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## Background

- Large, prospective studies found critical perioperative events in ~5% of pediatric surgical patients. The majority of events are respiratory followed by cardiac. Outcome of 50-97% of cases is ultimately characterized as “uneventful” (Lancet Resp Med 2017, 5: 412-25).
- Little is known on the incidence of postoperative escalation of care (EOC) and whether it is due to underappreciated patient morbidity or perioperative events. Unscheduled admissions or prolonged stay in the postanesthesia care unit (PACU)/ Day Surgery Unit (DSU) can present logistic difficulties for hospitals and may create financial, organizational, and emotional challenges for parents and children.
- This is the first study to systematically evaluate the rate of postoperative EOC in a pediatric surgical population.

## Results

- 38,857 anesthesia encounters were recorded in the study period, and 29,964 encounters in individual patients were included in the analysis.
- An Escalation of Care occurred in 1,015 encounters.
- Data from the postoperative note was more specific for assessing the reason for EOC than the administered medications and was thus used for the multivariable analysis.

## Methods

- Retrospective observational study: patients receiving anesthesia care in the operating suite at Children’s Wisconsin between 1/1/2022 and 12/31/2023.
- Radiological or emergent procedures were not included.
- EOC defined as 1) unscheduled admission to the nursing unit (NU), 2) unscheduled admission to the PICU including transfers from the NU <24h postop, 3) PACU stay >180 min PACU+DSU stay >360 min.
- If patients had multiple anesthesia encounters, the encounter with EOC was prioritized. In case of more than one EOC per patient, one was randomly chosen for the study.
- Comorbidities and reasons for EOC were retrieved from preoperative and postoperative notes in the electronic health record (EPIC™, Verona, WI) using textual pattern analysis and from the medication administration record.
- Comparison between patients with and without EOC used Pearson’s X<sup>2</sup>-test (categorical variables) and Wilcoxon signed-rank test (continuous, skewed variables).
- Multivariable logistic regression models were used to determine associations between patient and surgical factors and EOC (Rstudio© version 2023.12.1+402). P<0.05.

## Discussion

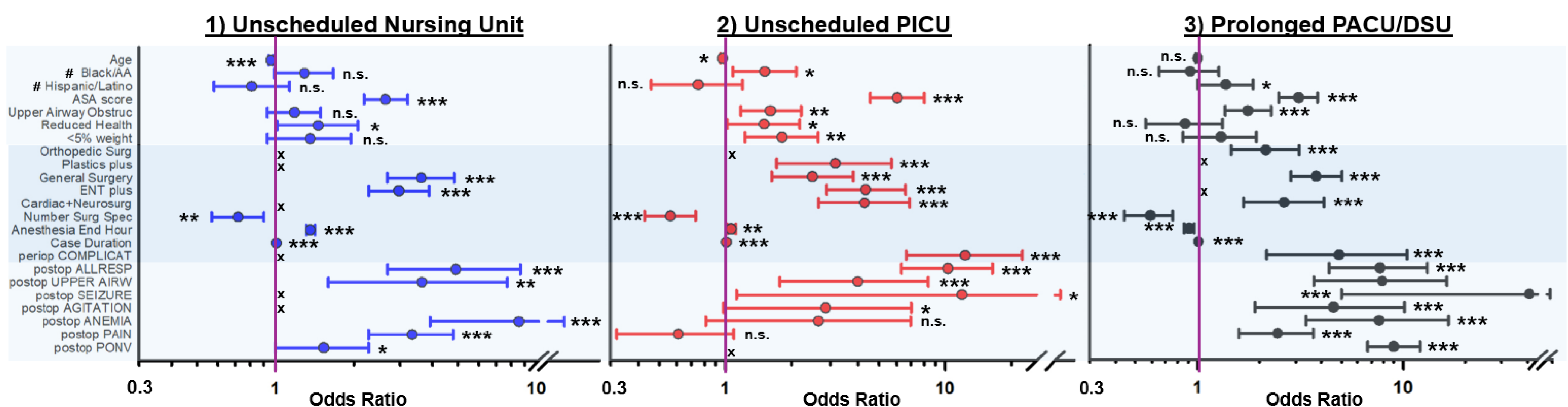
- Our results do not reflect *the incidence* of adverse events. Rather, they illustrate that the impact of patient comorbidities like upper airway obstruction, reduced health, and failure to thrive on the postoperative course was routinely underappreciated during scheduling.
- Certain surgical specialties were more likely to underestimate the required level of postoperative care.
- Common complications like respiratory failure, pain, or PONV were associated with EOC.
- This highlights the importance of aggressive prevention by the anesthesiologist and consideration during case scheduling by the surgeon.

