

Consensus outcome rating for international neonatal resuscitation guidelines

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ABSTRACT

The International Liaison Committee on Resuscitation uses the Grading of Recommendations, Assessment, Development and Evaluation (GRADE) working group method to evaluate the quality of evidence and the strength of treatment recommendations. This method requires guideline developers to use a numerical rating of the importance of each specified outcome. There are currently no uniform reporting guidelines or outcome measures for neonatal resuscitation science. We describe consensus outcome ratings from a survey of 64 neonatal resuscitation guideline developers representing seven international resuscitation councils. Among 25 specified outcomes, 10 were considered critical for decision-making. The five most critically rated outcomes were death, moderate-severe neurodevelopmental impairment, blindness, cerebral palsy and deafness. These data inform outcome rankings for systematic reviews of neonatal resuscitation science and international guideline development using the GRADE methodology.

INTRODUCTION

The International Liaison Committee on Resuscitation (ILCOR) performs detailed systematic reviews and develops consensus statements on resuscitation science with treatment recommendations. Since 2015, ILCOR task forces have used the Grading of Recommendations, Assessment, Development and Evaluation (GRADE) working group method to evaluate the quality of evidence and the strength of recommendations.¹ To ensure that systematic reviews and guidelines address the most critical patient-important outcomes, GRADE requires guideline developers to numerically rate the importance of specified outcomes on a 9-point scale (1–3=low importance for decision-making, 4–6=important but not critical for decision-making, 7–9=critical for decision-making).² As neonatal resuscitation has evolved, guideline developers must consider a range of both short- and long-term outcomes. Existing Utstein-style reporting guidelines, which allow for uniform definitions of terms and reporting of outcomes, do not apply to neonatal resuscitation research.³ As there are no uniform reporting guidelines for outcomes after neonatal resuscitation and no consensus on the relative importance of these outcomes, it has been difficult to combine results from clinical trials. Systematic review authors using the GRADE method for neonatal resuscitation have independently selected and rated outcomes for each treatment question leading to inconsistencies in their treatment

What is already known on this topic?

- ▶ Treatment recommendations for newborns using Grading of Recommendations, Assessment, Development and Evaluation (GRADE) methodology require a numerical rating for each outcome. There are currently no uniform ratings for neonatal outcomes.

What this study adds?

- ▶ Guideline developers were queried for relative importance of specific neonatal outcomes using GRADE methodology. These data inform outcome rankings for systematic reviews of neonatal resuscitation interventions.

recommendations.⁴ We aimed to describe consensus outcome ratings by an international group of guideline developers to provide consistency for future systematic reviews of neonatal resuscitation science.

METHODS

The ILCOR Neonatal Task Force and Neonatal Resuscitation Content Expert Group includes resuscitation science experts representing seven international resuscitation councils (American Heart Association, European Resuscitation Council, Heart & Stroke Foundation of Canada, Australian and New Zealand Committee on Resuscitation, Resuscitation Council of Southern Africa, InterAmerican Heart Foundation, Resuscitation Council of Asia). This collaborative group held a semi-annual meeting in Washington D.C. in December 2017 and generated a list of 25 potentially important outcomes related to neonatal resuscitation. The group was advised verbally that the outcome list would be distributed as an electronic survey with the intent to analyse and publish the results. Shortly after the meeting, the list was imported into an online survey software platform (Qualtrics, Provo, Utah, USA) and anonymous links were sent by email to all ILCOR Neonatal Task Force and Content Expert Group members (n=64). This anonymous survey did not collect protected health information, the identity of respondents could not be directly ascertained and no identifying links were created. This activity met the requirements (<https://az.research.umich.edu/medschool/guidance/exempt-human-subjects-research>) for investigator-determined



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Table 1 Neonatal resuscitation outcome rankings

Outcome	Mean score	SD	GRADE level	Median	25th percentile	75th percentile
Death	9.00	0	Critical	9.00	9.00	9.00
Neurodevelopmental impairment (moderate-severe)	8.41	0.60	Critical	8.45	8.03	9.00
Blind	8.32	0.79	Critical	8.50	8.00	9.00
Cerebral palsy	8.26	0.70	Critical	8.10	8.00	9.00
Deaf	8.18	0.81	Critical	8.15	7.78	9.00
Intraventricular haemorrhage (Papile Grade III or IV)	7.91	0.85	Critical	8.10	7.13	8.50
Periventricular leukomalacia	7.78	0.96	Critical	8.00	7.03	8.40
Retinopathy of prematurity (ICROP Stage III-V)	7.54	1.02	Critical	7.30	7.00	8.20
Necrotising enterocolitis (surgical)	7.34	1.06	Critical	7.35	7.00	8.10
Bronchopulmonary dysplasia (moderate-severe)	7.27	0.83	Critical	7.10	7.00	7.98
Chest compressions or medications in delivery room	6.45	1.75	Important	7.00	5.15	8.00
Intraventricular haemorrhage (any)	6.25	1.32	Important	6.10	5.20	7.10
Bronchopulmonary dysplasia (any)	5.95	1.25	Important	6.00	5.00	7.00
Pneumothorax	5.89	1.42	Important	6.00	5.10	7.00
Time until heart rate >100bpm in delivery room	5.79	1.80	Important	6.00	4.50	7.10
Necrotising enterocolitis (any)	5.76	1.19	Important	6.00	5.00	7.00
Duration of oxygen supplementation in NICU	5.72	1.65	Important	6.00	4.33	7.00
Retinopathy of prematurity (any)	5.68	1.53	Important	6.00	5.00	6.98
Tracheal intubation in delivery room	5.59	1.81	Important	6.00	4.03	6.63
Length of hospital stay	5.59	1.53	Important	6.00	5.00	6.18
Patent ductus arteriosus treated	5.41	1.64	Important	6.00	4.13	6.10
Time until first breath in delivery room	5.06	1.73	Important	5.00	4.00	6.00
Duration of positive pressure ventilation in delivery room	4.82	1.87	Important	5.00	3.00	6.10
Final oxygen concentration in delivery room	4.61	1.97	Important	4.40	3.00	6.10
Blood product transfusion in NICU	4.52	1.68	Important	4.50	3.00	6.00
Admission to NICU	4.47	1.79	Important	4.40	3.00	6.00

