How smart alarm handling reduced noise at CHC MontLégia's adult ICU

Background

CHC MontLégia serves as the main hospital for Liège, Belgium, with 720 conventional beds and an additional 120 day beds. CHC MontLégia operates a 48 bed ICU divided into two 24 bed units; this evidence collection focuses on adult ICU unit 310. The unit is organized into two 12 bed areas, each with its own central nursing station.

Problem statement

The ICU at CHC MontLégia, faces a common issue of excessive noise. This noise is created by several factors including medical devices (monitors, pumps, ventilators), staff activity, and other incoming alerts such as telephone calls.

Patients and nurses are negatively affected by this noisy environment, which exceeds the World Health Organization (WHO) recommended noise levels for hospitals (35 dB(A) during the day and 30 dB(A) at night, but actual levels are much higher).
For nurses, persistent noise levels lead to increased stress, headaches, irritability, and difficulty concentrating, which can compromise the quality of care and overall well-being.

A major contributing factor is the number of alarms generated by medical devices that nurses are expected to act upon. Many of the medical alarms are non-actionable or false alerts that do not require immediate intervention. Over time, this relentless stream of alarms can desensitize staff, causing them to respond more slowly or even miss critical alerts, which poses a risk to patient safety. This phenomenon is known as alarm fatigue.

Alarm fatigue not only increases stress and cognitive overload for healthcare professionals but also perpetuates the noisy environment, as alarms continue to sound without prompt

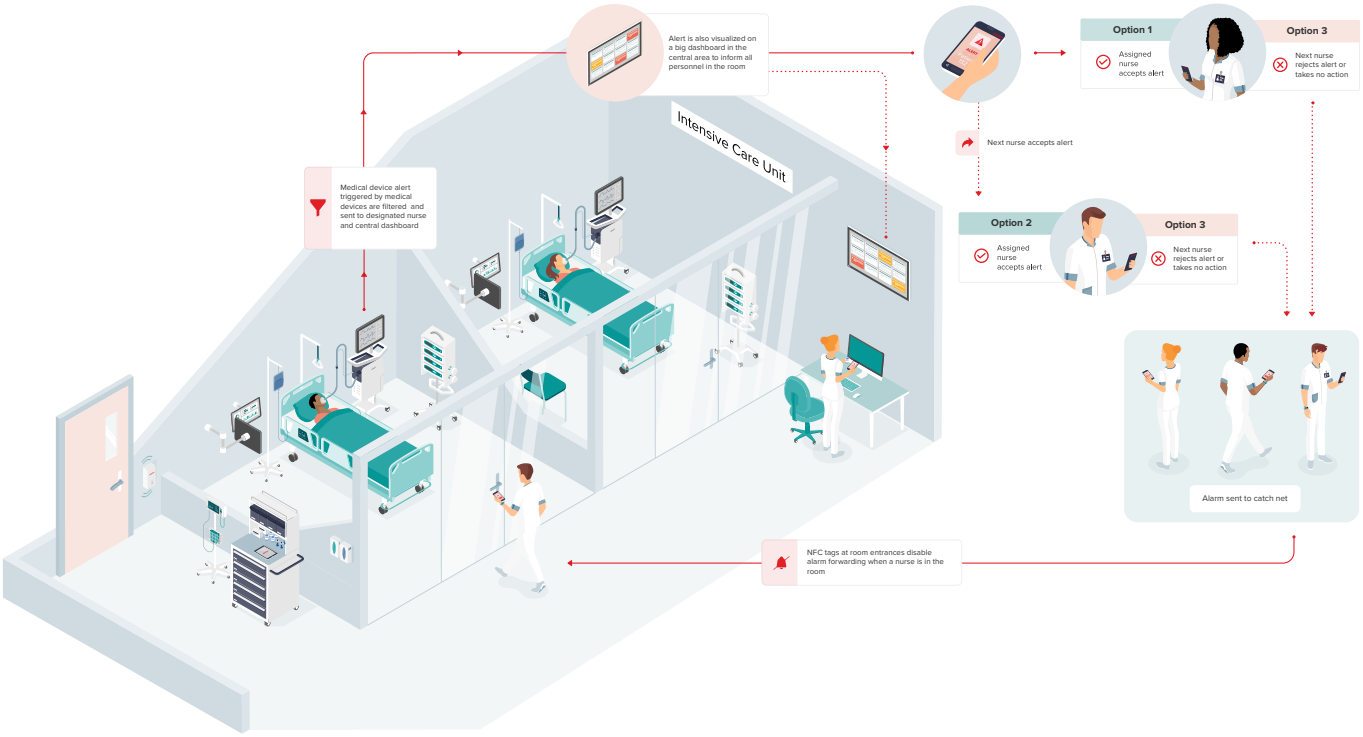
This translates into a three-tier problem

