



Analysis of the Multiple Risks Involving the Use of IV FentaNYL

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ABSTRACT

FentaNYL is a synthetic opioid analgesic with potent analgesic activity and fewer side effects in comparison with morphine whose rapid onset of action has led to increasing use in postanesthesia care units (PACUs) and emergency departments (EDs). Analysts reviewed medication errors and adverse drug reactions (ADRs) involving intravenous (IV) fentaNYL that were reported to the Pennsylvania Patient Safety Authority. The predominant medication error event types associated with IV fentaNYL were wrong-dose/overdosage events and wrong-drug events. Of the reported wrong-dose/overdosage events originating in the administration node, almost 68% mention breakdowns during the pump-programming process. High-alert medications were involved in almost 70% of wrong-drug events with fentaNYL. The most common categories of care areas cited in ADR reports include procedural areas (43.2%), surgical areas (19.9%), and intensive care units (12.5%). Effective risk reduction strategies include restricting the use of patient-controlled analgesia with fentaNYL to anesthesia or pain management team members, establishing standardized protocols and order sets for pain management, and requiring an independent double check before administering IV fentaNYL doses. (Pa Patient Saf Advis 2012 Dec;9[4]:122-9.)

INTRODUCTION

FentaNYL is a lipophilic, short-acting synthetic opioid that was synthesized to produce an opioid analgesic with potent analgesic activity and potentially fewer side effects in comparison with meperidine or morphine.^{1,2} Injectable forms of fentaNYL have been in clinical practice for more than 40 years as a component of anesthetic analgesic regimens and for the management of acute pain by different routes of administration.² The drug has strong affinity for the mu opioid receptor, binding at many sites within the central nervous system (CNS), increasing pain threshold, altering pain reception, inhibiting ascending pain pathways, and producing an analgesic effect, as well as adverse effects such as nausea, vomiting, and respiratory depression.^{1,3,4}

When fentaNYL is administered intravenously (IV), it has a short onset of action (one to two minutes), making it an ideal analgesic when rapid pain relief is required. This rapid onset of action explains why fentaNYL has been used with increasing frequency in postanesthesia care units (PACUs) and emergency departments (EDs).^{3,5} Within three to five minutes of administration, the drug reaches its peak effect, yet it has a relatively short duration of action of 30 to 60 minutes. The short duration of action makes fentaNYL an ideal agent when the goal is to have a short recovery time, such as in outpatient procedures. It should be noted that the elimination half-life of fentaNYL ranges between two to four hours and is influenced by the extent of storage into fatty issue.^{2,3} FentaNYL is thought to be 80 to 100 times as potent as parenteral morphine for acute pain in patients who are opioid-naïve.^{3,5} Some studies show that 25 mcg/hr of parenteral fentaNYL is equal to 1 mg/hr of parenteral morphine.³

Although medication errors with opioid analgesics are common,⁶ Pennsylvania Patient Safety Authority analysts found no specific studies addressing medication errors associated solely with IV fentaNYL. An examination of medication errors in PACUs reported over a seven-year period to MEDMARX (Quantros, Milpitas, California), an Internet-accessible medication error reporting system available to subscribing hospitals and related health systems, found that the most common medications mentioned were morphine, meperidine, HYDROMORPHONE, and fentaNYL.⁷ In a separate study of pediatric medication errors in the PACU reported over a six-year period to MEDMARX, researchers reported that 20% of the medication errors were harmful, with half of the errors involving morphine, acetaminophen, meperidine, or fentaNYL.⁸

An adverse drug event (ADE) is defined by the Joint Commission as “any incident in which the use of a medication (drug or biologic) at any dose, a medical device, or a special nutritional product (e.g., dietary supplement, infant formula, medical food) may have resulted in an adverse outcome in a patient.”⁹ ADEs can be divided into two categories: (1) medication errors, which are considered to be *preventable* ADEs, and (2) adverse drug reactions (ADRs), which are considered to be *unpreventable* ADEs. Despite this distinct difference in definition, ADR reports may be a source of potentially preventable events, even though reporters thought the ADE could *not* have been prevented.

