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Auditory alarms for medical equipment: What do we need to know and how should we ask?

Penelope M. Sanderson
School of Psychology and School of Medicine
The University of Queensland
St Lucia, QLD 4072
Australia

Abstract

An international standard IEC 60601-1-8 was released in 2005 that provides guidelines for auditory alarms on medical electrical equipment. Since the release of the standard, there have been concerns about the adequacy of its recommendations and, in particular, the effectiveness of its proposal that manufacturers should use melodies to distinguish alarms from different sources. Although the melodies presented in the standard are merely suggestions, the standard does not make it clear how an acceptable set of melodies can be established. Moreover, the standard does not require that developers perform thorough testing with representative users before any set of melodies is put into use. The paper reviews studies with representative users over the last few years that demonstrate that the melodies suggested in IEC 60601-1-8 are distinctly ineffective, including recently unpublished work. The paper also reviews and critiques suggestions that have been put forward for alternative alarm sounds, including speech synthesis techniques, better urgency mapping, and so on. Finally, criteria for future design and evaluation efforts are indicated.