Opioid-Induced Respiratory Depression in Children: Factors Associated with Intraoperative Naloxone Administration

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**Question of Interest**

Are there patterns or characteristics among pediatric patients and clinical scenarios that could represent identifiable risk-factors for opioid-induced respiratory depression (OIRD) intraoperatively, as evidenced by the use of intravenous naloxone by anesthesia-providers?

Our goal was to determine whether we could use information from electronic anesthesia records to help improve practice, particularly related to opioid dosing intraoperatively in children at higher risk for OIRD.

**Methods**

As part of a quality assurance project, we reviewed cases of intraoperative naloxone administration in a tertiary-care children’s hospital over a period of 3 years. In over 30,000 procedures evaluated, we found 56 children who received intravenous naloxone during the perioperative period. In these 56 children, we conducted an in-depth review of their preoperative history and intraoperative management.

**Results**

The 56 children who received naloxone had a wide range of preoperative diagnoses and operative procedures. The children ranged in age from 5 months to 17 years. The most frequently observed associated preoperative diagnoses was obstructive sleep apnea (OSA) (18%) (10/56) or developmental delay (29%) (16/56).

The intraoperative factors associated with naloxone use included the type of operative procedure performed and instances in which children had received opioid infusions of more than 2 hours. Posterior spinal fusions and adenotonsillectomies were the most common procedures performed - 23% (13/56) and 11% (6/56), respectively. Those who had been exposed to fentanyl infusions of at least 120 minutes represented 20% (11/56) of the cases in which naloxone was used.

There was an association among the individual factors themselves (which may represent confounding factors when attempting to associate a given factor to OIRD). A majority of the children with OSA (60%) (6 of 10) were those undergoing adenotonsillectomies. Of the patients undergoing posterior spinal fusions, the majority had received fentanyl infusions of more than 2 hours (62%) (8/13).

**Discussion**

In our review of children who had received naloxone intraoperatively, we assumed that the administration of naloxone was based on a presumptive diagnosis of opioid induced somnolence and/or respiratory depression. We found a disproportionately higher population of children who had symptoms of OSA. This finding is consistent with earlier studies that report children with renal failure, or with CYP2D6 gene polymorphisms as well as children who have had adenotonsillectomies are at greater risk for opioid-induced respiratory depression (Niesters et al., 2012).

We also found children with developmental delay as an underlying diagnosis were more likely to receive naloxone as well as those children exposed to prolonged fentanyl infusions. This preliminary analysis suggests that while there were a number of preoperative conditions and intraoperative factors that were associated with the use of naloxone, that there was also a large number of children who did not have identifiable factors that might be helpful to predict the use of naloxone.

A more in-depth review that provided more data about the indications for naloxone would be helpful to better understand how to improve the anesthetic management. With this information, one could develop guidelines that might be more useful to guide the anesthetic management of these children and reduce the frequency of naloxone administration.

**References**