



More Training = Sicker Patients: Pediatric Anesthesiologists Care for Younger and Sicker Children

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Introduction

Children routinely undergoing surgery in community-based facilities may or may not be cared for by anesthesiologists with specialized pediatric training. When compared to anesthesiologists without this training, pediatric anesthesiologists have undergone a year of formal training in caring for critically ill children and those undergoing complicated operative procedures. We examined whether the characteristics of patients treated by anesthesiologists with ACGME-approved pediatric fellowship training differed from patients treated by anesthesiologists without specialized pediatric training.

Methods

- Data collected as part of the Quantum™ Clinical Navigation System between 2009 and 2014 for all patients less than 18 years old.
- Patient and hospital characteristics, surgical procedure (CPT codes), anesthetic approach, efficiency and quality indicators, and patient outcomes within 48-hours prospectively were collected.
- 233 anesthetizing locations across 19 facilities were included.
- Each patient's anesthesiologist was classified as either having completed a pediatric anesthesia fellowship program or not, and case-mix characteristics were compared.
- In a sensitivity analysis designed to account for differences due to type of surgery, we repeated the comparison in a subset of patients undergoing isolated tonsillectomy and adenoidectomy.
- Due to the size of the sample, in addition to reporting p-values of group difference tests, we used standardized mean differences and considered differences significant if the SMD>0.1.

Results

Treatment by Pediatric Subspecialty-Trained Provider	No (N=35,691)	Yes (N=46,681)	Total (N=82,372)	p value	SMD†
Age				<0.0001 ¹	0.331
Median	6.0	4.0	5.0		
Q1, Q3	3.0, 12.0	1.0, 9.0	2.0, 11.0		
Range	(0.0-17.0)	(0.0-17.0)	(0.0-17.0)		
Age Category				<0.0001 ²	0.440
<1	2092 (5.9%)	9410 (20.2%)	11502 (14.0%)		
1-4	12443 (34.9%)	15081 (32.3%)	27524 (33.4%)		
5-17	21156 (59.3%)	22190 (47.5%)	43346 (52.6%)		
Year of Encounter				<0.0001 ²	0.168
2009	5859 (16.4%)	6798 (14.6%)	12657 (15.4%)		
2010	6777 (19.0%)	7852 (16.8%)	14629 (17.8%)		
2011	7380 (20.7%)	7805 (16.7%)	15185 (18.4%)		
2012	6184 (17.3%)	8930 (19.1%)	15114 (18.3%)		
2013	6064 (17.0%)	9669 (20.7%)	15733 (19.1%)		
2014	3427 (9.6%)	5627 (12.1%)	9054 (11.0%)		
Treatment Location				<0.0001 ²	0.818
Inpatient	11020 (30.9%)	32078 (68.7%)	43098 (52.3%)		
Outpatient	24671 (69.1%)	14603 (31.3%)	39274 (47.7%)		
Sex (Male)	20202 (56.6%)	27767 (59.5%)	47969 (58.2%)	<0.0001 ²	0.058
ASA PS				<0.0001 ²	0.639
1	18724 (52.5%)	13170 (28.2%)	31894 (38.7%)		
2	13754 (38.5%)	20321 (43.5%)	34075 (41.4%)		
3	2865 (8.0%)	9253 (19.8%)	12118 (14.7%)		
4	329 (0.9%)	3777 (8.1%)	4106 (5.0%)		
5	19 (0.1%)	160 (0.3%)	179 (0.2%)		
Born Premature*	262 (1.7%)	1633 (6.7%)	1895 (4.7%)	<0.0001 ²	0.235
OSA Diagnosis	190 (0.5%)	174 (0.4%)	364 (0.4%)	0.0006 ²	0.024
Procedure (top CCS 10 categories)					
Myringotomy	3688 (10.3%)	960 (2.1%)	4648 (5.6%)		
Oral and Dental Services	4689 (13.1%)	1042 (2.2%)	5731 (7.0%)		
Tonsillectomy and/or adenoidectomy	6434 (18.0%)	2147 (4.6%)	8581 (10.4%)		
Other vascular catheterization, not heart	442 (1.2%)	1365 (2.9%)	1807 (2.2%)		
Upper gastrointestinal endoscopy, biopsy	962 (2.7%)	2175 (4.7%)	3137 (3.8%)		
Appendectomy	879 (2.5%)	887 (1.9%)	1766 (2.1%)		
Non-diagnostic OR therapeutic procedures, male genital	607 (1.7%)	2573 (5.5%)	3180 (3.9%)		
Non-diagnostic OR therapeutic procedures, bone	709 (2.0%)	1109 (2.4%)	1818 (2.2%)		
Magnetic resonance imaging	2271 (6.4%)	5520 (11.8%)	7791 (9.5%)		
Anesthesia (prefix 0 cpts)	678 (1.9%)	784 (1.7%)	1462 (1.8%)		
Other	14332 (40.2%)	28119 (60.2%)	42451 (51.5%)		

