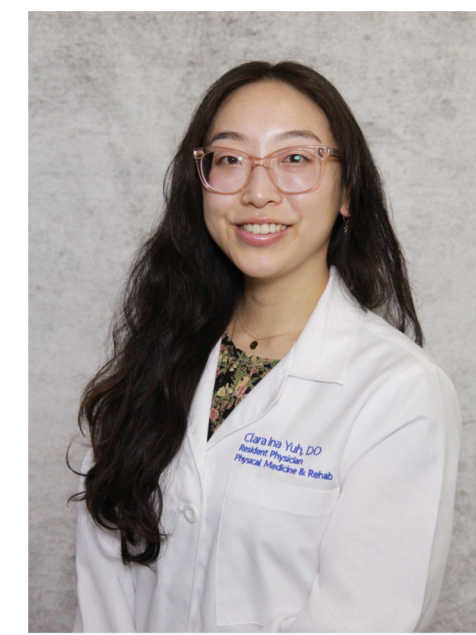


SafetyNet Policies may not be Sufficient to Prevent Harm with PCAs: A case report of Swiss Cheese Errors with Opioid Morbidity



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INTRODUCTION

We present a patient with uncontrolled pain after recent surgeries who underwent complications after receiving a PCA pump

METHODS

Patient informed consent was obtained for submission of a case report

CASE REPORT

A 33 year old transgender patient returned to the E.D. two days after multiple abdominal surgeries. Patient endorsed an 8/10 left lower quadrant abdominal pain radiating to the back with fever, nausea, and vomiting. The inpatient pain regimen started by the primary gynecology team included Gabapentin 600mg, Norco 10-325 mg PRN, Ketorolac injection 15mg as needed, Morphine injection 4mg as needed, and hydromorphone PCA.

At 05:41 patient was started on hydromorphone 25mg/50mL PCA with 1mg loading dose, 5mg/hr basal rate, 0.5mg incremental dose, 15 minute lockout interval, 4 boluses per hour ordered by primary gynecology team. Progress note at 07:37 indicated the patient was sleeping comfortably, slightly groggy but maintaining conversation. He reported a pain score decrease from a 9/10 upon admission in the ED to a 6/10. However, he endorsed having trouble with memory and acute pain service (APS) was consulted around 8:00.

With chart review, at 08:27 APS immediately noted that the dose of PCA was supranormal for this patient and the order was directly discontinued by APS. 08:40 APS was at the patient bedside where he was obtunded and unable to answer questions with signs of impending airway obstruction. He regained consciousness with a sternal rub and chin lift, while naloxone or ventilation measures were not needed.

Even with the implementation of best practices, care standards, and safety protocols, **PCA opioid delivery** devices can still lead to **Catastrophic** complications

HYDROmorphone (DILAUDID) 25 mg/50 mL PCA infusion – TOLERANT [471660831]

Loading Dose: 1 mg

Basal Rate: 5 mg/hr

Incremental Bolus Dose: 0.5 mg

Lockout Interval: 15 Minutes

Number of Bolus per Hour: 4 doses/hr

Route: IntraVENOUS

Frequency: CONTINUOUS

Admin Dose: --

Scheduled Start Date/Time: 12/23/22 End Date/Time: 12/23/22 0827

0450

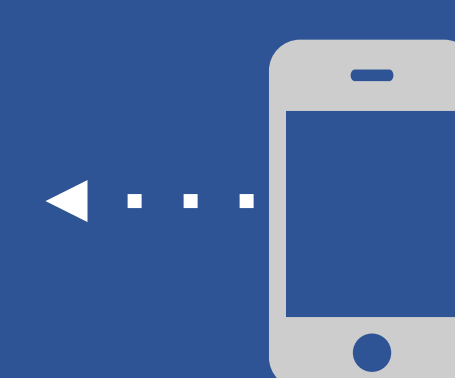
Admin Instructions:

Pump Settings: Tolerant

Controlled Substance, Please pick up from Pharmacy

Order Status: Discontinued

Figure 1: PCA infusion settings placed in EPIC



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DISCUSSION

The first error occurred at the prescribing stage. The physician prescribed an opioid dose that was higher than the recommended guidelines for the patient's medical history and weight. This prescribing error laid the foundation for subsequent complications. The second error took place during the pharmacy review process. The pharmacist, responsible for verifying and preparing medications, failed to detect the supranormal dose. This lapse in detection allowed the incorrect dose to proceed to the administration stage. The third error occurred during the administration of PCA therapy by nursing staff. The nurse, unaware of the prescribing and pharmacy errors, initiated the infusion without questioning the supranormal opioid dose. The patient, utilizing the PCA pump as directed, self-administered the excessive dose, leading to opioid toxicity.

In this case, the errors in prescribing, pharmacy review, and nursing administration aligned to create a perfect storm of patient harm. Despite the presence of safety systems such as PCA pumps with built-in overdose prevention mechanisms, the occurrence of a "swiss cheese" sequence of errors emphasizes the fallibility of relying solely on technology and safety protocols. Healthcare professionals must remain vigilant and proactive in error detection and prevention.

To mitigate similar occurrences, healthcare organizations can adopt several strategies:

- 1.Enhanced Training and Education
- 2.Double-Check Procedures
- 3.Clinical Decision Support Systems
- 4.Multidisciplinary Collaboration
- 5.Root Cause Analysis

REFERENCES

- 1.McNicol ED, Ferguson MC, Hudcova J. Patient controlled opioid analgesia versus non-patient controlled opioid analgesia for postoperative pain. Cochrane Database Syst Rev. 2015 Jun 2;2015(6):CD003348. doi: 10.1002/14651858.CD003348.pub3. PMID: 26035341; PMCID: PMC7387354.
- 2.Mohanty M, Lawal OD, Skeer M, Lanier R, Erpelding N, Katz N. Medication errors involving intravenous patient-controlled analgesia: results from the 2005–2015 MEDMARX database. Therapeutic Advances in Drug Safety. 2018;9(8):389-404. doi:10.1177/2042098618773013
- 3.Ritter III, H. T. M., CCE CBET, and Pennsylvania Patient Safety Authority. "Making Patient-Controlled Analgesia Safer for Patients." *Pennsylvania Patient Safety Advisory* 8.3 (2011): 94-99.
- 4.Yi Y, Kang S, Hwang B. Drug overdose due to malfunction of a patient-controlled analgesia machine -A case report-. Korean J Anesthesiol. 2013 Mar;64(3):272-5. doi: 10.4097/kjae.2013.64.3.272. Epub 2013 Mar 19. PMID: 23560197; PMCID: PMC3611081.