The following analysis addresses medication errors and ADRs specifically involving IV fentaNYL reported to the Authority and the predominant types of reported events involving IV fentaNYL.

METHODOLOGY

Analysts queried the event description field of all event types in the Authority’s Pennsylvania Patient Safety Reporting System database from June 2004 to March 2012 for “fentanyl.” The search also included the “medication prescribed” and “medication administered” fields in medication error events and the “suspected medication” field

in ADR events. The initial query yielded 3,857 reports. To focus on events involving only IV doses of fentaNYL, analysts excluded reports (n = 1,538) involving other dosage forms, including transdermal systems (e.g., Duragesic®) and oral formulations (e.g., Actiq®, Fentora®). The final data set included 2,319 events involving the use of IV fentaNYL.

AGGREGATE ANALYSIS OF EVENTS INVOLVING IV FENTANYL

Categorization of the reports by harm score, which is adapted from the National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP) harm index,¹⁰ shows that 74.6% (n = 1,729) of the events reached the patient (harm score = C to I), 33.1% (n = 768) of the events reached the patient and required monitoring to confirm that it resulted in no harm to the patient and/or required intervention to preclude harm (harm score = D), and 3.2% (n = 74) of the events resulted in patient harm (harm score = E to I).

The care areas in which the events occurred were distributed across many units. No individually mentioned unit represented more than 8% of reports. The most often cited care areas include pediatric intensive care units (ICUs) (7.8%, n = 180), pharmacy (6.6%, n = 154), medical-surgical units (6.6%, n = 152), PACUs (4.9%, n = 114), and neonatal ICUs (4.8%, n = 112). More than 85% (n = 1,972) of reports involving IV fentaNYL were reported as medication errors, 10.4% (n = 241) were reported as ADRs, and the remaining events were submitted as other types of reportable events. Besides the event type of “medication error, other” (16.6%, n = 385), the predominant event types reported mentioning IV fentaNYL (see Table) were “medication error, wrong dose/overdosage” (15.0%, n = 347), “medication error, wrong drug” (10.5%, n = 243), and “ADR, other” (7.6%, n = 177).

FOCUSED EVENT TYPE ANALYSIS

Wrong Dose/Overdosage

Review of the descriptions of the events submitted to the Authority show that the most common nodes associated with wrong-dose/overdosage events involving IV fentaNYL were administration (58.5%, n = 203), prescribing (15.2%, n = 53), and dispensing (6.3%, n = 22). In addition, most of the wrong-dose/overdosage events (38.9%, n=135) reached the patient and required monitoring and/or required intervention to preclude harm to the patient (harm score = D). Categorization of the harm revealed that 4.6% (n = 16) of the wrong-dose/overdosage events resulted in patient harm (harm score = E to I).

When looking at care areas, the most commonly cited care areas were ICUs (30.8%, n = 107) and units caring for pediatric patients (e.g., pediatric ICU, neonatal ICU, pediatric units) (21.0%, n = 73), followed by obstetrics and gynecology (5.2%, n = 18) and surgical areas (e.g., PACU, operating rooms [ORs], anesthesia) (4.6%, n = 16).

Pump programming. Of the events originating in the administration process, almost 68% (n = 138) mention breakdowns during the pump-programming process. Further analysis of the events that occurred during the administration of IV fentaNYL by infusion pump shows that most of the reported cases involved programming the wrong rate of infusion

(59.4%, n = 82) or wrong drug concentration (19.6%, n = 27).

The patient’s epidural infusion was ordered for 8 mL/hr. The patient’s level of sensation and ability to move extremities were normal for the first two hours. The patient then became nauseated, felt fatigued, and [had low] blood pressure. ePHEDrine was administered. When moving the patient’s position, the patient had difficulty positioning his arms. An additional dose of ePHEDrine was administered. It was at this time that the [infusion] rate was noted to be set at 88 mL/hr. The pump was shut off and the physician was notified. . . . The patient was monitored.

