right

By Susan E. Mazer, MA
President and CEO
Healing HealthCare System

Florence Nightingale, in her seminal work, *Notes on Nursing*, wrote "Necessary noise is that which damages the patient… Unnecessary noise is the cruelest absence of care." (Nightingale, 1859). There is a case that could be made regarding mid-19th century auditory standards being unrealistic in a world of technologies, highly advanced institutional care, and explosive patient populations. However, if she were here, Nightingale would most likely be even more emphatic, confirming that, even with these considerations, the impact on patients has not nor will ever change: Noise that creates expectation and anxiety remains hostile to the recovery process. Further, her response might question why noise has become the norm for patient care and quiet, the exception.

Assuming your hospital nurses are of the highest competence and your physicians' skills are without dispute, that your organization is efficient and effective, your technologies are the best and newest, and, further, each capital campaign reaches for exemplary architecture and interior design…the question remains as to how the hospital sounds. Ask yourself if these same high standards are reflected in the sounds that resonate throughout the rooms and corridors, 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 providing the highest standard of patient care has yet to guarantee that all facets of the patient experience is optimal.

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 and that are under 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, 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)

To the unknowing patient and family, what they *overhear* becomes an indicator of "relational temperature" of the organization. Most people compartmentalize information: what matters most is directed at or to them versus what becomes significant because it is not directed to them but, rather, provides key data for making sense out of what is going on. This includes conversations that are audible, as well as, confidential interactions that tell a truth under the assumption of privacy. The shield is penetrated by covert action: just by paying attention. The sounds of machines, of other voices and activities seem to be occurring without regard to who is impacted, tell another story about consideration extended from organization to the patient, from those "who work" to "those who are sick."

When All things are NOT Equal

In her often pithy, unforgiving manner, Nightingale outlines the justified imbalance between patients and those that care for them. She has little sympathy for the nurse who complains about patients having a poor attitude, being rude or otherwise disagreeable. Rather, she puts the burden on the nurse to accept, if not understand, that the patient is confined and suffering while the nurse moves in and out of the room at will. The relationship of the hospital staff, nursing and all others who interact with the patient, is hardly equal. The "sick room," is not only the place where patients reside, but it is also where they are con-

fined, 'imprisoned' by their diagnosis and the treatments themselves.

Acuity vs. Capacity

When patients' acuity is high, their adaptive capacity is low, resulting in a greater sensitivity to many kinds of environmental stressors. Far from benign, erratic sounds that create apprehension and expectation contribute to the need for restraints, requested pain medication, and nursing assistant 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 the outcomes that help determine the quality of healthcare at risk. 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 patients to understand what they are hearing and why, 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 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, as well, an on-going strategy for maintenance. With each step, a time line for the starting strategy and, as well, the amount of time in maintaining an appropriate environment will be reviewed.

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 sounds that *reach* the bedside. Because nurses are everywhere patients are, both in and outside of their room, they are the best to assess the circumstances surrounding the patient and family. Establishing a multidisciplinary Sound Quality Committee driven by nursing and including representation from the facility management staff, housekeepers, volunteers, administration, and ancillary staff, has proven to spread the accountability for the sound of the facility to all those who have direct contact with patients. Physicians should be included, however, they tend to 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 more into the fold more than might be anticipated.

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

Once established, have the committee determine a protocol for initial assessment of the sound environment.

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 at 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) near to the first patient room. 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 rated even higher.

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 specifically 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, frequency of use, as well as intelligibility, medical monitors, and other technological sound sources.

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 homeostatis, 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 rises 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.

Besides these types of changes, the committee should also make recommend-ations for other ways to enhance the sound environment. Most of us are familiar with "pink noise," which is a frequency-specific sound that is introduced into an environment to basically cancel out or render inaudible conversations that need to be private. Although pink noise has been shown to be effective in many workplace settings, it is not appropriate for hospitals.