GRADE, Grading of Recommendations, Assessment, Development and Evaluation; NICU, neonatal intensive care unit.

exemption by the University of Michigan Institutional Review Board. Completion of the survey implied consent to participate. Using a continuous visual analogue scale reflecting the GRADE outcome lexicon, respondents rated the importance of each outcome (range 1–9, as above). Data were analysed using PRISM V7.0 (GraphPad Software, San Diego, California, USA) and presented as descriptive statistics (mean with SD and median with IQR).

RESULTS

Responses were received from 43 participants (67% response rate) representing all seven member councils. Three responses were censored for data entry errors. All 25 outcomes were rated either ‘critical’ (n=10) or ‘important’ (n=15) for decision-making (table 1). Every outcome was ranked as critical by at least one respondent. The mean difference between the most critical and the least important outcome was 4.5 points. By rank, the five most critical patient-relevant outcomes were death, moderate-severe neurodevelopmental impairment (NDI), blindness, cerebral palsy and deafness. Surrogate outcomes (eg, time to heart rate >100 beats per minute, duration of oxygen supplementation in delivery room, duration of positive pressure ventilation in the delivery room) were rated lower but still considered important by the GRADE lexicon. The least important outcome was admission to the neonatal intensive care unit (NICU). Some variation was noted when ratings were stratified by council; however, the number of responses from any individual resuscitation council was too small to perform subgroup comparisons.

DISCUSSION

This survey describes a consensus rating of neonatal outcomes following delivery room resuscitation by a sample of international experts who develop treatment recommendations. Decisions regarding the quality of evidence supporting treatment recommendations depend on which outcomes the guideline panel identify as critical for decision-making. Numerically ranking outcomes focuses attention on those considered most important as systematic reviewers summarise evidence and guideline panels judge the balance between potential risks and benefits of an intervention.² The outcomes rated critical for neonatal resuscitation by the participants in this survey reflect patient-important outcomes such as mortality and NDI. Respondents gave relatively lower ratings to surrogate outcomes that may not be important to children and their parents.

Because some patient-important outcomes require prolonged follow-up beyond the delivery room, it is common for neonatal resuscitation clinical trials to include surrogate outcome measures such as final oxygen concentration in the delivery room and duration of oxygen in the NICU. However, resuscitation guideline developers should not assume that the impact of an intervention on these surrogate outcome measures is equivalent to the impact on outcomes valued by children and their parents. The lower rating assigned to surrogate outcomes by participants in this survey is consistent with this caution.

The process of rating outcomes is subjective and may vary across cultures and socioeconomic realities. The relative importance of outcomes rated in this survey reflect the experience of healthcare professionals involved in guideline development. When considering outcomes after neonatal resuscitation, guideline panels

must decide whether they are taking the perspective of the child, the parent, clinicians, third-party payers or society. Additionally, this listing applies to both term and preterm infants, which may change the applicability of select outcomes. Participants in this international survey were not directed to take a specific perspective or consider one gestational age group over another. Ultimately, the relative importance given to outcomes following resuscitation in the delivery room should reflect the preferences and values of children and their parents. There are currently no studies that adequately describe child and parent values in sufficient detail to inform a priority ranking system. Previous studies suggest that healthcare professionals, parents and adolescent survivors of neonatal intensive care have different preferences for selected health states and should lead us to be cautious about assuming that values enumerated by guideline panels reflect those of children and their parents.⁵

This survey is the first step in identifying a priority ranking for outcomes after neonatal resuscitation. The ILCOR Neonatal Task Force is working to develop an Utstein-style reporting system that would specify a uniform set of data elements, definitions and reporting methods to support neonatal resuscitation research. Future investigations should identify multicultural cohorts of children and parents to determine patient-important outcomes and assess their relative importance.

CONCLUSION

Among a representative sample of international neonatal resuscitation guideline developers, 10 outcomes were rated as critical

for decision-making. These data inform outcome rankings for systematic reviews of neonatal resuscitation science and international guideline development using the GRADE methodology. Council-specific guidelines implementing ILCOR recommendations may reflect international variations in outcome ratings.

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