The patient was found lethargic with shallow respirations. A fentaNYL drip was infusing at 25 mL/hr (250 mcg/hr) instead of 5 mL/hr (50 mcg/hr). The infusion was immediately stopped, the patient was placed on 100% oxygen, and 0.2 mg Narcan® was given.

A fentaNYL infusion was ordered to run at 20 mcg/hr. The infusion was programmed at 40 mcg/hr. Further investigation showed that the medication concentration had been changed from 10 mcg/mL to 20 mcg/mL, but the pump setting was not adjusted accordingly when the new syringe was hung.

Table. Predominant Event Types Associated with the Use of IV FentaNYL (N = 2,319), June 2004 to March 2012

EVENT TYPE	NO. OF REPORTS	% OF TOTAL REPORTS
Medication error, wrong dose/overdosage	347	15.0
Medication error, wrong drug	243	10.5
Medication error, wrong rate	134	5.8
Medication error, wrong strength or concentration	96	4.1
Medication error, wrong patient	70	3.0
Medication error, other	385	16.6
Adverse drug reaction, other	177	7.6



Administering. The descriptions of events that occurred during the administration node and did not involve the programming of an infusion pump (n = 78) did not provide enough detail to determine specifically what went wrong. Most reports (56.4%, n = 44) simply stated that the patient received a higher or wrong dose than what was intended. However, analysts were able to determine that the package size of the vials or ampules and/or that the available concentration (50 mcg/mL) of IV fentaNYL may have contributed in these errors, especially for the pediatric population.

During a trauma care, the physician gave a verbal order for fentaNYL 25 mcg IV push for one dose. The first nurse drew up the entire vial of fentaNYL (5 mL = 250 mcg) into a syringe. She did not label the syringe in any way. She handed the syringe to the second nurse and instructed him to push 25 mcg without telling him how much was in the syringe. The second nurse pushed the entire syringe, which was 250 mcg, a [tenfold] overdose from what was prescribed. The error was immediately noticed by the first nurse when the second nurse returned with an empty syringe. Physician [was made] aware, and patient was closely monitored for any adverse effects.

A six-month-old infant was admitted to the hospital for head trauma. In preparation for a head CAT [computerized axial tomography] scan to evaluate the status of his injury, the baby was to be given fentaNYL 5 mcg. The nurse caring for the child drew up 1 mL of fentaNYL (50 mcg) with the intention of administering 0.1 mL (5 mcg); however, a nurse orientee working with the nurse administered the entire syringe. The error was immediately noticed and the child was given Narcan 0.2 mg.

Prescribing. Of the wrong-dose/overdose events originating in the prescribing node, analysis shows that 35.8% (n = 19) involved orders exceeding the normal therapeutic dosing range, followed by duplicate therapy (30.2%, n = 16) and mix-ups between the dosage units of mg and mcg (17 %, n = 9).

An order [was] written for a two-month-old patient for fentaNYL 1 mcg/kg/dose, but the [patient's] weight was entered incorrectly as 70 kg. The patient actually weighs 3.7 kg. The dose was ordered by anesthesia as 70 mcg instead of 4 mcg. The fentaNYL was given in the OR, but the dose [was] not recorded. . . . The pharmacy saw this order in PACU and halted the order immediately.

An order was received for a fentaNYL infusion for a patient who was already on a morphine infusion. Upon calling the PACU, I questioned the fact that this patient was already on morphine at 5 mg/hr. The equivalent dose of fentaNYL would be 50 mcg/hr. The order was written for fentaNYL at 200 mcg/hr. The order was corrected, and the morphine infusion was discontinued.

