Reversal of Pediatric Opioid Toxicity with Take-Home Naloxone: a Case Report

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Abstract

Background Take-home naloxone, an opioid antagonist, has become part of a multimodal approach to curbing opioid-related mortality. However, there is little information about the utility of take-home naloxone in pediatric patients. We report a case of opioid toxicity after exposure to methadone in a pediatric patient, which was successfully reversed with take-home naloxone.

Case A previously healthy 22-month-old girl ingested an unknown amount of liquid methadone. The child became progressively somnolent. The mother administered intranasal naloxone at home with reversal of somnolence. The patient presented to the emergency department and had recurrence of symptoms. The patient was placed on a naloxone infusion and discharged from a tertiary care facility, uneventfully, 2 days after ingestion.

Results To our knowledge, we report the first case of pediatric opioid toxicity reversed by take-home naloxone. In the setting of rising opioid-related mortality, providers and public health officials should consider expanding access of take-home naloxone for children at high risk for opioid overdose.

Background

Community distribution and layperson administration of naloxone is an important harm reduction approach to mitigating opioid-related mortality. Take-home naloxone programs, in which naloxone is provided to high-risk individuals and their family or friends, have been associated with reduced opioid overdose mortality [1]. Although naloxone distribution is targeted to patients considered high risk for opioid overdose, such as heroin or chronic prescription opioid users, children remain at high risk for opioid overdose due to unintentional exposure [2]. We report a case of opioid toxicity in a pediatric patient that was reversed by administration of take-home naloxone.

Case

A regional poison control center was contacted by the mother of a previously healthy 22-month-old girl approximately

20 min after the unwitnessed ingestion of an unknown volume of her mother's liquid methadone. No other medications were reported missing. The child became progressively somnolent, and the mother placed her in the shower in an attempt to keep her awake. The mother then administered her own prescribed intranasal naloxone (4 mg (0.3 mg/kg)) to the child, with subsequent reversal of the child's depressed mental status. The poison center was then contacted and the patient was transported by ambulance to the emergency department (ED). Upon arrival to the ED, initial vital signs were the following: pulse 129 bpm, blood pressure 85/68 mmHg, respirations 24/min, temperature 36.8 °C, and 100% room air oxygen saturation. She was alert, and her physical exam was normal. Her electrocardiogram was normal. The patient's urine drug screen was positive for methadone. Approximately 4 h following the initial naloxone dose, the patient had recurrence of somnolence, respiratory depression, and pinpoint pupils. She was given naloxone 0.1 mg IV without significant improvement. She was then given an additional dose, naloxone 0.4 mg IV, 10 min later with reversal of somnolence. The patient was then started on a naloxone infusion at 40 mcg/kg/h and transferred to a tertiary care facility. Her hospital course was uneventful, and the naloxone infusion was weaned over approximately 36 h. The patient was discharged, in stable condition, approximately 48 h after ingestion. Informed consent was obtained from the family for publication of this case report.

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Discussion

Community distribution of naloxone, a short-acting opioid antagonist, is an emerging strategy to address acute opioid toxicity and opioid-related mortality [3]. Over the past decade, most states have modified their laws to make naloxone more available [4]. However, many naloxone distribution guidelines do not address the utility of take-home naloxone administration in the pediatric population [5]. To our knowledge, we report the first case of pediatric opioid overdose reversal with take-home naloxone.

Naloxone administration rapidly and effectively reverses opioid-induced respiratory depression. Take-home naloxone is currently offered in intramuscular (IM) and intranasal (IN) formulations and can be easily administered to pediatric patients. IM naloxone is dispensed as a kit with two single-dose vials (0.4 mg/mL) with a syringe and needle or as a prefilled, FDA-approved, autoinjector that contains a single dose (0.4 mg). IN naloxone is prescribed as a 2-mL (2 mg/mL), prefilled luer-lock needleless syringe with an IN mucosal atomizing device. IN naloxone has similar efficacy and safety as IM naloxone for reducing respiratory depression and is given as a spray in each nostril [6].

Intranasal delivery of naloxone offers unique advantages when compared to other routes of administration, particularly in pediatric patients. Successful IN administration requires minimal training and can be easily performed at home by family or prehospital providers. Intranasal administration also eliminates the need for intravenous access, which can often be painful, anxiety provoking, and time consuming in pediatric patients. Additionally, while IN naloxone has a delayed onset of action when compared to IV [7], time from initial patient contact to clinical response following naloxone administration was not significantly different in a study of prehospital adult patients [8], likely due to time saved obtaining IV access.

While naloxone has been associated with a number of complications in adults, including seizures, arrhythmias, and pulmonary edema [9], adverse effects in pediatric patients remain uncommon [10]. In a retrospective review of 195 pediatric patients who received intravenous naloxone in the ED, postoperative, or pediatric intensive care setting, only one adverse event, pulmonary edema, was reported [10]. Moderate increases in respirations, heart rate, and blood pressure were observed and expected. Additionally, naloxone is unlikely to precipitate acute opioid withdrawal in pediatric patients, unlike their adult counterparts, as they are not likely to be physiologically opioid dependent.

Conclusions

Children remain at high risk for unintentional opioid overdose. Providers and public health officials should consider providing take-home naloxone in situations where children are at risk for opioid overdose and anticipatory guidance for its use in children.

Sources of Funding None.

Compliance with Ethical Standards

Consent for publication of this case was obtained and provided to the journal in accordance with JMT policy.

Conflicts of Interest None.

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