

Reducing ICU noise to enhance patient care - Ascom and partners show innovative ways forward at HIMSS Interoperability Showcase™

Reducing the number of alarms in critical care environments is an urgent challenge. The scale of the task is illustrated by research in the US from the Association for the Advancement of Medical Instrumentation, which found an average of 350 alerts per bed per day in a large American hospital¹. This number was as high as 771 per bed per day in one Intensive Care Unit (ICU). The resulting noise is a constant auditory stimulation for clinicians and patients.

If the high number of alarm notifications isn't troubling enough, an estimated 80-99% of the alerts are false or non-actionable, adding an additional burden to busy clinicians.²

These nuisance alarms are an issue. Clinicians risk becoming desensitised to the constant blizzard of alerts and may respond by reacting inappropriately. Since 2014, the widely respected and independent ECRI Institute has warned that nuisance alarms lead to an increased risk of patient harm and dissatisfaction among patients and staff.³

Noise levels and the effect on patients

Noise level in healthcare is another pressing concern. The World Health Organisation recommends that noise levels should not be higher than 35dB at night and 40 dB during the day, but a UK study found levels can far exceed these levels⁴. One study comparing ICU noise levels from 1960 to 2003 showed a daytime increase from 57 dB to 72 dB, and a nighttime increase from 42 dB to 60 dB.⁵ Noise contributes to keeping patients awake, which can lead to delirium. Indeed, the majority of ICU patients are at risk of delirium.⁶ With delirium comes prolonged length of stay and the risk of long-lasting neurocognitive impairments.⁷

How can these trends be reversed?

How can noise levels from devices and alerts be reduced - or eliminated - in today's high-tech ICUs? Two promising areas of research are 'Quiet ICU' and 'Silent ICU'. Healthcare professionals and industry are working hard to launch viable solutions in both areas.

A 'Quiet ICU' is an ICU where technology and staff training are harnessed to minimise - but not completely eliminate - noise from medical devices at the bedside. In a Quiet ICU, bedside medical devices remain responsible for alarm notifications.

A 'Silent ICU' is one where all noise sources are silent. To implement a Silent ICU room, all medical devices must support alert delegation, which entails major changes in medical devices and risk management strategies from hospitals and the medical device industry.

The benefits of Quiet and Silent ICUs promise to be extensive - from the ability to better isolate patients for more effective infection control, to better-rested patients with fewer cases of ICU delirium, and reduced nuisance alarms.

From concept to reality with IHE interoperability solutions

Integrating the Healthcare Enterprise (IHE) is an international initiative driven by healthcare professionals and industry to improve the way computer systems in healthcare share information. Systems developed in accordance with IHE communicate with one another better, are easier to implement, and enable care providers use information more effectively.

In the spring of 2018, the Patient Care Device (PCD) group at IHE launched the 'Quiet Hospital' initiative to reduce noise in healthcare. A technical framework was published in December 2019 and several medical device manufacturers have already endorsed the PCD Profiles.⁸ (IHE interoperability solutions are documented in implementation guides called 'IHE Profiles').

The basic idea of the IHE PCD solution is that when a medical device is connected to a patient, an alarm notification triggers the following:

1. The alarm notification is distributed directly to the clinician on a device where they can acknowledge and accept it
2. An audio pause is employed to silence the medical device alarm notification in the patient room until a clinician can respond
3. If the clinician response is delayed beyond a prescribed time for that specific alarm notification, the system reverts to audible alerts.

A key component of the IHE PCD solution is the Alert Manager (AM), which orchestrates the distribution of alerts between medical (alarm notification sources) and nurse communication devices. Medical devices ('Alert Reporters') send various kinds of notifications, alerts, warnings or other messages. The AM collects the relevant alerts and transfers them to nurse communication devices ('Alert Communicator').

Depending on other systems such as nurse assignment, the Alert Communicator alerts the appropriate clinician(s). Clinicians typically acknowledge or redirect notifications. This information is then transmitted back to the AM. The AM can then send a confirmation of alert delivery or even a clinician's acceptance back to the Alert Reporter. Figure 1 shows the flow of alert information and acknowledgement, as well as the updated IHE PCD Profiles, e.g., PCD-06.

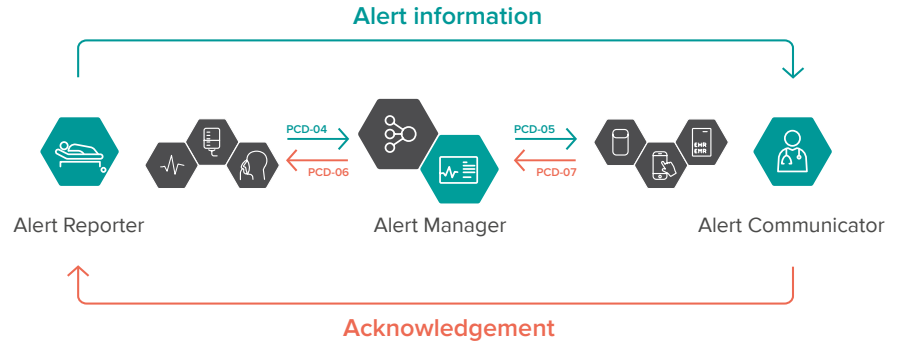


Figure 1. Flow of alert information and acknowledgement between medical devices and nurse communication devices

This confirmation enables the audible alert to be paused, reducing the noise level temporarily while the clinician responds appropriately to the event. If the clinician fails to respond to the alert in a timely manner, the medical device will produce audible noise at the bedside for safety reasons.

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