Wrong Drug

Almost one-third of wrong-drug events (29.6%, n = 72) involving IV fentaNYL reached the patient and required monitoring and/or required intervention to confirm that it resulted in no harm (harm index = D). Roughly 5.3% of events (n = 13) resulted in patient harm (harm score = E to I). The care areas most often cited with IV fentaNYL wrong-drug events include ICUs (22.2%, n = 54), surgical areas (20.2%, n = 49), pediatric units (11.1%, n = 27), and procedural areas (e.g., endoscopy/gastrointestinal lab, imaging) (4.9%, n = 12).

Analysts determined that high-alert medications, drugs that bear a heightened risk

of causing significant patient harm when used in error,^{11,12} were involved in almost 70% (n = 170) of drug mix-ups with fentaNYL. Four medications accounted for nearly half (47.7%, n = 116) of the mix-ups with fentanyl, including HYDROMORPHONE (15.6%, n = 38), MORPHINE (13.6%, n = 33), MIDAZOLAM (11.1%, n = 27), and the combination fentaNYL/bupivacaine (7.4%, n = 18).

Examples of the events involving mix-ups with fentaNYL include the following:

Patient was admitted to the ED for multiple trauma. The ED physician was going to intubate the patient, and nursing brought the requested medications for the intubation, including midazolam, fentaNYL, and succinylcholine. The succinylcholine had been drawn up in a syringe and labeled. The physician decided not to intubate but ordered the nurse to give fentaNYL for pain. The nurse picked up the syringe and administered 0.5 mL when he realized it was succinylcholine.

A physician, in the labor and delivery area, ordered ampicillin and fentaNYL at the same time. The nurse prepared the medications at the same time. The fentaNYL for the epidural was hung in place of the ampicillin; the nurse noted the error after approximately 5 mL were given.

Anesthesia signs out a drug box each morning, which contains fentaNYL and ketamine. The ketamine was recently added to the drug box. The doctor stated she was not aware that ketamine was in the box. She drew up the ketamine but labeled and administered [it] as if it were fentaNYL. Patient [was] not arousing in the recovery area as anticipated, and doctor [was] informed of this. Error [was] realized when the medication box was checked back in by a staff nurse. The fentaNYL and the ketamine counts were incorrect.

The patient was agitated and attempting to self-extubate. A nurse grabbed a syringe at the bedside and thought it was fentaNYL. The nurse asked the respiratory therapist at the bedside to place the patient back on the vent. At that time, the patient was no longer breathing and was tachycardic. The nurse looked at the syringe in which they pulled the dose and saw it to be pancuronium.

Roughly 8.2% (n = 20) of wrong-drug events with IV fentaNYL involved retrieving the incorrect drug from the automated dispensing cabinet (ADC) or stocking the wrong drug in the drawers of those cabinets.

Went to the ADC to get a HYDROMORPHONE PCA [patient-controlled analgesia] syringe, pulled the medication, went to patient's room with syringe, and before loading it into the PCA pump, I checked the medication, and it was fentaNYL. I informed the charge nurse, who checked the ADC and found that the HYDROMORPHONE drawer had fentaNYL and that the fentaNYL drawer had HYDROMORPHONE.

Nearly 12% (n = 29) of wrong-drug events with IV fentaNYL involved epidural PCA therapy.

Patient was connected to an epidural infusion in the OR by anesthesia. It was discontinued at the time of transport to the PACU. In the PACU, the physician went to restart the infusion and it was determined that the medication in the bag was morphine sulfate for PCA use only and the medication was not restarted. An epidural infusion with fentaNYL was started.

Adverse Drug Reaction

Similar to the analysis of HYDROMORPHONE ADR reports published in the September 2010 *Pennsylvania Patient Safety Advisory*,¹³ analysts reviewed ADR reports

submitted to the Authority to determine if there were cases that may have been preventable (e.g., errors caused by an excess dose of IV fentaNYL, use of concomitant respiratory/CNS depression drugs). Analysts searched for “fentanyl” in the “suspected medication,” “additional suspected drug medication,” and event description fields to find ADR reports that may have involved IV fentaNYL alone or in combination with other medications.

