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FAST FACTS AND CONCEPTS #92

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Introduction Patient Controlled Analgesia (PCA) is a technique allowing patients to self-administer parenteral analgesics. The primary advantage of PCA is to shorten the interval from the time of patient-defined need to the time of actual analgesic administration. PCA is an effective, safe, and well-accepted treatment for post-operative pain, sickle cell crisis pain (as young as age 4), and cancer pain. In general, PCA will provide the same degree of analgesia compared to other delivery systems with the same or less total amount of medication. PCA allows for more immediate relief of incident (breakthrough) pain and can provide patients with a greater sense of personal control over their pain.

Indications The primary indication for PCA is the patient who requires parenteral analgesia (e.g. severe pain and/or oral/transdermal/rectal route not useable) and has incident pain or other pain patterns that are not predictable. PCA is also indicated for use as a method of rapid dose titration and dose finding in acute, severe pain. Relative contraindications include patients who a) do not have the cognitive ability to understand how to use a PCA device, or b) have an anticipated need for parenteral opioids less than 24 hours.

PCA devices Most devices have a drug reservoir and infusion system whereby PCA administration can occur with or without a background continuous infusion. Thus, PCA devices need the following orders; 1) **PCA dose** in mg or mcg ('patient initiated dose,' 'patient demand dose,' or 'bolus dose'), 2) **Delay Interval** ('lockout') – in minutes (period during which the patient cannot obtain additional demand medication), 3) **Continuous infusion (CI) Rate** in mg/hr or mcg/hr (if CI is used), and 4) **Hour Limit** – maximum amount of drug to be dispensed in a defined period of time. Often the one hour limit is set to deliver 3-5 times the estimated required hourly dose. (Note: due to the need for frequent dose adjustments, the Hour Limit is often omitted in palliative care). Most palliative care patients will need both PCA demand and CI dosing. Opioids used in PCA devices include morphine, hydromorphone, fentanyl, and methadone. IV or SQ are the most common routes of administration; PCA can also be used with epidural, intrathecal, or intraventricular opioid administration (see *Fast Facts #28, 85, and 98*).

Dosing in opioid-naïve patients The following information is for morphine, the first-line drug of choice for most patients. **Note:** dosing and delay interval information will differ with other opioids. Start dosing: PCA demand dose = 1-3 mg morphine; Delay Interval = 8-10 min. Initial CI (if any) is dependent on the clinical situation. For instance, 1 mg/hour of IV morphine is approximately equivalent to 35 mg bid of oral morphine ER. This may be excessive for opioid-naïve patients; conversely many opioid-naïve patients with severe pain will easily tolerate this, so the decision to immediately start a CI depends on clinician judgment. If not started immediately, one can initiate a CI after four hours by summing the total demand dose given over 4 hours and converting that into an hourly rate (e.g. if 16 mg is given over four hours, CI would be 4 mg/hour). A new PCA demand dose can then be calculated at 50% of the hourly CI rate ($4 \text{ mg/hr} \div 2 = 2 \text{ mg PCA demand dose}$, Delay Interval 8-10 min).

Dosing in non-naïve patients Convert their current total oral/transdermal dose to a total 24 hour IV dose; divide by 24 to give the hourly CI rate in mg/hour (see *Fast Fact #36* on dose conversions). The PCA demand dose is initially calculated at 50% of the hourly rate.

Risk of Overdose The patient who is pushing his or her own PCA button will fall asleep before serious signs of overdose occur as long as only the patient pushes the button. **Note:** special care is needed for patients with sleep

apnea as they will be more sensitive to opioids.

Dose titration and Loading Doses See *Fast Facts #20* Opioid Dose Escalation, #54 Opioid Infusions in the Imminently Dying Patient, and #72 Opioid Infusion Titration Orders.

Common Sense Cautions These dosing recommendations are rough guidelines—clinicians need to take into account pain severity, patient age, renal and pulmonary function, co-morbid illness, and other psychoactive medications. When in doubt, it is advised to use a lower CI rate (with upward dose adjustments of the CI rate no more frequently than every 8 hours), while adjusting the PCA dose at frequent intervals (q30-60 minutes) to effectively control pain.

References

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