A 4.7 kg, 2 month old infant with a history of congenital bilateral hip dislocation presented for quadriceps lengthening with spica cast application under general anesthesia. An epidural was placed for intra and post operative pain control.

On post operative day 2, the epidural was turned off in anticipation of discontinuing it. Approximately 30 minutes later, she appeared to be in pain based on a standard FLACC assessment. Hydromorphone 50 mcg was delivered without incident. 6 hours later she was again treated with hydromorphone 50 mcg. Her respiratory rate subsequently slowed to 3 and oxygen saturation dropped to 30%. Her heart increased to 180 bpm. The nurse activated the emergency response team.

Positive pressure mask ventilation increased the oxygen saturation to 100% although she remained minimally responsive to stimulation. Naloxone 5 mcg was administered, which caused her to arouse. She was transferred to the intensive care unit for the remainder of her recovery.

An Unusual Preparation of Hydromorphone

- **Target Dose:** Hydromorphone 50 mcg/ml.
- **Plan – Image A:** Draw up 0.025 ml of concentrated hydromorphone 2 mg/ml into a syringe with 0.975 ml of saline.
- **Implementation – Image B:** By failing to take into account the needle volume of 0.09 ml AND using the same needle for both the concentrated hydromorphone and saline, an additional 0.09 ml of concentrated hydromorphone was pulled into the administration syringe.
- **Resulting Error – Image C:** A total of 0.115 ml of concentrated hydromorphone in the administration syringe equals 230 mcg/ml which is 4.6x desired dose.

Discussion

- Review of this case revealed an error in the hydromorphone preparation. The nurse obtained the vial of hydromorphone 2 mg/ml from an automated dispensing machine.
- Had the hydromorphone been injected into a syringe of saline, instead of the saline being pulled into the hydromorphone syringe, the overdose would have been avoided.
- A recent review of intravenous medication errors identified 10 studies that examined the administration of intravenous medications. This review confirmed that the reconstitution of the drug and diluent and the administration carried the greatest probability of error [McDowell 2010].
- In the pediatric population, the greater variation of patient weight leads to a greater risk of error.
- Standardization of concentrations, pre-filled syringes, and continuing education of providers are a few methods employed to reduce errors.