

Clinical Evidence Series

Optimisation of clinical workflow and monitor settings safely reduces alarms in the NICU



What's different

Instead of delivering alarms as isolated notifications, the Philips CareEvent solution delivers alarms together with waveform information directly to clinicians' handheld devices.



Interpretation

Following implementation of Philips CareEvent along with a workflow and alarm-setting optimization program, NICU alarm burden was lower and infants spent more monitored time within the target SpO₂ range.



Key takeaways

A structured alarm optimization program combining CareEvent, workflow improvements, alarm-setting refinement, and staff training reduced critical monitoring alarms while increasing time spent within optimal oxygen saturation targets.



Background

- Alarm fatigue is a recognized patient safety concern in neonatal intensive care units (NICUs), where clinicians are exposed to large numbers of alarms, many of which do not require clinical intervention
- Oxygen saturation alarms are among the most common alarms in NICUs because premature infants often require supplemental oxygen and close SpO₂ management
- Excessive alarms may disrupt infant sleep, increase parent and clinician stress, and contribute to delayed responses to clinically meaningful alarms
- Mobile alarm management solutions may support more effective alarm handling by delivering alarm information directly to clinicians



Study design and methods

- Longitudinal implementation study conducted in an 18-bed single-family-room NICU at Máxima Medical Center, Netherlands
- Three implementation phases were evaluated between October 2017 and December 2019
- Phase 1 introduced Philips CareEvent with waveform visualization on handheld devices
- Phase 2 added workflow optimization, revised alarm settings, protocol standardization, alarm management training, and clinical practice guidelines.
- Outcomes included alarm frequency, alarm duration, nurse responses, oxygen saturation distributions, and nurse survey responses.



Objectives

Evaluate the impact of implementing Philips CareEvent and a multidisciplinary alarm optimization program on alarm burden, alarm handling, and patient oxygen saturation management in the NICU.



Results

Reduction in critical alarms:

- All red monitoring alarms decreased from 39.5 to 27.8 alarms per patient-day ($p < 0.001$)
- SpO₂ $\leq 80\%$ alarms were reduced by more than 50% (27.7 vs 13.1 alarms per patient-day; $p < 0.001$)
- Alarm durations for both red and yellow monitoring alarms decreased significantly ($p < 0.001$)

Oxygenation management:

Time spent within the target SpO₂ range (88% < SpO₂ < 95%) increased from 33.2% to 44.9% ($p < 0.001$).

Staff perception:

- Survey responses indicated false alarms were less likely to reduce trust in alarms
- Nurses reported improved ability to identify alarm sources and greater adherence to alarm management protocols