Extubating Extremely Premature Newborns: Predictors of success and reasons for failure

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Objective: Mechanical ventilation is crucial for survival for the most immature newborns but associated with complications. The optimal timing of extubation is still a challenge for clinicians. Our aim was to explore first extubation attempts among extremely low gestational age newborns (ELGANs) < 26 weeks, identifying factors that may increase the quality of clinical judgment of extubation readiness.

Method: A population-based study using data from the Norwegian Neonatal Network supplemented by data from medical records of neonates admitted to Norwegian neonatal intensive care units between 2013-2018. All included newborns were clinically judged ready for extubation. The primary outcome was successful extubation, defined as no reintubation within 72 hours.
Results:
We analyzed 261 first extubation attempts from conventional ventilation. The median gestational age was 24.6 weeks (IQR 24.1-25.4), and postnatal age at the extubation attempt was median 5 days (IQR 2-17).

Overall, 140 (54%) neonates were successfully extubated, whereas 121 (46%) failed.

Pre-extubation fraction of inspired oxygen ≤ 0.35, higher Apgar score, higher gestational age at birth, female sex and higher postnatal age were identified as important predictors of successful extubation.

Figure 1 Odds ratio with 95% confidence interval for the adjusted predictors of extubation success among extremely low gestational age neonates clinically judged ready for extubation.

Abbreviations: GA, gestational age; MAP, mean airway pressure
**Results:**
Apnea was the most frequently reported reason for reintubation (51%), whereas work of breathing, high oxygen requirement, hypercapnia and sepsis were reported for 22%, 14%, 7% and 6%, respectively.

![Reasons for extubation failure](image)

**Conclusion:**
Our results suggest that additional emphasis on oxygen requirement, sex and general condition at birth may further increase extubation success when clinicians are about to extubate ELGANs for the first time. The reasons for failure were generally respiratory related.
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