



# Complications, preventable harm and death at emergence: an analysis of the Wake Up Safe database

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## Introduction

- Etiology of adverse events during anesthesia care relate to the phase of care
- Study of specific phases may guide process improvement to reduce adverse events

## Methods

- We defined the emergence phase using variables in the Wake Up Safe (WUS) database that specified emergence, extubation, and within the first postoperative hour
- Events during emergence were selected and reviewed by three anesthesiologists for inclusion criteria

## Results

- WUS database reviewed 7/8/2020 - 4874 events - 1073 met inclusion criteria (22.0%), 6 duplicates removed, resulting in 1067 events (Table 1)
- Some events listed in multiple categories (ie. respiratory event led to cardiac arrest and then death)
- 54 events resulted in permanent harm or death
- Identified 205 cardiac arrests, 35 (17.1%) resulted in harm/death
- 59.5% of arrests (122/205) were respiratory in etiology and 74.2% deemed preventable (89/120) (Table 2)
- 8 preventable events resulted in permanent harm
  - 4 followed cardiac catheterization
  - 2 due to unrecognized procedural complications
  - 1 due to unrecognized hyperkalemia following resuscitation

## Table 1: All Complications

Event template	Number	Preventable	Learning Potential	Harm	Anesthesia or Periop team Contribution
Airway and Respiratory	748	264/585	403/590	12/748	472/748
Medication	103	72/95	79/93	0/99	99/99
Cardiovascular Support	54	15/46	26/46	13/54	31/52
Nervous System	20	6/18	13/19	5/18	4/18
Awareness	2	2/2	2/2	0/2	2/2
Other	53	20/51	28/50	0/60	28/52
Total	1067	406/872	584/875	55/1063	655/980

Legend: Event template indicates how frequently a given template was used. Some events used multiple templates. For some events, some variables were left blank. Harm = Permanent or greater.

## Conclusion

- 22.0% of adverse events in the WUS database occur during the emergence phase
- Respiratory and medication events rarely result in lasting harm
- 24% of cardiovascular events during the emergence phase resulted in permanent harm or death
- 59.5% of cardiac arrests were respiratory in etiology

## Table 2: Cardiac Arrest

Event template	Number	Preventable	Learning Potential	Harm	Anesthesia or Periop team Contribution
Respiratory	122	89/120 (74.2%)	96/114 (84.2%)	6/122 (4.9%)	84/115 (73.0%)
Cardiac	63	11/60 (18.3%)	32/60 (53.3%)	26/64 (40.6%)	23/61 (37.7%)
Medication	10	10/10 (100%)	9/10 (90%)	1/10 (10%)	10/10 (100%)
Other	13	2/8 (25%)	7/13 (53.8%)	3/11 (27.2%)	5/11 (45.5%)
Total	205	109/189 (57.7%)	141/194 (72.7%)	35/203	119/194 (61.3%)

Legend: Some events used multiple templates

## References

1. Habre W et al. Incidence of severe critical events in paediatric anaesthesia (APRICOT): a prospective multicentre observational study in 261 hospitals in Europe. *Lancet Respir Med* 2017;5:412–25.
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3. Oofuvong M et al. Risk over time and risk factors of intraoperative respiratory events: a historical cohort study of 14,153 children. *BMC Anesthesiol* 2014;14:13.