

# Identifying Pediatric Neurosurgical Patients at High Risk of Death Following Unplanned Postoperative Reintubation

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## INTRODUCTION

- Pediatric patients undergoing neurosurgery are a vulnerable patient population in whom unplanned reintubation may occur.
- Unplanned reintubation is associated with increased morbidity, mortality, and prolonged length of stay in the intensive care unit and may signal evolving respiratory or neurologic compromise.
- Understanding which children are most likely to die following unplanned reintubation is a critical clinical question to explore.
- This study examined the rate of death following unplanned reintubation in pediatric neurosurgical patients.

## METHODS

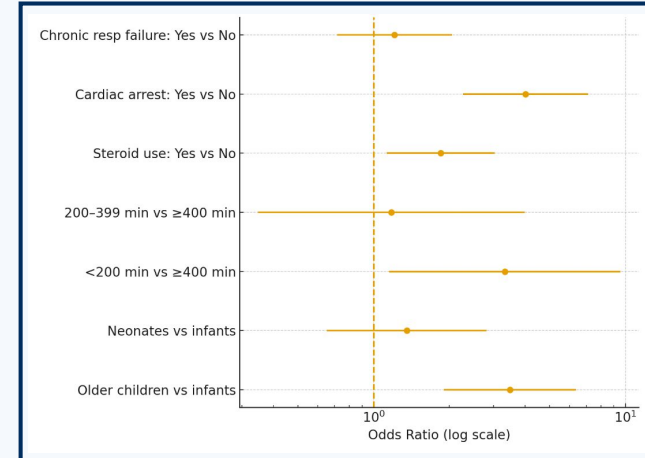
- Retrospective cohort study of children (<18 years) in the National Surgical Quality Improvement Program-Pediatric (NSQIP-P) who underwent neurosurgical procedures and required unplanned reintubation between 2012 and 2023.
- The primary outcome was hospital mortality following unplanned reintubation.
- Secondary outcomes were identifying the risk factors associated with mortality following unplanned reintubation and delineating the sequence of physiologic deterioration leading to mortality.

## RESULTS

**Table 1. Characteristics of pediatric patients with unplanned reintubation in those who survived vs died within 30 days of neurosurgery**

	Overall	Survived to 30 days	Died within 30 days
	No. (%)	No. (%)	No. (%)
<b>Study population</b>	222	207	15
<b>Age</b>			
Adolescents (>12 years)	45 (20.3)	42 (20.3)	3 (20.0)
Children (>5 years-12 years)	53 (23.9)	48 (23.2)	5 (33.3)
Young children (>12 months -5 years)	38 (17.1)	34 (16.4)	4 (26.7)
Infants (<=12 months)	86 (38.7)	83 (40.1)	3 (20.0)
<b>ASA classification ≥ 3</b>	190 (85.6)	175 (84.5)	15 (100.0)
<b>Procedural group</b>			
Tumor	151 (68.0)	141 (68.1)	10 (66.7)
<b>Operative time</b>			
< 200 minutes	69 (31.1)	62 (30.0)	7 (46.7)
200-399 minutes	93 (41.9)	88 (42.5)	5 (33.3)
≥ 400 minutes	60 (27.0)	57 (27.5)	3 (20.0)
<b>Central nervous system abnormality</b>	153 (68.9)	145 (70.0)	8 (53.3)
<b>Childhood malignancy</b>	109 (49.1)	99 (47.8)	10 (66.7)
<b>Seizure disorder</b>	48 (21.6)	42 (20.3)	6 (40.0)
<b>Steroid use (within 30 days)</b>	72 (32.4)	66 (31.9)	6 (40.0)

**Figure 1. Risk factors for increased mortality in pediatric neurosurgical patients following unplanned postoperative reintubation**



## DISCUSSION

- 222 children required unplanned reintubation after neurosurgery with a high mortality rate, typically within two weeks of surgery
- Unplanned reintubation is associated with unusually high rates of postoperative mortality in neurosurgical patients.
- This likely reflects a combination of surgical and physiologic factors.
- Key predictors of mortality following unplanned reintubation are ASA score ≥ 3, older age, preoperative steroid use, and perioperative cardiac arrest.

## CONCLUSION

- Mortality following unplanned reintubation in pediatric neurosurgical patients is associated with distinct clinical factors including higher ASA status, older age, preoperative steroid exposure, and perioperative cardiac arrest.
- This underscores the importance of identifying opportunities for improvement and implementing early rescue protocols for high risk neurosurgical patients.

### References:

1. Drapeau AI, Mpody C, Gross MA, et al. J Neurosurg Anesthesiol. 2024;36(1):37-44.
2. Mpody C, Kidwell RC, Willer BL, et al. Br J Anaesth. 2024;133(5):1085-1092.