i. Excessive noise in Intensive Care Units

ii. Number of alarms

iii. Healthcare staff alarm fatigue

Solution description:



The MontLégia deployed Ascom Clinical Alarm Management Solution including Myco smartphones.

The Clinical Alarm Management Solution ingests alarms from third party medical devices (monitor, pumps, ventilators), these alarms are filtered based upon rules agreed with MontLégia Clinical team and the unfiltered alarms routed to the smartphone of the responsible nurse.

Many of the alarms are artefacts (particularly common for pulse oximetry). The clinical alarm management solution is configured with a short delay (5 seconds) to ensure these artefacts alarms are not presented to the nurse responsible unless they persist.

On the device, the nurse can accept the event (becoming the owner of subsequent recurrences), refuse it (immediately passing it to the next nurse), or take no action, in which case the system automatically escalates after 60 seconds to the backup nurse and, if still unattended, to a catch net that alerts the wider team. This escalation ensures that urgent alarms always find a responder even in peak workload moments.

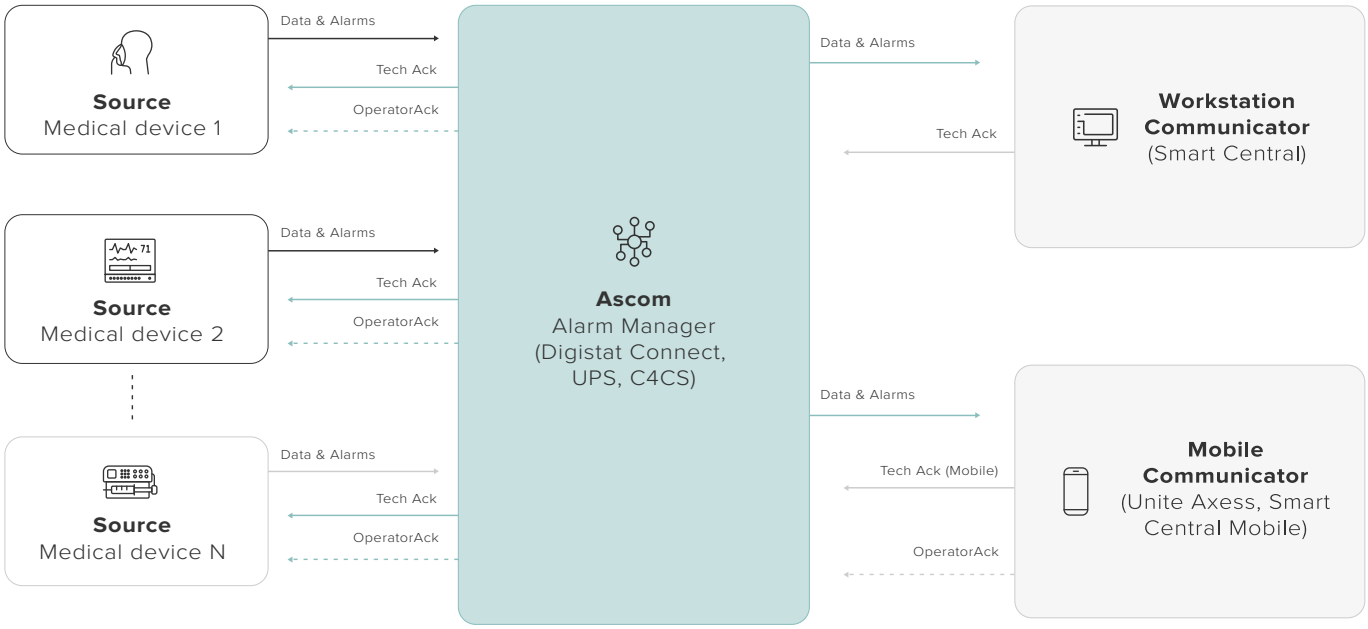
The project team experimented with a dynamic mapping of patient rooms to devices and then decided to simplify the model by switching to a fixed room to device mapping (e.g., rooms 1–3 to Myco #1; 4–6 to Myco #2, and so on). The stable map reduced cognitive load at shift changes and cut configuration time and errors.

