Trends in caring for hospitalized children with pain and weaning from sedatives

Jean C. Solodiuk, PhD, MSN, PNP, RN

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No financial interests or relationships to disclose.

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Learning objectives

- Understand the trends in caring for hospitalized children with pain and weaning from sedatives.
- Review protocolized weaning of sedatives in hospitalized children.

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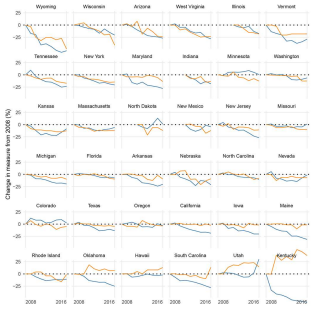
Availability of Pediatric Inpatient Services in the United States

Pediatrics. 2021 Jul;148(1):e2020041723. doi: 10.1542/peds.2020-041723. Epub 2021 Jun 14. PMID: 34127553; PMCID: PMC8642812.

- Shown are % changes in number of statewide pediatric inpatient days (blue) and number of pediatric inpatient beds (orange) by state.
- Overall decrease in hospitals with pediatric inpatient units by 19%.
- Of those with pediatric inpatient units, 16% increase in PICU beds.
- More PICU beds with fewer total beds, leaves fewer hospitals caring for children with greater acuity, a recent critical illness and often complex medical conditions.



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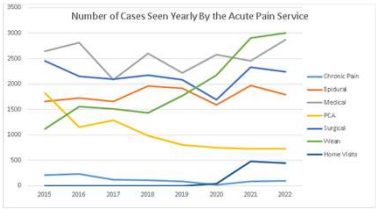
Boston Children's Hospital Pain Service evolving needs 2015-2022



- # patients cared for by pain service after surgery, with epidurals, with chronic pain is stable.
- PCAs decreasing while use of nerve catheters to manage pain and limit opioid use is increasing.
- Weaning sedatives in non-ICU areas is increased (3-fold)

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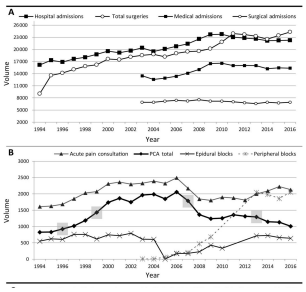
Patient- and Nurse-Controlled Analgesia: 22-Year Experience in a Pediatric Hospital

Hosp Pediatr. 2019;9(2):129-133. doi:10.1542/hpeds.2018-0179

- Trends for admissions, surgeries, PCA administrations.
- # surgeries increased while surgical admissions unchanged.
- # PCAs peaked in 2006. Epidurals unchanged. # nerve catheter (inpatient/ outpatient) increased (10-fold).



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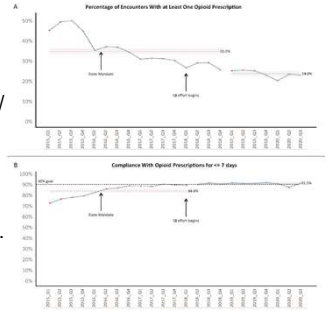
Standardizing Opioid Prescribing in a Pediatric Hospital: A Quality Improvement Effort

Hosp Pediatr. 2022;12(2):164-173. doi:10.1542/hpeds.2021-005990

- Hospital-wide opioid prescriptions P-charts.
- % encounters (inpatient/ day surgery) with >=1 opioid prescription at discharge.
- Compliance with < = 7 days opioid prescription.



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Surgical Pain

- Increasing numbers of patients are discharged home with nerve catheters
- Inpatients with extensive surgeries
  - Nerve catheters, epidurals
  - PCA/NCA opioids
  - Acetaminophen, NSAIDS when indicated
  - Low dose ketamine infusions, N-methyl-D-aspartate (NMDA) receptor antagonist

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A systematic review of ketamine for the management of vaso-occlusive pain in sickle cell disease

Pediatr Blood Cancer. 2021 Jul;68(7):e28989. doi: 10.1002/pbc.28989. Epub 2021 Mar 31. PMID: 33788404.

- Sickle cell disease vaso-occlusive crises
  - PCAs with continuous infusions
  - Acetaminophen, NSAIDS
  - Low dose ketamine infusions, N-methyl-D-aspartate (NMDA) receptor antagonist
  - Nerve Catheters for those with severe limb pain limited to 1 limb.
  - Chronic clinic for those with chronic pain

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Iatrogenic withdrawal in children

- Sedation is a necessary part of safe and compassionate pediatric critical care.
- 80% patients intubated and sedated for >5 days develop dependence
- PICUs that used protocolized sedation had less polypharmacy and used minimum effective dosing of sedatives (Curley)

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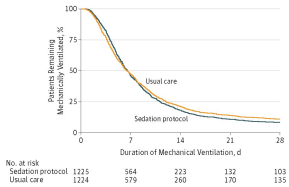
Protocolized Sedation vs Usual Care in Pediatric Patients Mechanically Ventilated for Acute Respiratory Failure: A Randomized Clinical Trial

JAMA. 2015;313(4):379-389. doi:10.1001/jama.2014.18399

- Cluster Randomized trial of 31 PICUs (n=2449).
- Negative study for duration of mechanical ventilation.
- PICUs that used protocolized sedation had less polypharmacy and used minimum effective dosing of sedatives.



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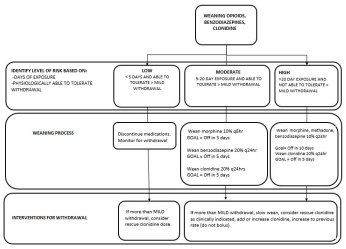
Effect of a Sedation Weaning Protocol on Safety and Medication Use among Hospitalized Children Post Critical Illness

J Pediatr Nurs. 2019 Nov-Dec;49:18-23. doi: 10.1016/j.pedn.2019.08.001. Epub 2019 Aug 27. PMID: 31470315.

- Significant decrease (11% pre to 3% post) in patients discharged weaning (p<0.005).
- Eliminated patients discharged weaning methadone without increasing median LOS.
- % severe withdrawal remained consistently low (0.6% pre: 1% post).



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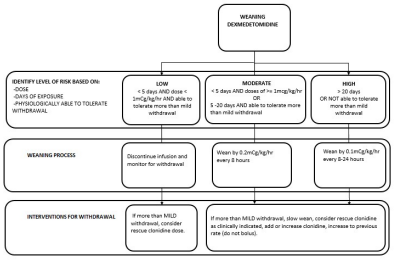
Weaning Dexmedetomidine in Non-ICU Areas: An Implementation Effort

Pediatr Crit Care Med. 2022 May 1;23(5):353-360. doi: 10.1097/PCC.0000000000002889. Epub 2022 Jan 6. PMID: 34991138.

- Developed & implemented guidelines for weaning dexmedetomidine in NON-ICU setting.
  - Median time to discontinuation of dexmedetomidine after transfer to non-ICU areas was 5.8 (IQR 4.75-15) days.
  - Dedicated team with 24/7 in-house coverage.



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Conclusion

- Trends in pediatric pain management and pediatric hospitalizations are changing due in part to minimally invasive surgeries, nerve and plexus blocks and use of other opioid-sparing medications.
- More PICU beds with fewer total pediatric beds, leaves fewer hospitals caring for children with greater acuity, a recent critical illness and often complex medical conditions.
- Less opioids but opioids are still required for severe pain related to cancer, sickle cell vaso-occlusive episodes, and sedation/analgesic during a critical illness.
- Protocolized sedation can help with managing pain and withdrawal.

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