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Jordan Keys

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Treatment of Post-Operative Pain in Children with Severe Neurologic Impairment

Jordan Keys, MD¹; Jessica Markham, MD¹; and Matthew Hall, PhD^{1,2}; Jessica Bettenhausen, MD¹

¹Children's Mercy, Kansas City, Missouri, USA; ²Children's Hospital Association, Lenexa, Kansas, USA

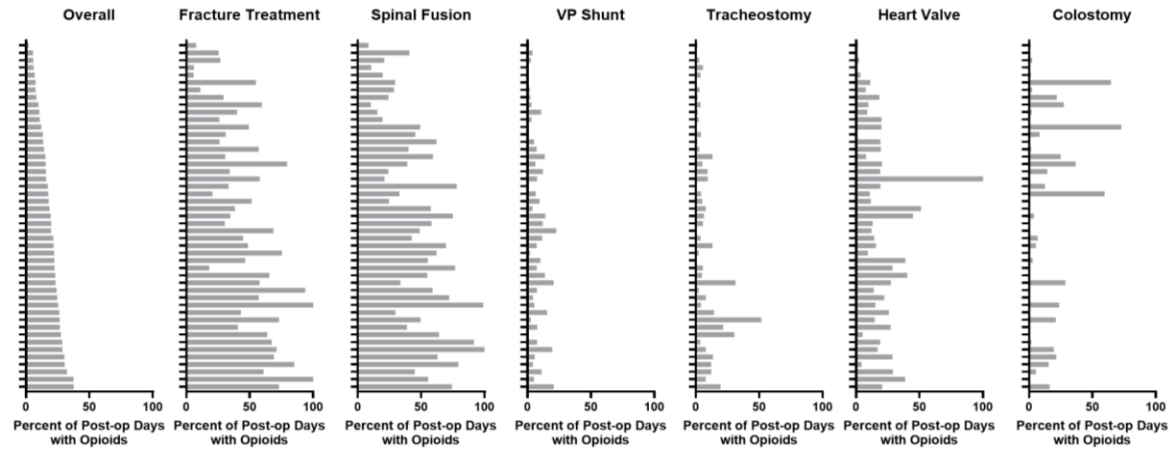
Background: The assessment of pain in children with severe neurologic impairment (SNI) can be more challenging than in neurotypical children.

Objective: To describe: 1) the type, number of classes, and duration of post-operative pain medications for common procedures among children with SNI and 2) the variability in pain management strategies across children's hospitals, specifically for opioid administration.

Design/Methods: This retrospective cohort study using the Pediatric Health Information System database included children aged 0-21 years hospitalized with SNI who underwent common procedures during 2019. We defined SNI using previously described high-intensity neurologic impairment (HINI) diagnosis codes and identified six common (>500 encounters) procedures among our population (e.g., fracture treatment, tracheostomy, spinal fusion, ventriculoperitoneal shunt placement (VP shunt), colostomy, or heart valve repair) using the clinical classifications software (CCS). Children excluded from this cohort did not undergo any of the six preselected procedures, had multiple procedures performed, or received an organ transplant. Medication classes were defined using the *Classification of Palliative Care Pain Medications*. Non-opioid medications were excluded from analysis to hone in on opioid administration. Clinical and demographic information were summarized using bivariate statistics.

Results: The cohort consisted of 7180 children; 65.9% had 1 HINI diagnosis, and 12.0% had 3+ HINI diagnoses. The proportion of post-operative days with pain medications ranged from the least 28.8% (VP shunt) to the most 71.7% (spinal fusion). The number of classes of pain medications ranged from the least 0-1 (VP shunt) to the most 2-4 (Tracheostomy, Table 2). We observed notable variability in the use of opioids across hospitals (0% to 100% overall, $p < .001$) and by procedure (Range 0-100% across procedures, Figure 1).

Conclusion: Children with SNI experienced variability in the type, number of classes, and duration of all pain medications delivered post-operatively. This included an inconsistent use of opioids based upon hospital and procedure. Our findings indicate the need for both a standardized approach to the assessment of pain and post-operative pain management for children with SNI.



	Overall	Fracture Treatment Including Reposition with or without fixation; hip or fem	Spinal Fusion	Insertion; Replacement; or Removal of Extracranial Ventricular Shunt	Tracheostomy (Temporary and Permanent)	Heart Valve Procedures	Colostomy (Temporary and Permanent)
Percent of postop days with pain meds*	53.00	62.94	71.68	28.80	61.55	47.47	37.66
Number of Classes of Pain Medications, Median [IQR]*	1 [0, 3]	2 [0, 3]	2 [2, 3]	0 [0, 1]	3 [2, 4]	2 [1, 3]	1 [0, 2]
Classes of Pain Medications, N(%)							
NonOpioids	3041 (42.3)	818 (58.5)	1081 (80.4)	375 (12.8)	166 (43.1)	512 (57.3)	89 (39)
Opioids	3505 (48.8)	793 (56.7)	1130 (84)	444 (15.1)	316 (82.1)	700 (78.4)	122 (53.5)
Anticonvulsants	1529 (21.3)	409 (29.3)	740 (55)	181 (6.2)	143 (37.1)	26 (2.9)	30 (13.2)
Benzodiazepine	2779 (38.7)	751 (53.7)	1027 (76.4)	260 (8.9)	295 (76.6)	380 (42.6)	66 (28.9)
MuscleRelax	54 (0.8)	15 (1.1)	28 (2.1)	2 (0.1)	5 (1.3)	0 (0)	4 (1.8)
Antidepressants	49 (0.7)	4 (0.3)	30 (2.2)	7 (0.2)	3 (0.8)	2 (0.2)	3 (1.3)
Corticosteroids	586 (8.2)	18 (1.3)	63 (4.7)	259 (8.8)	66 (17.1)	160 (17.9)	20 (8.8)
Alpha2Adrenergic	873 (12.2)	145 (10.4)	139 (10.3)	97 (3.3)	239 (62.1)	222 (24.9)	31 (13.6)
Topical	727 (10.1)	88 (6.3)	144 (10.7)	188 (6.4)	125 (32.5)	145 (16.2)	37 (16.2)
NMDA	176 (2.4)	7 (0.5)	41 (3)	16 (0.5)	40 (10.4)	63 (7.1)	9 (3.9)
Misc	8 (0.1)	2 (0.1)	0 (0)	2 (0.1)	4 (1)	0 (0)	0 (0)