

## 2014 Japan-America Frontiers of Engineering Symposium

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**Abstract Title:** *Managing Noise in Healthcare Environments to Benefit Patient Outcomes*

*Unnecessary noise...is the most cruel absence of care  
which can be inflicted either on sick or well.*

*Florence Nightingale, 1859*

Despite 155 years passing since Florence Nightingale wrote this opinion, the adverse effects of noise on hospital patients are still not universally recognized as a major influence on patient outcomes, often leading to delayed recovery, longer inpatient periods, and even death. Fortunately, noise control in U.S. healthcare environments has grown as a priority after the publication of landmark papers in 2004, documenting the gradual and detrimental rise in worldwide hospital noise levels since 1960 and the resulting noise-related medical errors. Consequently, noise in healthcare environments is becoming recognized as a serious health issue, increasing staff stress and absenteeism, hindering patient healing, and causing patient injury and fatalities.

In the U.S., new incentives for improved acoustical environments have been implemented the last five years. For the built-environment, sustainable building design initiatives have become increasingly popular in the U.S., and have included acoustics as a design consideration since 2009. Additionally, the 2010 edition of the *Guidelines for the Design and Construction of Health Care Facilities*, a document used or referenced in forty-two American states and in sixty countries, has a greatly expanded acoustics section covering a wide range of topics from acoustical finishes and sound isolation to structural vibration and noise-related safety risk reduction. Financial incentives started in October 2013 when government reimbursement to hospitals were based on the scores of a standardized patient assessment survey, on which noise is consistently rated worse than any other category. Most recently, a 2014 directive from The Joint Commission, a healthcare facility accreditation body, elevated medical alarm management to a national patient safety goal as a result of multiple alarm related accidents, thus forcing hospitals to make the issue a top priority.

Previously, noise engineers and medical personnel generally had been working independently on noise issues, with limited progress and implementation of their findings due to the teams having limited expertise in both medicine and engineering. With the new urgency for improvement, multidisciplinary teams have been formed to produce actionable research and evidence-based design initiatives. This collaboration between medicine and engineering has produced data on physiological responses, healthcare outcomes, and economic impact, which all have more influence on policy making than the historic assumption that noise is nothing more than an annoyance. While progress has been made in the built-environment, changing healthcare worker behavior and the healthcare culture has proven to be more challenging.

This growing body of research about the harmful effects of noise in healthcare environments has reinforced the importance of noise control efforts. Though obtaining funding for these studies presents challenges, they support the initiatives and incentives of recent years and many more topics must be investigated. The end goal is improving patient outcomes, increasing staff comfort and establishing a healthy environment for all.