There were 318 ADR reports submitted to the Authority between June 2004 and March 2012 related to the use of IV fentaNYL. Analysts excluded reports that would not have resulted from dosing-related problems that were categorized as skin reactions (24.2%, n = 77) from the analysis, resulting in 241 reports. Almost 82.2% (n = 198) of the ADR reports indicated that the patient received the medication and required monitoring and/or required intervention to confirm that it resulted in no harm (harm score = D), with nearly 8% (n = 19) of ADRs resulting in patient harm (harm score = E to I). Specific care areas most often cited in ADR reports involving fentaNYL include the endoscopy/gastroenterology lab (24.1%, n = 58), OR (7.9%, n = 19), and PACU (7.5%, n = 18). The most common categories of care areas cited include procedural areas (43.2%, n = 104), surgical areas (19.9%, n = 48), and ICUs (12.4%, n = 30).

The most common categories of reactions described in the narratives include respiratory depression (50.2%, n = 121) and mental status changes (10.8%, n = 26). Roughly 22% (n = 52) of the reports did not give enough information to discern the types of reaction. Since fentaNYL is a primary drug for conscious sedation, determining preventability is difficult in these events without knowing the details of the procedure (e.g., length of the procedure), as multiple doses of fentaNYL may be needed for longer cases.

Anecdotal examples of events that appear to be preventable events include:

Patient scheduled for ERCP [endoscopic retrograde cholangiopancreatography]. Patient received initial medications consisting of midazolam 3 mg, fentaNYL 80 mcg, and diphenhydramine 40 mg. The patient was still awake, so additional doses of midazolam 2 mg and fentaNYL 40 mcg were given. Within 10 minutes, the patient became somnolent and the oxygen saturation fell into the 70s. Narcan was given.

Patient was admitted for a colonoscopy and was given sedation for the procedure. Shortly after the colonoscopy began, the patient became dusky, respirations decreased, and she became unresponsive, with a pulse oximetry [reading] of 65%. She had received a total of 5 mg of midazolam and 250 mcg of fentaNYL in titrated doses. She was given Narcan 1.2 mg in divided doses and bagged with an Ambu bag. She immediately recovered a pulse oximetry [reading] of 96% and became awake and alert. The procedure was able to be completed, and the patient was monitored in the recovery area for two hours prior to discharge.

A 71-year-old patient received a total of fentaNYL 120 mcg and midazolam 4 mg for ERCP procedure. The patient became less responsive, the respiratory rate was 8 and pulse oximetry [reading] was 72% despite repositioning of head and increased oxygen. 0.3mg Narcan given.

RISK REDUCTION STRATEGIES

Healthcare facilities can strive to identify system-based causes of errors with the use of IV fentaNYL and other opioids and implement effective types of risk reduction strategies to prevent harm to patients. Risk reduction strategies such as constraints and standardization, which focus



on system improvement, will be more effective than education alone, which relies on individual performance.^{14,15} Consider the strategies described below, which are based on a review of the literature and of events submitted to the Authority, as well as observations from the Institute for Safe Medication Practices.

Constraints

- Prescribing
 - Consider restricting fentaNYL PCA use to anesthesia or pain management team members only.¹⁶
 - Consider requiring prescribers to undergo a privileging process to verify proficiency with PCA pain management.¹⁷
 - Implement standard order sets for PCA therapy, with all sections completed, and limit verbal orders to dose changes.¹⁶
 - Take into consideration important information about the patient that could affect the prescribing of IV fentaNYL (e.g., patient’s current medication profile for drugs with additive CNS or respiratory depressant side effects, age, drug-drug interaction, total current opioid therapy).
- Storage
 - Reduce stock amounts of IV fentaNYL wherever possible, and eliminate it from floor stock entirely if usage is low.
 - Store each medication in a separate, lock-lidded bin or drawer in the ADC to help prevent drug-selection errors. In the pharmacy, segregate prefilled syringes and vials of these drugs, especially if they contain the same concentration.¹⁸

