

## Too much noise? Try sound masking.

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Anyone who has been in a hospital for any length of time knows that they are noisy places. Alarms call, beepers beep, trays rattle, nurses deliberate, and TVs blare. The net result is that a hospital can be downright inhospitable and a tough place to rest, sleep, heal, and convalesce. In addition, these conditions also affect healthcare workers by interfering with their work and by increasing their already high levels of stress. It is no wonder that a 1993 study of this problem was famously entitled "Pandemonium in the Modern Hospital."

What can be done? The standard acoustical method for reducing noise consists of three elements: to quiet the source, to disrupt the noise path from the source to the receiver, and to reduce the sensitivity at the receiver (e.g., with earplugs). This usually sensible approach runs into unique challenges in hospitals. For example, alarms have to be loud enough to be heard outside a patient room. Path-reducing materials such as acoustical absorbing tiles may be too susceptible to bacterial growth. Earplugs are not what the doctor ordered for nurses who need to be tuned in to the important sounds present (e.g., the alarms) and to be able to communicate with the patients, the doctors, and each other.

There is another approach that is well suited to hospitals that at first sounds paradoxical: adding sound to the environment. How can adding sound make a hospital seem less noisy? This is precisely what sound masking—an approach used for decades in open offices (think Dilbert cubicles)—does. By introducing a steady broadband sound background (sounding like air conditioning) into a space with a series of speakers typically mounted in the ceiling, at the right loudness an interesting perceptual phenomenon occurs. The level of sound in the space becomes less variable in time, people's threshold of hearing goes up a bit, and they no longer become aware of all the individual sounds—all the while unaware of the presence of the sound masking itself. The bottom line is that a space seems quieter. Psychological and physiological functions improve so that, for example, people are less aware of and annoyed by the noise environment and are able to rest and sleep better. All this occurs without any interference with medical staff being able to hear alarms in patients' rooms, as the masking levels are much lower than those of the alarms. Another advantage of masking is an increase in "speech privacy." With masking present, the distance at which a conversation can be overheard becomes shorter, which creates a more private environment for a patient and makes it less likely that his or her private information will be disclosed.

So we see that a technology originally developed for open space offices can add just the right kind and amount of noise to an already noisy environment to solve several of the problems brought on by the noise. Pioneering efforts to install masking in hospitals, including some very big ones, have been carried out and more are anticipated. Let's hope that masking can truly put a dent in this pandemonium.

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