Opioid weaning in critically ill children

Source: Sanchez-Pinto LN, Nelson LP, Lieu P, Koh J, Rodgers J, Larson K, Huson J, Amirnovin R. Implementation of a risk-stratified opioid weaning protocol in a pediatric intensive care unit J Crit Care 2018; 43:214-219.

This study aimed to implement a risk-stratified opioid weaning protocol. Its rationale is to reduce the duration of opioid use in the care of critically ill children without increasing the incidence of withdrawal syndrome. It was prospectively conducted in a large children's hospital pediatric intensive care unit (PICU) with 107 children younger than 21 years of age who received scheduled opioids for at least seven days during their admission to the PICU. The 24-bed tertiary PICU serves a wide range of patients: medical, surgical, trauma, and solid-organ and hematopoietic stem cell transplantation patients, but not postoperative cardiac patients. Two groups of patients were compared: pre and post-protocol implementation. In the pre-intervention period, opioid weaning was at the discretion of the treating physicians.

To apply the weaning protocol, the authors first used an algorithm to stratify each patient risk of withdrawal in low, moderate, high or very high. The opioid infusion dose was then converted to a weaning medication (either intravenous hydromorphone or oral methadone, according to the patient's risk of withdrawal), and withdrawal signs and symptoms were assessed regularly using the Withdrawal Assessment Tool (WAT-1). The primary outcome was duration of opioid exposure, measured using the total length of scheduled opioids and the length of opioid weaning. Total exposure to opioids was also calculated as cumulative morphine equivalents (mg/Kg/patient) from initiation of opioids until the last dose of scheduled weaning opioid. The secondary outcomes included hospital length of stay, number of patients discharged home on opioids, and protocol compliance.

The mean age was similar in both groups: 2.1 and 2.3 years in the pre and post-intervention groups respectively. In the post-intervention group, 15 patients (38%) met moderate-risk, 23 patients (59%) met high-risk, and 1 patient (3%) met very high-risk for withdrawal criteria. Protocol implementation decreased the total length of scheduled opioids, the length of opioid weaning and total exposure to opioids (33.2 vs 48.8 mg/kg/patient, p=0.02). The reduction in hospital length of stay in the post-intervention group was not statistically significant. The number of patients discharged home on opioids was not different. Protocol compliance in the post-intervention group was very high. Protocol-driven opioid weaning did not increase adverse events such as withdrawal symptoms, rescue opioid or naloxone doses or unplanned extubations.

The authors conclude that the purpose of the protocol implementation, that is, reducing opioid exposure without increasing opioid withdrawal syndrome, was achieved, which is consistent with previous studies. They highlight the importance of monitoring withdrawal signs and symptoms in the advance of the weaning protocol, especially for those patients who present withdrawal signs or symptoms from other causes. Risk stratification ensures a tailored approach for each patient, increasing the chances of successful weaning as well as maximizing protocol acceptability by health care professionals.

Commentary by: Letícia Massaud-Ribeiro, MD.
Pediatrician and Pediatric Intensive Care Specialist.

This is a large study that tested the use of an opioid weaning protocol in various profiles of critically ill children, except for cardiac surgery patients. Nevertheless, this population of postoperative cardiac patients was tested separately by the same research group with a similar study design and results, but with statistically significant reduction in hospital length of stay.[1] So results can overall be considered consistent. However, both are single-center studies and need to be replicated externally for the results to be validated.

One particular aspect that needs to be pointed out is that there was no other weaning protocol before the implementation of this risk-stratified opioid weaning protocol. Weaning, as well as sedation, was at the discretion of the treating physician. It is possible that the intervention in this study that most influenced the outcomes was the implementation of the protocol itself, regardless of its methods, since there was absolutely no recommendation to physicians before. The absence of a sedation protocol, however, does not seem to have influenced the results, since exposure to adjunct medications was similar between groups.

In general, intensive care interventions are associated with better outcomes when driven by protocols rather than at the discretion of the bedside team. Improvements in outcomes have been similarly demonstrated for other widely used interventions, such as sedation,[2] neuromuscular blockade,[3,4] mechanical ventilation weaning[5] and, most notably, sepsis management.[6] Sedation and analgesia management outcomes are closely related to opioid weaning. Current recommendations favor the use of goal-directed sedation protocols, which can decrease opioid exposure and, as a result, duration of the opioid weaning phase, with less withdrawal signs and symptoms.

Sedation and analgesia management in particular is a widely variable. intervention across PICUs. Apart from all the outcome benefits of protocol-driven care, the use of goal-directed sedation and weaning protocols reduces variability of these practices within the PICU, making it more uniform and rendering practitioners more conscious of the risks and benefits of their management decisions, putting the clinical knowledge base developed in the protocol into everyday practice.

References

1. Amirnovin R, Sanchez-Pinto LN, Okuhara C, Lieu P, Koh JY, Rodgers JW, Nelson LP. Implementation of a Risk-Stratified Opioid and Benzodiazepine Weaning Protocol in a Pediatric Cardiac ICU Pediatr Crit Care Med 2018; 19(11):1024-1032.

2. Harris J, Ramelet AS, van Dijk M, Pokorna P, Wielenga J, Tume L, Tibboel D, Ista E. Clinical recommendations for pain, sedation, withdrawal and delirium assessment in critically ill infants and children: an ESPNIC position statement for healthcare professionals Intensive Care Med 2016; 42(6):972-986.

3. Playfor S, Jenkins I, Boyles C et al. Consensus guidelines for sustained neuromuscular blockade in critically ill children Paediatr Anaesth 2007; 17:881-887.

4. Murray MJ, DeBlock H, Erstad B et al. Clinical Practice Guidelines for Sustained Neuromuscular Blockade in the Adult Critically Ill Patient Crit Care Med 2016; 44:2079–2103.

5. Jordan J, Rose L, Dainty KN, Noyes J, Blackwood B. Factors that impact on the use of mechanical ventilation weaning protocols in critically ill adults and children: a qualitative evidence-synthesis (Review) Cochrane Database Syst Rev 2016; 10:CD011812.

6. Davis AL, Carcillo JA, Aneja RK et al. American College of Critical Care Medicine Clinical Practice Parameters for Hemodynamic Support of Pediatric and Neonatal Septic Shock Crit Care Med 2017; 45(6):1061-1093.