For example, in an initial effort to reduce the effect of ambient noise in its intensive care unit, a hospital in Omaha, Nebraska initiated a pilot study on the use of pink noise. It soon became apparent that pink noise rendered sounds not only inaudible, but also non-directional. Staff found that the observation of or response to patient alarms was difficult because they could not accurately and quickly locate the alarming device.

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.

There are several programming alternatives for hospital television on the market that cost only pennies per bed, per day. They combine music with images, as well as devices for patients to use during surgical procedures. Important considerations for this type of programming include choosing music and imagery that crosses the age, gender, and cultural boundaries. The musical content used to create night and day programming is also a plus, as well as a 24-hour minimum of non-repetitious play.

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 Regional 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. Not currently standard, creating an *auditory impact standard* for all equipment and including this on RFP forms as well as on repair requests will begin and sustain attention to this area. 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, 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.

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.

It is not uncommon for a noisy cart that is still operational to be used for years without the staff addressing this as a malfunction because the loudness of the wheels does not impair their own functioning. Unless specific standards are set to identify squeaks, rattles, and noisy operations that mandate repair, this will not be perceived as a problem by staff.

Most hospitals have refrigerated soft drink and ice machines that "rattle and roll" at a pitch of 85-90 dB. Being conscious of their location and using alternative methods of refrigerating products in public areas are worth considering. Some hotels, for instance, have put vending and ice machines in isolated cubicles specifically to contain the mechanical rumble. Where padding or insulation is not a workable solution, the use of decorative baffles of plexiglass or other appropriate materials to control and direct the noise coming from these machines might be considered.

Purchasing new equipment based not only on function and price but also on auditory impact is another possible approach. Biomedical engineering departments that evaluate all patient care equipment prior to its use should be tested 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, 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 are 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.

Concord Hospital, Concord, New Hampshire, produced an effective educational video that demonstrated the best and worst behavioral examples regarding noise, conversations, use of pagers, beepers. Without a doubt, seeing and hearing from the standpoint of the patient is a great 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 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 — 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 (including National Research Corporation, the company that bought the survey tool developed by The Picker Institute and The Center for Health Design) 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.

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.

8. Conclusion

Nursing excellence addresses the whole patient, the medically mandated care and the patient experience. 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" itself that was the most effective protocol, that within it 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. 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.

References

Anari M, Axelsson A, Eliasson A, Magnusson L. Hypersensitivity to sound—questionnaire data, audiometry and classification. Scand Audiol. 1999;28(4):219-30.

Baker CF. Sensory Overload and Noise in the ICU: Sources of Environmental Stress, Critical Care Quarterly 1984; 6; 66-80.

Biley FC. Related Articles Effects of noise in hospitals. Br J Nurs. 1994 Feb 10-23;3(3):110-3. Review.

Cmiel C, Karr D, Gasser D, Oliphant L, Nevau A. Noise control: A nursing team's approach to sleep promotion. American Journal of Nursing. 2004; 104(2).

Job, R.F.S., "The Psychology of Reactions to Environmental Agents," *Environment International* ,Volume 22, Issue 1, 1996, Pages 93-104

Joseph, A. "The Role of the Physical Environment in Promoting Health, Safety, and Effectiveness in the Healthcare Workplace," November, 2006, The Center for Health Design, Issue Paper #3, Martinas, CA.

Schneider, Bruce A. ,Pichora-Fuller, Kathleen M. "Implications of Perceptual Deterioration for Cognitive Aging Research," pp. 155-220, from Craik and Salthouse, *The Handbook of Aging and Cognition,* (2000), Lawrence Erlbaum Associates, Mahwah, New Jersey.

Susan Mazer is acknowledged as a pioneer in the use of music as environmental design, she is the President and CEO of Healing HealthCare Systems (www.healinghealth.com) and produces the CARE Channel. In her work in health care, she has authored and facilitated educational training for nurses and physicians and is well published in the field of the effects of noise on patients. She can be reached at smazer@healinghealth.com.