Title: Neonatal Resuscitation Video Review – Has the time for wider adoption come?

Commentary to PR-2024-0706

Authors:

Anne Lee Solevåg[1], Maxi Kaufmann[2,3], Ruben Witlox[4], Charles Christoph Roehr[5,6,7]

[1]Division of Pediatric and Adolescent Medicine, Oslo University Hospital Rikshospitalet, Oslo, Norway
[2]Department of Pediatrics, Division of Neonatology and Pediatric Intensive Care Medicine, TU Dresden, Medical Faculty Carl Gustav Carus, Dresden, Germany
[3]Saxony Center for Feto-Neonatal Health, TU Dresden, Medical Faculty Carl Gustav Carus, Dresden, Germany
[4]Department of Paediatrics, Leiden University Medical Center, Leiden, The Netherlands
[5]National Perinatal Epidemiology Unit, Nuffield Department of Population Health, Medical Sciences Division, University of Oxford, UK.
[6]Newborn Services, Southmead Hospital, North Bristol NHS Trust, UK
[7]Faculty of Health and Life Sciences, University of Bristol, UK

Corresponding author:

Dr Charles Christoph Roehr
Professor of Neonatal and Perinatal Medicine
University of Bristol
Faculty of Health Sciences
North Bristol Trust
Southmead Rd, Bristol BS10 5NB
Bristol
UK
Email: charles.roehr@bristol.ac.uk
Office: +44 1179 50 50 50

Neonatal resuscitation video review (NRVR) is an educational technique using video recordings of resuscitation situations to learn and reflect on one's own, and other's actions. Initially described by Carbine et al. in 2000[1] who used NRVR at the San Diego Medical Center, University of California, USA as part of a continuous quality improvement initiative surrounding the care for high-risk deliveries, NRVR is now being used for quality improvement, and also as part of various research studies, both in high income countries and low-resource settings[2]. However, to date resuscitation guidelines suggest verbal team debriefing and chart review following neonatal resuscitation, currently without use of video recordings, as a means to reflect on and improve neonatal stabilization and resuscitation.[3]

In the current issue of Pediatric Research, Weimar and coworkers report on their interview study exploring nurses' and physicians' perceptions of partaking in NRVR at a tertiary neonatal intensive care unit that has used NRVR since 2019. In the study, individual and group sessions using NRVR were held several times each month. Group sessions were held only after approval by the clinician leading the resuscitation. NRVR in this setting used resuscitation videos in a birds-eye perspective, audio and physiological data (pulse oximetry- and respiratory function monitor data).

The multi-disciplinary team of researchers included a neonatologist, obstetrician-gynaecologist, educators and qualitative researchers. Their methodology of using qualitative research methods is compelling, as very little qualitative methods have yet been employed in medical team's research, compared to, for instance, in nursing team's research. Weimar's study demonstrates that individual semi-structured interviews analysed with thematic analysis and with social constructivism as theoretic framework can supplement quantitative data such as performance scores[1,6] to assess objective and subjective effects of NRVR. In the study, clinicians with a range of clinical experience and exposure to NRVR were asked to reflect on positive and negative aspects of NRVR. The results demonstrated very positive effects of NRVR both on clinicians' attitudes, and on technical and non-technical skill retention. Although some suggestions for improvement were put forward, attitudes towards NRVR as a learning method were largely positive. These findings support those from previous, largely observational studies on NRVR.[4,5,6]

Despite their very positive findings, Weimar et al. appreciate that there is still a way to go towards the universal adoption of NRVR. As reasons for this they consider legal barriers, logistics, and privacy concerns. Further, based on the information given on the frequency of training session – even without the duration of sessions being stated – and especially of the local demands on, and technicalities of, processing the video recordings, one can assume that their way of performing NRVR was considerably resource intense. Which, given this being in the context of a research study and with associated funding, seem like a reasonable option. Their processes largely match our experience from delivery suites Leiden University Medical Centre (The Netherlands), Carl Gustav-Carus University Medical Centre, Dresden (Germany), and Akershus University Hospital and Oslo University Hospital, Oslo (Norway) where NRVR has been extensively used as part of PhD projects.[7,8,9]

A common finding, experienced in our centres was that when the PhD student finished her/his thesis, NRVR was discontinued (Dresden and Akershus/Oslo), or was continued with less frequent intervals (Leiden). For us, however, and opposed to what Weimar et al. suggest, legal barriers were not so much of an issue as was the process of preparation of review sessions, which was time consuming as considerable technical skills, knowledge and

interest are required for setting up the equipment, recording, downloading and video-processing. Thus, running regular, well-structured NRVR in the context of the individual operator's clinical duties can prove very difficult. Further consideration needs to be taken concerning the high workloads on staff caring for infants in the neonatal intensive care unit, making gathering for review and debriefing difficult. We speculate these being potential reasons for why NRVR, more than two decades after the first reports of its use, is still not widely adopted, even though it has been shown to improve the quality of technical and non-technical performances in neonatal resuscitations, and that staff largely express positive attitudes towards it. It would be interesting for future studies to explore institutional barriers to implementing NRVR from a resource standpoint. NRVR might compete with other teaching and learning activities in the neonatal intensive care unit, and as previously mentioned, resources and competence are needed for video recording, processing, preparations and facilitating well-structured, effective debriefings, or reflections on individual and group NRVR. We suggest that future studies also include newer technology to overcome some of the barriers posed by the video recording itself, such as integration of physiological monitoring data, processing and review. The use of artificial intelligence in both real-time and post-hoc use of delivery room video recordings may hold such promise.[10]