†SMD=standardized mean difference. A difference larger than 0.1 is considered a meaningful difference, and a difference >0.5 is a large difference.
*Prematurity status only collected for 2012-2014, missing for 42,471. Percent is rate among those with collected data.
¹Wilcoxon ²Chi-Square

Treatment by Pediatric Subspecialty-Trained Provider	No (N=6,434)	Yes (N=2,147)	Total (N=8,581)	p value	SMD†
Age				<0.0001 ¹	0.256
Median	5.0	4.0	4.0		
Q1, Q3	3.0, 7.0	2.0, 6.0	2.0, 7.0		
Range	(0.0-17.0)	(0.0-17.0)	(0.0-17.0)		
Age Category				<0.0001 ²	0.228
<1	66 (1.0%)	32 (1.5%)	98 (1.1%)		
1-4	3034 (47.2%)	1244 (57.9%)	4278 (49.9%)		
5-17	3334 (51.8%)	871 (40.6%)	4205 (49.0%)		
Year of Encounter				<0.0001 ²	0.135
2009	1107 (17.2%)	372 (17.3%)	1479 (17.2%)		
2010	1362 (21.2%)	465 (21.7%)	1827 (21.3%)		
2011	1193 (18.5%)	408 (19.0%)	1601 (18.7%)		
2012	955 (14.8%)	399 (18.6%)	1354 (15.8%)		
2013	1191 (18.5%)	340 (15.8%)	1531 (17.8%)		
2014	626 (9.7%)	163 (7.6%)	789 (9.2%)		
Treatment Location				<0.0001 ²	0.250
Inpatient	121 (1.9%)	150 (7.0%)	271 (3.2%)		
Outpatient	6313 (98.1%)	1997 (93.0%)	8310 (96.8%)		
Sex (Male)	3327 (51.7%)	1169 (54.4%)	4496 (52.4%)	0.0278 ²	0.055
ASA PS				<0.0001 ²	0.596
1	3911 (60.8%)	737 (34.3%)	4648 (54.2%)		
2	2431 (37.8%)	1229 (57.2%)	3660 (42.7%)		
3	91 (1.4%)	175 (8.2%)	266 (3.1%)		
4	1 (0.0%)	6 (0.3%)	7 (0.1%)		
Born Premature*	46 (1.7%)	45 (5.0%)	91 (2.5%)	<0.0001 ²	0.124
OSA Diagnosis	124 (1.9%)	54 (2.5%)	178 (2.1%)	0.0979 ²	0.040

†SMD=standardized mean difference. A difference larger than 0.1 is considered a meaningful difference, and a difference >0.5 is a large difference. OSA=obstructive sleep apnea
*Prematurity status only collected for 2012-2014, missing for 4,907. Percent is rate among those with collected data.
¹Wilcoxon ²Chi-Square

Results

- Of 82,372 eligible pediatric patients cared for by 109 anesthesiologists, 56.7% were cared for by 20 subspecialty-trained pediatric anesthesiologists (18.3% of all anesthesiologists).
- Pediatric anesthesiologists were more likely to care for infants and neonates (20.2% of their cases vs 5.9% of cases for non-fellowship trained anesthesiologists).
- Fellowship-trained anesthesiologists were more likely to treat younger (median age 4 vs 6 for non-fellowship anesthesiologists) and sicker (higher ASA status, history of prematurity) patients.
- In sensitivity analysis restricted to 8,581 patients undergoing T&A, pediatric anesthesiologists remained far more likely to care for younger (median age 4 vs 5 for non-fellowship anesthesiologists) and sicker patients.
- While caring for comparable numbers of patients, fellowship-trained providers encountered approximately five times more pediatric patients per year (mean 491.3 vs. 98.6 for non-fellowship anesthesiologists).

Conclusions

- In a large community-based practice across more than 200 anesthetizing locations, pediatric anesthesiologists were more likely to care for younger or sicker patients when compared with anesthesiologists who did not have equivalent fellowship training.
- A sensitivity analysis of T&A procedures suggests this was true even after adjusting for the type of procedure.
- The implications of treating patients with higher acuity of illness in terms of examining efficiency indicators, quality indicators, and patient outcomes deserves further exploration.

