INTUBATION
Supporting information

This guideline has been prepared with reference to the following:

Fawke J, Wyllie J, Madar J et al. Newborn resuscitation and support of transition of infants at birth Guidelines. 2021. Resuscitation Council (UK)

https://www.resus.org.uk/library/2021-resuscitation-guidelines/newborn-resuscitation-and-support-transition-infants-birth

Australian Resuscitation Council, New Zealand Resuscitation Council (2011), Tracheal Intubation and Ventilation of the Newborn Infant. ARC and NZRC Guideline 2010. Emergency Medicine Australasia, 23: 436–439

https://resus.org.au/guidelines/anzcor-guidelines/

Size of ETT is best selected according to the weight of the baby?
A 2021 RCT compared two different methods (Tochen's formula = weight in kilograms + 6 cm; and nasal septum-tragus length [NTL] + 1 cm) used to determine the endotracheal tube (ETT) insertion depth (Uygur, 2021). A total of 167 infants (22-42 weeks of gestational age) were included in the study. The proper tube placement rate in both groups was similar (32.4 vs. 30.4% for infants < 34 weeks of gestational age and 56.8 vs. 45.0% in infants > 34 weeks of gestational age). The ETT was frequently placed below T2 at a higher rate in infants with a gestational age of <34 weeks, especially in the NTL group (46% in the Tochen group and 60.7% in the NTL group).
A study in 39 intubated neonates (Luten, 2007) tested the accuracy of a measuring tape (based on a combination of data from the babies in the study and published anthropometric papers) in predicting the correct size of ETT. The average relative difference between tape-predicted weight and actual weight was 9.5% (95% CI 8.3-10.6%) and was evenly distributed throughout all the weight groups. The tape predicted actual ETT size in 96% of cases (95% CI 86.3-99.5%) and was correct within 1 tube size (0.5 mm) in 100% (95% CI 94.8-100%). The authors concluded that length was an accurate predictor of ETT size and weight and could be used in emergency resuscitation when weight was unobtainable.
A small audit in 36 babies (Whyte, 2007) found that nasal-tragus length predicted correct insertional length for ETTs in 94% of cases, compared to 73% when either weight or sternal length was used.
An audit in 33 UK neonatal units (Kempley, 2008) resulted in the provision of a table showing ETT length by gestation and weight.

Uygur O, Öncel MY, Şimşek GK et al. Is Nasal Septum-Tragus Length Measurement Appropriate for Endotracheal Tube Intubation Depth in Neonates? A Randomized Controlled Study. Am J Perinatol. 2021;38:728-33

Kempley ST, Moreiras JW, Petrone FL. Endotracheal tube length for neonatal intubation. Resuscitation 2008;77: 369-73

Luten R, Kahn N, Wears R, et al. Predicting endotracheal tube size by length in newborns. J Emerg Med 2007; 32: 343-7

Whyte KL, Levin R, Powis A. Clinical audit: optimal positioning of endotracheal tubes in neonates. Scott Med J 2007;52:25-7

Evidence Level: IV

Is fentanyl superior to morphine for sedation?
A small, double-blind, randomised trial in 20 preterm neonates (Pereira e Silva, 2007) compared intubation conditions (ease of laryngoscopy, position of the vocal cords, coughing, jaw relaxation and movement of the limbs) in two equal-sized groups given morphine or remifentanil. Conditions were rated as Excellent, Good or Poor. Morphine scored 0, 6, 4 respectively, compared to 6, 4, 0 for remifentanil. The authors concluded that conditions with remifentanil were significantly better (p = 0.0034) than with morphine. Although small, the study had a statistical power of 83%.

“Many units who give sedation use morphine, probably because of familiarisation rather than proven efficacy” (Wyllie, 2008).
Although fentanyl or morphine are the most commonly used sedative agents, there is a need for larger trials to determine the most effective regimen (Carbajal, 2007).
A small randomised study in 30 infants (Cignacco, 2008) failed to demonstrate any pain relief from the use of morphine as measured by three assessment tools (Bernese Pain Scale for Neonates, Premature Infant Pain Profile and Visual Analogue Scale).

Carbajal R, Eble B, Anand KJ. Premedication for tracheal intubation in neonates: confusion or controversy? Semin Perinatol 2007;31:309-17

Cignacco E, Hamers JP, van Lingen RA, et al. Pain relief in ventilated preterms during endotracheal suctioning: a randomized controlled trial. Swiss Med Week 2008;138:635-45

Pereira e Silva Y, Gomez, RS, Marcatto JO, et al. Morphine versus remifentanil for intubating preterm neonates. Arch Dis Child Fetal Neonatal Ed 2007;92:F293-4
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2675432/

Wyllie JP. Neonatal endotracheal intubation. Arch Dis Child Educ Pract Ed 2008;93:44-9
http://ep.bmj.com/content/93/2/44.full

Evidence Level: III

How often do nasogastric tubes need changing routinely and why?
Only two papers addressing this question were identified. The first (Rogahn, 1998) commented that no other previously published articles on the subject had been found. The author carried out a survey of 14 NICUs with 10 or more ventilators to establish their current practice on changing nasogastric tubes and whether or not this was evidence-based. Practice varied from changing the tubes daily to weekly (median 3 days), and was based on experience rather than evidence in all cases.
The second paper (Mears, 2001) observed that little had changed since the publication of the previous paper in 1998. The author surveyed 36 neonatal units in the Thames region and found that, despite her own unit changing the tubes at 48 hour intervals, 64% of those surveyed changed them at 4-7 days, with no reported complications.
The author also contacted the maker of the tubes used in her own unit (Vygon UK Ltd) for advice. This was that tubes may be safely left in situ for up to seven days, after which the integrity of the PVC used in their manufacture could not be guaranteed.
The author’s unit conducted an audit on the basis of this information and altered the frequency of tube change from 48 hours to 5 days, with some tubes being left in situ for up to 7 days if an infant was deemed too unwell to tolerate removal. A re-audit was performed 6 months after completion of the original study, which confirmed that leaving the tubes in situ for up to 7 days was not associated with any recorded adverse effects.

Mears M. Changing nasogastric tubes in the sick and preterm infant: a help or a hindrance? J Neonatal Nurs 2001;7:202-6

Rogahn J. Intragastric feeding in preterm infants: a survey of frequency of tube change. J Neonatal Nurs 1998;4:31-3

Evidence Level: V

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