Colleagues wanting to integrate NRVR in their clinical practice will have to enquire at an institutional level, ensuring that all technical, ethical, and privacy requirements concerning filming, image storing and -review are met, as denoted by local governance systems. As an example, in Akershus and Oslo University Hospital (Norway), the requirement from the local data protection officers was that the video recordings would be erased after review and debriefing. The clinicians were allowed to keep transcripts (text) of the videos. In cases where videos were deemed to hold value for future education, these were transcribed in detail, and then deleted. These transcripts have been very valuable for review and, with appropriate ethical board approval, would be available to use for research purposes. However, whilst transcribing the videos to text overcomes issues around storage of personalised videos, this can be very time consuming. In Leiden (Leiden University Medical Center, the Netherlands) the video recordings where only the baby and hands of caregivers are filmed have become part of the medical record and thus are available to parents for review. Reviewing the videos with parents has proven to be valuable. (ref 7 den Boer et al.) Videos where the whole room is filmed and the recording of audio has been added are only available for video reflection sessions as part of a quality improvement project. These videos are erased after the review an debriefing. Other institutions will have different levels of data safety requirement. It would therefore be desirable to have a super-regional consensus on what the ethically acceptable minimum form of personalised data acquisition and storage would be. Ideally, such consensus should come from appropriate patient data safety advocating agencies or institutions. The European Board of Neonatal and Childhood Research (EBNCHR) could act as a sounding board for neonatologists wanting to institutionalise NRVR as an educational and research tool to improve patient safety.

In aggregate, Weimar et al. add another important milestone to the feasibility, benefits and staff acceptance of NRVR. We believe it is now time for NRVR to be widely integrated into clinical routine as a means for service improvement and it seems timely for guideline developers to now consider including video recordings as standard tool for debriefs following neonatal resuscitation. Nonetheless, setting aside issues around implementing NRVR at an organizational or institutional level, more data is needed on what knowledge, skills and training are required for optimal use of videos and physiological data. Also, aspects of cost

effectiveness, including requirements for allocated time both for staff organizing and participating in NRVR, need further exploration. Like Weimar et al., qualitative methods could be used to a greater extent to assess facilitators views and offer a tool for improvement of team training.

References

1. Carbine DN, Finer NN, Knodel E, Rich W. Video recording as a means of evaluating neonatal resuscitation performance. *Pediatrics*. **106**: 654-8 (2000).
2. Simma B et al. Video recording in the delivery room: current status, implications and implementation. Pediatr Res. 96: 610-615 (2024).
3. Madar J et al. European Resuscitation Council Guidelines 2021: Newborn resuscitation and support of transition of infants at birth. *Resuscitation.* **161**: 291-326 (2021).
4. den Boer MC, et al. Benefits of recording and reviewing neonatal resuscitation: the providers' perspective. *Arch Dis Child Fetal Neonatal Ed*. **104**: F528-F34 (2019).
5. Heesters V et al. Using the providers' perspective on video review of neonatal procedures to create a roadmap: a qualitative study. *Arch Dis Child Fetal Neonatal Ed*. **109**: 550-6 (2024).
6. Skare C et al. Video performance-debriefings and ventilation-refreshers improve quality of neonatal resuscitation. *Resuscitation*. **132**: 140-6 (2018).
7. den Boer MC, et al. Reviewing recordings of neonatal resuscitation with parents. *Arch Dis Child Fetal Neonatal Ed.* **106**: 346-51 (2021).
8. Boldingh AM, Skare C, Nakstad B, Solevag AL. Suboptimal heart rate assessment and airway management in infants receiving delivery room chest compressions: a quality assurance project. *Arch Dis Child Fetal Neonatal Ed*. **105**: 545-9 (2020).
9. Konstantelos D, Ifflaender S, Dinger J, Rüdiger M. Suctioning habits in the delivery room and the influence on postnatal adaptation - a video analysis. J Perinat Med. 43: 777-82 (2015).
10. Batey N et al. The newborn delivery room of tomorrow: emerging and future technologies. Pediatr Res. 96: 586-594 (2024).

Conflict of interest statement:

None of the authors has a conflict of interest to declare.

Financial statement:

No funding was received for the completion of this work.

Reprints:

No reprints requested