## Patient Characteristics

	1) Unscheduled Nursing Unit			2) Unscheduled PICU			3) Prolonged PACU/DSU		
	no EOC n=20,728	EOC n=421	p-value	no EOC n=26,476	EOC n=255	p-value	no EOC n=21,238	EOC n=341	p-value
Age (y)	5 (2,11)	7 (3,13)	<0.001	6 (2, 12)	5 (1, 13)	0.139	5 (2, 11)	9 (4, 14)	<0.001
Weight (kg)	21 (14,45)	27 (16,58)	<0.001	22 (14, 47)	19 (11, 44)	0.003	21 (14, 46)	33 (18, 59)	<0.001
Sex	female	163 (39%)	0.182	11,184 (42%)	101 (40%)	0.397	8,923 (42%)	158 (46%)	0.123
	male	258 (61%)		15,292 (58%)	154 (60%)		12,314 (58%)	183 (54%)	
Race	Asian.AI.PI	19 (4.5%)	<0.001	1,093 (4.1%)	7 (2.7%)	<0.001	852 (4.0%)	17 (5.0%)	0.091
	Black/African-American	114 (27%)		4,840 (18%)	77 (30%)		3,697 (17%)	56 (16%)	
	Hispanic/ Latino	49 (12%)		3,978 (15%)	28 (11%)		3,164 (15%)	68 (20%)	
	White/Caucasian	229 (54%)		15,969 (60%)	137 (54%)		13,055 (61%)	193 (57%)	
	Unknown	10 (2.4%)		596 (2.3%)	6 (2.4%)		470 (2.2%)	7 (2.1%)	
ASA score	2 (1, 2)	3 (2, 3)	<0.001	2 (2, 3)	3 (3, 3)	<0.001	2 (2, 2)	3 (2, 3)	<0.001
Prematurity	1,169 (5.6%)	40 (9.5%)	<0.001	1,598 (6.0%)	39 (15%)	<0.001	1,212 (5.7%)	34 (10.0%)	0.001
Reduced Health	898 (4.3%)	56 (13%)	<0.001	1,364 (5.2%)	65 (25%)	<0.001	942 (4.4%)	36 (11%)	<0.001
Weight <5th percentile for age	1,203 (5.8%)	46 (11%)	<0.001	1,695 (6.5%)	61 (24%)	<0.001	1,258 (6.0%)	36 (11%)	<0.001
Weight >95th percentile for age	3,112 (15%)	79 (19%)	0.037	4,253 (16%)	35 (14%)	0.364	3,201 (15%)	57 (17%)	0.331
Anesthesia End Hour (time)	11.00 (9.00, 13.00)	14.00 (11.00, 17.00)	<0.001	11.00 (9.00, 14.00)	14.00 (11.00, 17.00)	<0.001	11.00 (9.00, 13.00)	11.00 (10.00, 14.00)	<0.001
Case Duration (min)	49 (27, 85)	91 (58, 150)	<0.001	57 (32, 96)	142 (71, 219)	<0.001	50 (28, 86)	103 (61, 155)	<0.001

**Table 1:** Patient characteristics for the three types of Escalation of Care (EOC), unscheduled admission to the 1) nursing unit or 2) pediatric intensive care unit (PICU) or 3) prolonged stay in the postanesthesia care unit (PACU) and/or Day Surgery Unit (DSU). Please note that the size of the control groups (no EOC) varied dependent on the originally scheduled postoperative disposition. Data are shown as median (25-75% range) or number (%). Pearson’s X<sup>2</sup>-test for categorical variables and Wilcoxon signed-rank test for continuous, skewed variables. Asian.AI.PI: combined count of patients of Asian, American Indian, and Pacific Islander descent.

## Factors Associated with Escalation of Care



**Figure 1:** Odds Ratios (OR) for the association of individual patient factors (top), surgical factors (middle), and reason for admission documented in the postoperative note (bottom) with unscheduled admission to the 1) nursing unit or 2) pediatric intensive care unit (PICU) or 3) prolonged stay in the postanesthesia care unit (PACU) and/or Day Surgery Unit (DSU). Shown are OR and 95% confidence interval. An OR>1 expresses an increased likelihood of the event. Please note the logarithmic scale. For the multivariate analysis, n.s.: not significant, \*p<0.05, \*\*p<0.01, \*\*\*p<0.001; x: variable not significant in the univariate analysis and thus not included in the multivariate analysis. Variables that did not reach significance in the multivariate analysis in any group #: relative to White/ Caucasian. AA: African American; Reduced Health: includes significant, chronic systemic disease, e.g., neuromuscular disease, complex syndromes, oncology, failure to thrive; Plastics plus: includes plastic and oromaxillofacial surgery; ENT plus: includes otolaryngology and pulmonary medicine; Cardiac+Neurosurg: includes cath lab, cardiac and neurosurgery; Number of Surgical Specialties involved in the encounter; Anesthesia End Hour: time of day at end of surgery; COMPLICAT: “complications” checked in postoperative note; ALLRESP: aspiration, reactive airway disease, hypoxia; UPPER AIRW: upper airway obstruction, croup, stridor; PONV: postoperative nausea and vomiting.