Standardization

- Establish and mandate the use of standardized protocols for pain

management, including a standard pain scale for assessment, guidelines for the use of specific analgesics, standard order forms and screens, guidelines outlining conditions that require a dose reduction, and requirements for monitoring.¹⁷

- Match the sequence of information that appears on fentaNYL PCA medication labels and order sets with the sequence of information that must be entered into the PCA pump.¹⁵
- Establish one standard concentration for IV fentaNYL used for PCA.¹⁶
- Establish protocols for reversal agents that can be administered without additional physician orders when warranted.¹⁹
- In standard order forms, guide prescribers to an appropriate dose based on age and opioid tolerance by providing default doses for three types of patients: (1) most patients; (2) patients older than 64 years or those with sleep apnea; and (3) opioid-tolerant patients.²⁰

Differentiation

- Clearly label infusion bags that contain epidural fentaNYL with “For Epidural Use Only” in a large font. Use color and design to differentiate these products from IV medications.¹⁶
- For epidural infusions, use pumps that look different than pumps used for IV infusions and clearly label pumps used to deliver epidural medications as “Epidural Only.”¹⁶
- Use yellow-lined tubing without injection ports for epidural infusions to set its appearance apart from typical IV tubing. Never use yellow-lined tubing for anything other than epidural administration.²¹

Redundancies

- Where possible, require an independent double check before

administering IV fentaNYL doses. Since nurses routinely obtain narcotics from floor stock, the typical pharmacist-nurse double check is not in place (as it is with specific patient doses dispensed from the pharmacy). Some ADCs can be programmed to require a witness when selected narcotics are removed or when the override feature is used to access selected narcotics. Reminders can also appear on the screen.¹⁷

Patient Monitoring

- Establish guidelines for appropriate monitoring of patients who are receiving fentaNYL, including frequent assessment of the quality of respirations (not just a respiratory rate), the type of equipment to be used for monitoring respirations (e.g., capnography), and specific signs of oversedation. Ensure resources—both personnel and equipment—are available to monitor patients per established guidelines.¹⁸
- Use standardized formats for documenting pain control and monitoring parameters.¹⁸
- Ensure that oxygen and naloxone are available where opioids are administered.¹⁸
- Establish a process to screen patients for obstructive sleep apnea before initiation of fentaNYL PCA therapy, with further assessment by a respiratory therapist if the screening reveals two or more risk factors.¹⁹

Education and Information

- Require annual competence assessments for all professionals who prescribe, dispense, administer, or monitor the effects of fentaNYL.¹⁶
- Create mandatory education programs for all practitioners potentially involved with IV fentaNYL use. Include all aspects of safe use; accepted prescribing practices,

including those related to the management of the opioid-naïve patient; dosing norms; assessment parameters; and monitoring techniques.

- Provide staff with safety information on the use of potent narcotics via newsletters, during in-services, or through material available on their preferred form of technology (e.g., smartphones, tablets).

Monitoring of ADRs

- As demonstrated by previous analysis of ADR reports submitted to the Authority,¹² these types of reports serve as a potentially rich source of information to identify risk with the use of IV fentaNYL, as well as other opioids, in the facility. Consider

reviewing ADR reports, as well as the use of “trigger” drugs (e.g., naloxone) used to reverse the effects of opioids, to obtain outcome measures to get a broader picture of the harm resulting from the misuse of IV fentaNYL.

- Consider measures other than practitioner reporting of medication errors to evaluate your organization’s processes with the use of IV fentaNYL, including assessing core processes associated with IV fentaNYL.

CONCLUSION

FentaNYL is a potent, synthetic opioid analgesic with fewer side effects in comparison with morphine whose rapid onset of action has led to increasing use in many care areas including PACUs and EDs.