Complementary NFC tags at room entrances disable local alarm forwarding temporarily when a nurse is physically in the room, avoiding unnecessary self-notifications and escalations. Since the objective is a quieter unit, the Mycos have been configured to rely primarily on vibration and light, rather than sound, for notification.

The same clinical information is accessible on desktop dashboards at the central nursing stations, where waveforms and alarm analytics can be visualized by the nurses away from the patient's bedside.

The initial roll out revealed a fundamental lesson, technology alone does not change practice. The plug-and-play approach to adoption of technology does not work.

The project team partnered with the hospital's quality service to develop a change management program with clear governance, a stepwise plan, vision of the solution, practical simulation for onboarding nurses.



Results:

The solution results are therefore threefold:

i. The ICU at CHC MontLégia faced a challenge of excessive noise, primarily generated by medical devices and the volume alarms. The study measured average noise levels at 48.04 ± 4.86 dB without the Ascom solution and 44.21 ± 3.55 dB with Ascom solution, showing a statistically significant reduction (p=0.02) when the Clinical Alarm Management Solution was implemented. However, maximum and minimum noise levels remained similar, and nighttime averages also stayed above recommended thresholds. While the Ascom system helped lower the average noise, the ICU environment remained noisier than the WHO guidelines, indicating that further improvements are needed for full compliance.

ii. A major source of ICU noise and stress was alarm fatigue, caused by the volume of alarms—many of which were non-actionable. This led to desensitization among staff, slower response times, and increased risk to patient safety. The Clinical Alarm Management Solution managed 16,178 critical alarms (557 per day), 48,492 medium alarms (1,672 per day), and 57,011 technical alarms (1,965 per day).

iii. Literature cited in the study suggests that up to 58% of alarm notifications can be reduced through effective filtering. The Ascom solution addressed alarm fatigue by filtering and prioritizing alarms, sending only the actionable to the appropriate nurse's device. Staff feedback was encouraging: 62% believed Ascom solution reduced noise and alarm fatigue. In addition, 40% of the nurses believe the Ascom solution reduces the duration and frequency of alarm sound peaks, 21% of the nurses believe the Ascom solution improved responsiveness, and 18% believe the Ascom solution contributes to a safer, quieter care setting.

iv. The consequences of this noisy environment was felt acutely by nurses. This study's questionnaire revealed that 100% of respondents considered their work environment to be highly noisy, and 91% reported that noise negatively impacted their work—manifesting as nervousness, concentration problems, stress, anxiety, and headaches. Furthermore, 89% believed that noise adversely affected patient recovery. Although the Ascom solution contributed to a quieter environment, the persistent noise levels meant that both patients and staff continued to face significant challenges, underscoring the need for ongoing noise reduction strategies.

Following the study's conclusion in February 2025, the ICU clinical leadership team decided to reduce medical device alarm volumes for critical events from a volume level of 6 to a level 4. This decision was made in the context of increased dependence on routed, tactile, and visual alerts; leadership emphasized that opting out of the workflow after volume reduction would compromise both staff and patient safety by delaying awareness of events. The solution is being expanded to the second 24 bed side of the ICU, moving from 24 to 48 equipped beds in October 2025.

Conclusion:

Many hospitals across the globe are struggling with the challenge of noise in the intensive care environment whilst industry formulates technology to eliminate alarms at the patient bedside healthcare providers look for ways and methods to mitigate noise today.
As Clinical Alarm Management continues to be developed towards silent medical alarming and smart alarm filtering, Ascom works in partnership with intensive care unites and medical device suppliers to mitigate noise and lay a foundation for the "Silent ICU".
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All figures taken from: Rompen, V. (2023-2024), Comparative Study Assessing the Impact of an Alarm Forwarding System on Noise Pollution in an Adult Intensive Care Unit (in French). Master's thesis in Public Health Sciences–Critical Care specialization, Faculty of Medicine, University of Liège.

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