

Variations in newborn airway management

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Abstract

Aims

Newborn infants requiring emergency respiratory support are a distinct and challenging population. We aimed to describe newborn airway management and training practices throughout Ireland.

Methods

Telephone-based interviews with neonatologists, paediatricians or senior nursing staff in all 19 neonatal centres nationally were conducted in November 2021. Questions pertaining to equipment, medication, training and governance were answered.

Results

Data were obtained from all 19 centres where eleven different neonatal facemasks, ten direct laryngoscopy blades and three video laryngoscopes were in use. Premedication prior to intubation was routinely administered in ten (53%) centres. Eleven (58%) centres did not have a neonatal intubation policy while 17 (89%) lacked a difficult airway policy. Simulation training was organised in 14 (74%) centres and no centre provided dedicated airway skills training.

Discussion

There is considerable variability in equipment, practice and educational opportunities nationally. Key areas of intervention have been identified.

Introduction

Neonatal resuscitation is frequently performed^{1,2}, requires a specific skillset and timely intervention by first responders (midwives, neonatal nurses and doctors). The success of the resuscitation is dependent on the provision of effective respiratory support via facemask ventilation or endotracheal intubation, initiated by a well-trained operator³ using suitable equipment. Effective facemask ventilation is a difficult skill to master and declining opportunities to intubate have led to reduced success rates amongst trainees^{4,5}. A variety of interventions have recently been shown to enhance neonatal airway management; respiratory function monitors (RFMs) improve the effectiveness of facemask ventilation training⁶ while sedatives and muscle relaxants, high flow nasal cannulae⁷ and video laryngoscopy (VL)^{8,9} improve the success rates and safety of neonatal intubation. We were aware that neonatal resuscitation equipment, policies and training opportunities differ across Ireland and conducted this study to assess the degree of variability.

Methods

All 19 neonatal centres in Ireland were included. Pre-arranged, telephone-based interviews were conducted by one researcher (CNC) with a designated senior member of staff (neonatologist, paediatrician or senior nursing staff) at each site in November 2021. 45 questions were developed by the authors by consensus and circulated to participants in advance of the interview. Information in the following domains was gathered; equipment, medication, education and governance.

Results

Data were obtained from all 19 (100%) centres from; 3 neonatologists, 6 paediatricians and 10 senior nurse managers (*table 1*).

Equipment

Facemask ventilation: Eleven different neonatal facemasks were in use nationally. Variations within centres were also noted; eight (42%) had both round and anatomical masks, seven (39%) had two different types of facemasks and two (11%) centres had three. *Endotracheal intubation:* Equipment available for neonatal intubation included ten direct laryngoscopy blades and three different video laryngoscopes. Video laryngoscopes were available in 15 (79%) centres (7 local, 4 regional, 4 tertiary) and in use at 13 (74%). One centre (5%) used VL for all initial attempts.

Medication

The choice of premedication prior to intubation was inconsistent and not routinely administered.

Training, education and governance

Fourteen (74%) centres organised simulation-based sessions and 18 (95%) had a manikin that could be intubated. No centre used RFMs for facemask ventilation training or provided dedicated airway skills training. A variety of neonatal intubation and surfactant administration policies were in place. Two (11%) centres reported having a dedicated algorithm for the management of a difficult airway. ENT surgeons and anaesthetists were on site in 5 (21%) and 19 (100%) centres respectively.

Table 1. Variability in facemasks, laryngoscopes, premedication, policies and training

	No. (%) n=19
Facemask brand (Round)	
- Fischer & Paykel	8 (42)
- Armstrong medical Neoflow	1 (5)
- Laerdal	5 (26)
- Intersurgical	1 (5)
Facemask brand (Anatomical)	
- Ambu Ultraseal	1 (5)
- Fannin	2 (11)
- Armstrong medical	3 (16)

- VBM medizintechnik	1 (5)
- Mercury Medical	3 (16)
- Ambu King	1 (5)
- Intersurgical	2 (11)
Centres with both round and anatomical masks	8 (42)
Direct laryngoscopes	
- Single use only	7 (37)
- Reusable only	6 (32)
- Both	6 (32)
Video laryngoscopy	
- Video laryngoscope available	15 (79)
- Video laryngoscope in use	13 (68)
- Used more frequently than direct laryngoscopes	1 (5)
Video laryngoscopes	
- InfantView (Acutronic)	9 (60)
- C-MAC (Karl Storz)	3 (20)
- McGrath MAC (Medtronic)	3 (20)
Premedication	
- Guideline available	13 (68)
- Routine administration prior to intubation	10 (53)
Choice of premedication	
- Fentanyl/Atropine/Suxamethonium	3 (16)
- Fentanyl/ Suxamethonium	3 (16)
- Morphine	3 (16)
- Atropine / Ketamine	1 (5)
Protocols	
Endotracheal intubation	8 (42)
Surfactant administration	13 (68)
Difficult airway	2 (11)
Types of training sessions	
- Manikin based learning	16 (84)
- Intubatable manikin on site	18 (95)
- Simulation sessions	14 (74)
- Objective airway skills training	0 (0)

Discussion

Our findings highlight considerable disparity in the equipment available at each centre. There are 11 different facemasks in use across Ireland. This represents a significant challenge for trainees who rotate through neonatal centres. Different facemasks require specific techniques for optimal use. The provision of dedicated

facemask ventilation training using the equipment available locally may address this. There are three different video laryngoscopes in use nationally; the superiority of one over another has not been established. Our findings suggest VL has been embraced by Irish neonatal units. However, despite its wide availability and utility for novice intubators, only one centre uses VL routinely for all first neonatal intubation attempts. Wide availability with minimal uptake suggests a gap in the training and framework for use. VL training interventions may increase their use. We also found considerable variation in the use of neonatal intubation policies and a limited availability of difficult airway algorithms. The self-reported use of premedication in Ireland was 53%, which is lower than a large, international registry study which reported a rate of 64%¹⁰. Reasons why premedication is not routinely administered may include a lack of familiarity with the drugs or a fear of adverse events. Development of a national premedication policy and neonatal difficult airway algorithm are warranted. The latter should outline; team structure, methods to optimise oxygenation as well as the choice and use of advanced equipment. This complete survey of all neonatal centres in Ireland has identified key areas of intervention to support trainees, paediatricians and neonatologists which deserve consideration and standardisation on a national level.

Declarations of Conflict of Interest:

None declared.

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