

Updated Acoustic Criteria Address Noise Issue

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A major study by Johns Hopkins University researchers published in 2004 showed that worldwide noise levels in hospitals had steadily increased over 40 years to the point that, by the first decade of the 21st century, many people (from patients to doctors, nurses and families) agreed with an article in the *New England Journal of Medicine* that the noise problem represented uncontrolled “pandemonium” and posed a danger to occupants. The Johns Hopkins paper (see www.ncbi.nlm.nih.gov/pubmed/16419808) and others prompted the Facility Guidelines Institute (FGI) to commission the development of comprehensive acoustic criteria for health care facilities. The FGI Acoustics Working Group, a national group headquartered in Boston and supported by FGI and the Acoustics Research Council, was formed in 2004 to respond to this need and has been continuously working since then to strengthen and improve the criteria. The resulting acoustic criteria were first published in the 2010 edition of the *FGI Guidelines for Design and Construction of Health Care Facilities*. For the 2014 *FGI Guidelines*, these 2010 criteria have been extensively revised and improved.

“Unnecessary noise is the cruelest absence of care.”
—Florence Nightingale

The acoustic requirements in both 2014 *Guidelines* documents (one for hospitals and outpatient facilities and one for the residential care industry) require careful attention. The revisions and improvements were made in response to the following:

- Legislative changes since 2010 (e.g., ACA-HCAHPS)
- Regulatory changes since 2010 (e.g., strengthened HIPAA enforcement)
- Feedback from authorities having jurisdiction
- Two formal, multi-year beta tests of the 2010 criteria carried out during large hospital construction projects
- Field data gathered from various FGI sources
- Independent comments submitted to FGI and/or the FGI Acoustics Working Group

Following are general descriptions of the reasons for some of the changes in the 2014 FGI *Guidelines* and why it’s important to understand the differences between the requirements in the Hospital and Outpatient *Guidelines* and the Residential *Guidelines*.

Response to ACA-HCAHPS scores

The Affordable Care Act, implemented in 2012, mandates postoccupancy testing as part of the standardized Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) test results that are made publicly available. HCAHPS scores routinely reveal that noise receives the poorest response of all the questions asked of patients. The scores in the “Quietness of the hospital environment” column in the July 2014 table summarizing HCAHPS survey results

continue this trend. Since HCAHPS scores are related to federal reimbursements, HCAHPS test results have generated considerable, urgent new interest in the subject of noise control in hospitals. The acoustic criteria in the FGI *Guidelines* can help designers address this important issue.

Beta testing as part of FGI’s continual improvement process

Two organized beta tests of the FGI acoustic criteria have been conducted since 2010. These studies demonstrated that HCAHPS scores can be dramatically improved when designers fully implement the 2010 minimum acoustic guidelines;

however, since HCAHPS scores are adjusted upward each year, professional opinion suggests that designers may need to take additional steps to continue ensuring satisfactory scores. FGI plans to undertake a cost-benefit analysis of a project that incorporates acoustic design elements to help evaluate this question.

Information from the beta test results was also used to refine the acoustic criteria included in the 2014 edition, in particular identifying criteria that needed to be more flexible and clarifying requirements for non-acoustically sensitive locations.

Noise as a factor in safety risk assessment criteria

Both the Hospital and Outpatient and the Residential 2014 *Guidelines* include expanded safety risk assessment (SRA) methods “intended to proactively identify hazards and risks and mitigate underlying conditions of the built environment that can contribute to adverse safety events,” such as falls and medication errors, and propose “built environment solutions to mitigate potential risks and hazards.” “Noise” is identified in the appendix material as a leading concern that affects a number of design decisions. The Acoustics Working Group recommends careful reading of the safety risk assessment procedures to understand how these apply to acoustic design.

Increased support for HIPAA Privacy Rule compliance

The Affordable Care Act mandates compliance with HIPAA’s Privacy Rule and imposes serious fines for non-compliance. Accordingly, the speech privacy criteria that are part of the acoustic guidelines have been strengthened in several ways, including the addition of a new standard that provides objective, numerical values for both “confidential privacy” and “secure privacy.” Four equivalent speech privacy rating methods are indicated; the method chosen must be appropriate

Developers of the FGI Acoustic Criteria

The revision process for the 2014 FGI acoustic criteria was managed by the FGI Acoustics Working Group, the permanent committee that drafted the FGI 2010 comprehensive acoustic criteria. This national group is comprised of about 500 volunteers representing nine professions across the United States and Canada, including medicine, architecture and design, industry research and development, academic and government research, health care law, and the three leading professional societies in acoustic science—the Acoustical Society of America, the Institute of Noise Control Engineering, and the National Council of Acoustical Consultants. The steering committee of this group meets monthly with FGI President Kurt Rockstroh and is operated by the Boston-based Acoustics Research Council under the leadership of David M. Sykes and William J. Cavanaugh, FASA, F/INCE, with technical co-chair Gregory Tocci, PE, FASA, F/INCE, and a six-person steering committee that includes committee secretary Daniel Horan, LEED AP BD+C.

for determining whether a space, whether open plan or closed plan, meets speech privacy goals. A quick look at the speech privacy tables and footnotes in Chapter 1.2 of the Hospital and Outpatient *Guidelines* and Chapter 2.5 of the Residential *Guidelines* will give readers a clear picture of how these criteria have been strengthened and clarified to meet the more stringent enforcement of the HIPAA Privacy Rule.

