

## Auditory Displays in Anesthesiology

Penelope M Sanderson <sup>PhD FASSA</sup><sup>1</sup>  
David Liu <sup>BE(Hons)</sup><sup>2</sup>  
Simon A Jenkins <sup>BMBS FANZCA</sup><sup>3,4</sup>

<sup>1</sup> Schools of ITEE, Psychology and Medicine, The University of Queensland – Brisbane, Australia

<sup>2</sup> School of Information Technology and Electrical Engineering, The University of Queensland – Brisbane, Australia

<sup>3</sup> Department of Anaesthesia, Pain Medicine and Hyperbaric Medicine, Royal Adelaide Hospital – Adelaide, Australia

<sup>4</sup> Centre for Sleep Research, University of South Australia – Adelaide, Australia

### Abstract

Purpose of review. We outline and discuss recent work on auditory displays, covering both auditory alarms that indicate technical or physiological threshold levels, and informative auditory displays that provide a continuous awareness of a patient's well-being.

Recent findings. The struggle to make auditory alarms informative proceeds with work on two fronts. In one approach, researchers are developing and evaluating auditory alarm displays to indicate the source and urgency of off-normal states, and are relying on the emergence of smart software algorithms to reduce the false positive rate. In a complementary approach, other researchers are providing information about the patient's well-being in normal as well as abnormal states, generalising the advantages of variable-tone pulse oximetry to other systems and other auditory display formats. In either approach, a multidisciplinary team is essential in the design and evaluation of auditory displays. Finally, because informative auditory displays may subtly change clinical practice, there are repercussions for training.

Summary. Auditory display in anesthesia can extend well beyond auditory alarms to displays that give the anesthesiologist a continuous peripheral awareness of patient well-being. Much more rigorous approaches should be taken to evaluating auditory displays so they add information rather than noise.