Analysis of medication errors and ADRs involving IV fentaNYL reveal that the predominant medication error event types associated with IV fentaNYL were wrong-dose/overdosage events and wrong-drug events, which could lead to patient harm. More than two-thirds of reported overdose events mention breakdowns during the pump-programming process, and high-alert medications were involved in almost 7 out of 10 wrong-drug events with fentaNYL. Effective risk reduction strategies to prevent patient harm could include restricting fentaNYL PCA use to anesthesia or pain management team members, establishing standardized protocols and order sets for pain management, and requiring an independent double check before administering IV fentaNYL doses.

NOTES

1. Peng PW, Sandler AN. A review of the use of fentanyl analgesia in the management of acute pain in adults. *Anesthesiology* 1999 Feb;90(2):576-99.
2. Prommer E. The role of fentanyl in cancer-related pain. *J Palliat Med* 2009 Oct;12(10):947-54.
3. Pasero C. Fentanyl for acute pain management. *J Perianesth Nurs* 2005 Aug;20(4):279-84.
4. Lexicomp Online. Fentanyl [online]. 2012 [cited 2012 Jul]. Available with subscription at http://online.lexi.com/lco/action/doc/retrieve/docid/patch_f/6903#pha.
5. Conti G, Costa R, Pellegrini A, et al. Analgesia in PACU: intravenous opioids. *Curr Drug Targets* 2005 Nov;6(7):767-71.
6. Bates DW, Spell N, Cullen DJ, et al. The costs of adverse drug events in hospitalized patients. Adverse Drug Events Prevention Study Group. *JAMA* 1997 Jan 22;277(4):307-11.
7. Hicks RW, Becker SC, Windle PE, et al. Medication Errors in the PACU. *J Perianesth Nurs* 2007 Dec;22(6):413-19.
8. Payne CH, Smith CR, Newkirk LE, et al. Pediatric medication errors in the postanesthesia care unit: analysis of MEDMARX data. *AORN J* 2007 Apr;85(4):731-40.
9. Glossary. In: Joint Commission. *Comprehensive accreditation manual for hospitals: the official handbook (CAMH)*. Update 2. Oakbrook Terrace (IL): Joint Commission Resources; 2012 Sep.
10. National Coordinating Council for Medication Error Reporting and Prevention. NCC MERP index for categorizing medication errors [online]. 2001 Feb [cited 2012 Aug 2]. <http://www.nccmerp.org/medErrorCatIndex.html>.
11. Institute for Safe Medication Practices. ISMP 2007 survey on high-alert medications: differences between nursing and pharmacy perspectives still prevalent. *ISMP Med Saf Alert Acute Care* 2007 May 17;12(10):1-3.
12. Institute for Safe Medication Practices. ISMP’s list of high-alert medications [online]. 2012 [cited 2012 Aug 8]. <http://www.ismp.org/Tools/highAlertMedications.asp>.
13. Adverse drug events with HYDROMORPHONE: how preventable are they? PA PSRS Patient Saf Advis [online] 2010 Sep [cited 2012 Aug 8]. [http://www.patientsafetyauthority.org/ADVISORIES/AdvisoryLibrary/2010/Sep7\(3\)/Pages/69.aspx](http://www.patientsafetyauthority.org/ADVISORIES/AdvisoryLibrary/2010/Sep7(3)/Pages/69.aspx).
14. Cohen MR, Smetzer JL, Tuohy NR, et al. High-alert medications: safeguarding against errors. Chapter 14. In: Cohen MR, ed. *Medication errors*, 2nd ed. Washington (DC): American Pharmacists Association; 2007.
15. Institute for Safe Medication Practices. Medication error prevention “toolbox.” *ISMP Med Saf Alert Acute Care* 1999 Jun 2;4(11):1.
16. Institute for Safe Medication Practices. Misprogram a PCA pump? It’s easy! *ISMP Med Saf Alert Acute Care* 2004 Jul 29;9(15):1-2.
17. Institute for Safe Medication Practices. Safety issues with patient-controlled analgesia. Part II—how to prevent errors. *ISMP Med Saf Alert Acute Care* 2003 Jul 24;8(15):1-2.
18. Institute for Safe Medication Practices. Risk of deadly mix-up exists in most hospitals. *ISMP Med Saf Alert Acute Care* 2004 Jul 1;9(12):1-2.
19. Institute for Safe Medication Practices. High alert medication feature: reducing patient harm from opioids. *ISMP Med Saf Alert Acute Care* 2007 Feb 22;12(4):2-3.
20. Institute for Safe Medication Practices. Beware of basal opioid infusions with PCA therapy. *ISMP Med Saf Alert Acute Care* 2009 Mar 12;14(5):1-2.
21. Institute for Safe Medication Practices. Don’t use epidural tubing for an IV solution. *ISMP Med Saf Alert Acute Care* 2008 Jan 17;13(1):3.



