

Understanding the impact of Respiratory Function Monitoring in Neonatal Monitoring

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SUMMARY

This paper presents a study investigating how the presence of respiratory function monitoring (RFM) data impacts clinical decision making during neonatal resuscitation procedures. To date this is an under researched area despite technology advances making this data set accessible for neonatologists and their teams. Simulations of neonatal resuscitation were undertaken with eight participants. Each participant took part in each study condition, with and without RFM. Eye tracking data was captured and then participants were involved in Critical Decision Method interviews. The results showed that presence of RFM modified decision making pathways, with clinicians using more stimulus seeking strategies in the procedure as opposed to recognition primed reasoning. An additional change was that the presence of the RFM encouraged an optimisation mindset, with participants seeking to maximise performance rather than relying on satisficing strategies. These findings have important implications for device design, training, and clinical integration.

KEYWORDS

Neonatal Resuscitation, Critical Decision Method, Simulation

Introduction

The immediate postnatal period represents a critical transition in which neonates must adapt and establish gas exchange (breathing) Effective decision-making during neonatal resuscitation is critical to patient outcomes. While the majority establish respiration without difficulty, approximately one in ten require immediate support (Kattwinkel et al 2010).

Traditionally, the adequacy of ventilation is assessed subjectively by observing chest rise; however, this method is both inaccurate and highly variable (Poulton et al 2011). This has driven the development of respiratory function monitors (RFMs), which aim to improve clinical decision making and subsequent neonatal outcomes by providing clinicians with real-time, objective feedback. However, their influence on clinicians' cognitive processes remains unclear. Previous research has observed positive effects in simulation settings that have not always translated to clinical practice. To date, no studies have investigated how RFMs influence decision-making during neonatal resuscitation.

Aims

The study aimed to examine how RFMs affect decision-making during neonatal resuscitation, with three accompanying objectives.

- 1) To identify the decision-making strategies employed with and without an RFM;
- 2) To examine the influence of the RFM on the frequency and nature of these strategies; and

- 3) To evaluate visual attention patterns with and without the RFM and their relationship to decision-making strategies.

Study Design

A mixed methods approach was used to investigate the influence of RFMs on decision-making during neonatal resuscitation. Eight clinical professionals completed two simulated resuscitation scenarios: one with the RFM visible and one with it hidden (with the order randomised to mitigate order effects).

Eye-tracking data were collected to capture visual attention (Omodei et al 2005). Participants then performed a retrospective think-aloud while reviewing their recordings, which were subsequently used to guide Critical Decision Method (CDM) questioning (Klein et al 1989).

Simulated scenarios were used due to the unpredictability of neonatal resuscitation and ethical considerations, as the effect of the RFM is not yet fully understood. Ethical approval was obtained for this study from the higher education institute in which the research took place.

Results

Results showed that the presence of an RFM influenced decision-making pathways, shifting from top-down, recognition-primed reasoning to predominantly bottom-up, stimulus-driven strategies. Participants adopted a more optimisation-focused mindset, seeking to maximise performance.

Without the RFM, participants focused on maintaining as minimal intervention as necessary once they achieved adequate ventilation. Whereas, with the RFM, participants sought to maximize performance, even when the baby appeared stable. This contrasts with Kuypers et al. (2023), whose survey results indicated that the RFM reinforces decision-making, suggesting instead that it may prompt clinicians to re-evaluate their choices.

Eye-tracking data indicated reduced fixation on the infant and earlier attentional capture by the RFM. This reallocation of attention was mirrored in participants' goals, which moved from patient-centric to device-centric. These findings demonstrate that RFMs can meaningfully shape cognitive processes and attentional focus during neonatal resuscitation.

Discussion

While the study does not evaluate whether RFMs improve clinical outcomes, it highlights how their presence can influence decision-making, which may help explain why simulation benefits are not always translated to clinical practice. These findings underscore the importance of meticulous attention to device design, user training, and seamless integration into clinical workflows, ensuring that RFMs support rather than disrupt established decision-making processes.

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