Separation of criteria into independent volumes for hospital and residential care

With the separation of the FGI *Guidelines* into two independent volumes, the acoustic needs of these very different kinds of occupancies needed to be considered and developed separately. Many of those who reside or receive care in long-term care facilities such as nursing homes, hospice and assisted living facilities, independent living settings, adult day care facilities, and

More Details on Updated FGI Acoustic Requirements

The original work of the FGI Acoustics Working Group (AWG) served as the sole source for FGI's acoustic criteria and is completely consistent with the 2014 FGI *Guidelines*. Minimum requirements, largely presented in tables and footnotes, were included in the 2010 FGI *Guidelines*. The AWG's complete report was then published by Springer Verlag in 2011 as "Sound & Vibration 2.0 (2010)." In late 2014, Springer will publish a new edition of the book as "Sound & Vibration 3.0 (2014)." The manuscript of this new edition (approximately twice as long as the 2010 edition) is available for viewing as a "read-only" file under the Resources tab on the FGI website to provide guidance and interpretation for users of the FGI *Guidelines* acoustic criteria.

"Sound & Vibration 3.0 (2014)" contains six new chapters, including a chapter on ACA-HCAHPS, two chapters on the beta tests, a chapter on acoustic problems in residential care facilities, and a chapter on research needs.

wellness centers have hearing impairments, making the acoustic requirements for such facilities quite different from those for hospitals and outpatient facilities. For the 2014 edition, the acoustic criteria in the hospital volume were adapted and migrated to the new Residential *Guidelines*. However, it was felt that more intention needed to be applied to development of acoustic criteria for these very different environments. In response, the Rothschild-FGI Task Force on Acoustics for Elders in Residential Care Facilities was formed in 2013. The group, funded by the

Hulda B. and Maurice L. Rothschild Foundation, organized by the Acoustics Research Council (FGI Acoustics Working Group), and hosted by FGI, began meeting in 2014 and plans to publish its first guidance at the end of 2014. It is expected that the resulting acoustic guidelines for residential care will differ significantly.

More realistic acoustic criteria for site location and vibration

The site location table has been revised for 2014 and now requires use of outdoor/indoor transmission class (OITC) measures. OITC, an industry standard measurement (see ASTM E-1332: *Standard Classification for Rating Outdoor-Indoor Sound Attenuation*), was specified to respond to the need for a more robust classification system that addresses more low frequency incident sounds. OITC measures the ability of a product to reduce overall noise from ground and air transportation. An OITC rating is similar to an STC rating in that it uses ASTM E-90:

Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements sound transmission loss data to derive a single number rating.

After some concern from the field regarding the difficulty of meeting the criteria for footfall vibration in the 2010 edition, these criteria have been relaxed somewhat in the 2014 edition. Furthermore, the differences in construction types between hospitals (typically steel and concrete) and residential care facilities (typically wood frame and smaller scale) necessitated a very different approach to setting vibration criteria for these different physical environments.

Alarming trends – Guidance on alarm fatigue

In 2014, for the third year in a row, the noise problem called “alarm fatigue” was designated the “#1 technology hazard” in hospitals by the ECRI Institute, the U.S. Food and Drug Administration, and the Joint Commission. This determination was based on the ECRI Institute’s independent analysis of the FDA’s MAUDE database, a collection of “manufacturer and user facility device experience,” that identified several hundred “adverse incidents” related to alarm fatigue.

A 12-person delegation of the Acoustics Research Council and FGI Acoustics Working Group participated in organizing the first national summit on alarm fatigue in 2011. That same year, this group drafted a white paper titled “Clinical alarms and fatalities resulting from ‘alarm fatigue’ in hospitals: Perspectives from clinical medicine, acoustical science, signal processing, noise control engineering & human factors,” which was submitted along with proposals to update language in the 2010 FGI *Guidelines*. In 2013 the group urged FGI to support formation of a task force on alarm fatigue to consider the design implications of this problem. As a result, a task force of about 24 professionals is currently working on the issue and expects to produce a preliminary white paper followed by a full report. Watch the FGI website (www.fgiguideines.org) for posting of the white paper and follow-up information.

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