LEARNING OBJECTIVES

- Recognize the risks associated with the dosing of intravenous (IV) fentaNYL.
- Recognize the types of medication errors that are associated with IV fentaNYL.
- Identify common reported adverse drug reactions with the use of IV fentaNYL.
- Select appropriate strategies to promote the safe prescribing, dispensing, and administering of IV fentaNYL.

SELF-ASSESSMENT QUESTIONS

The following questions about this article may be useful for internal education and assessment. You may use the following examples or develop your own questions.

A physician writes an order for 500 mcg of IV fentaNYL for a 39-year-old who complains of pain after a laparoscopic procedure. After receiving this dose, the patient was found unresponsive with low oxygen saturation and respiratory rate.

1. What is the equivalent dose of morphine IV for this patient?
 - a. 10 mg
 - b. 20 mg
 - c. 50 mg
 - d. 75 mg
2. Which of the following statements *best* describes why IV fentaNYL has been considered to be an ideal analgesic agent in outpatient procedures, where the goal is to have a short recovery time?
 - a. IV fentaNYL has fewer side effects compared with other analgesics.
 - b. IV fentaNYL has a rapid onset of action.
 - c. IV fentaNYL is safer than other analgesics.
 - d. IV fentaNYL is more potent than other analgesics.
3. Which of the following is the type of medication error involving the use of IV fentaNYL most commonly reported to the Pennsylvania Patient Safety Authority?
 - a. Wrong drug selection
 - b. Wrong rate of infusion
 - c. Wrong dose/overdosage
 - d. Monitoring error/documented allergy
4. Which of the following is the area of care with medication errors involving the use of IV fentaNYL most commonly reported to the Authority?
 - a. Intensive care unit
 - b. Postanesthesia care unit
 - c. Emergency department
 - d. Medical-surgical unit
5. Which of the following is the adverse drug reaction related to IV fentaNYL most commonly reported to the Authority?
 - a. Bradycardia
 - b. Hypotension
 - c. Central nervous system depression
 - d. Respiratory depression

SELF-ASSESSMENT QUESTIONS (CONTINUED)

A facility's pain team evaluated a patient at 10 a.m. and increased the basal rate of the fentaNYL patient-controlled analgesia (PCA) to 20 mcg/hr from 12 mcg/hr. Three hours later, the palliative care team saw the patient and increased the basal rate of the PCA to 100 mcg/hr. Early the next morning, the patient needed a dose of naloxone, and fentaNYL basal rate was decreased to 50 mcg/hr by the hospitalist.

6. Based on this scenario, which of the following is the *least* effective strategy to mitigate the risk of harm with IV fentaNYL?
 - a. Provide staff with safety information on the use of IV fentaNYL via newsletters and in-services.
 - b. Restrict the use of fentaNYL PCA to anesthesia or pain management team members.
 - c. Establish standardized protocols and order sets for pain management.
 - d. Implement processes with double checks during the administration phase of IV fentaNYL.

PENNSYLVANIA PATIENT SAFETY ADVISORY

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