

How To Start and Stop a PCA



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Disclosure

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PATIENT CONTROLLED ANALGESIA (PCA)



History

- Utilized to optimize pain relief since 1971
- Commercial appearing PCA pump 1976
- Peripheral vein inserted catheter
- Administration of PCA IV , epidurally, centrally.



Patient-Controlled Analgesia

MD SearchLight
Be Your Own Advocate



The Terminology

Many things can handle a PCA:

Central lines

Epidural catheters

Peripheral nerve catheters

- Epidural: PCEA
- Spinal: PCEA
- Peripheral nerve catheters: PCA
- Other solutions- ketamine, magnesium, lidocaine, etc:
- PCA



Other PCAs

- Ketamine
- Naloxone
- Clonidine
- Magnesium
- Ketorolac
- Lidocaine
- Droperidol

Faster pain relief: No waiting for a nurse to administer the medication.

Greater patient control: Provides patient control

Less Medication Overall: In all studies, IV, oral, IM

Unable to tolerate oral

Less stress on the nursing staff



The GOOD

Saves money on medications

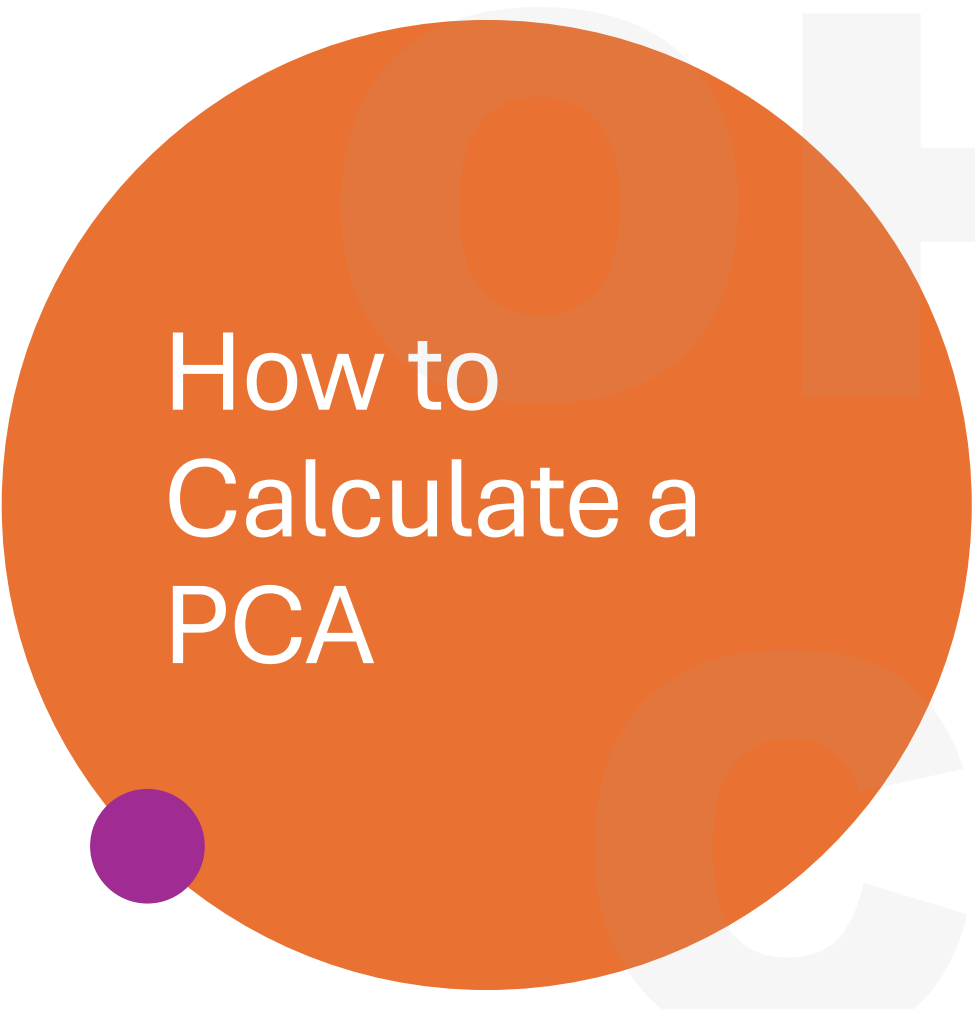
Less usage

Mainly superior post-op analgesia, better patient satisfaction

Side-effects or economic benefit were not significantly different between PCA vs PRN models (Wu et.al 2001)



PCA by proxy: This is when others push the button for the patient. Only the patient should press the button.



How to Calculate a PCA

- A quick and dirty way to calculate how to start a PCA:
- Calculate needs over 60 minute period
- Then assume need $\frac{1}{2}$ hour of this dose in the next 3 hours for drugs with 3 hour half life (most medications have 3 hour half life-oxycodone/hydromorphone)
- Divide by 3 for hourly dose
- Divide by 3 for the 20 minute dose.

What dose do I start with? What if opioid tolerant?

Standard Dosing Tables

Morphine 1 mg q 10 minutes

Hydromorphone 0.2 mg q 10 minutes

Fentanyl 10 ug q 10 minutes

Breakthrough Dosing

- Morphine 2-4 mg q 2 hr prn
- Hydromorphone 0.4-1 mg q 2 hr prn
- Fentanyl 20-40 ug q 2 hr prn



CONTINUOUS PULSE
OXIMETRY



REMOTE TELEMETRY OVER
BEDSIDE MONITORING

The Fentanyl Family

WHAT IS FENTANYL?



Fentanyl is a synthetic opioid that is approximately **50X MORE POTENT THAN MORPHINE¹**

Many people are exposed to fentanyl without knowledge while others use it intentionally because of its potency.

OVERDOSE DEATHS IN THE UNITED STATES EXCEEDED 100,000 IN A 12-MONTH PERIOD FOR THE FIRST TIME!

64% of these deaths involved synthetic opioids, mainly illicitly manufactured fentanyls (IMFs) (May 2020-April 2021)²

This is up from the more than 91,000 overdose deaths that occurred the previous year. (December 2019-December 2020)³



Potencies of the Fentanyl Family

It goes
alphabetical
least potent to
most potent:

Alfentanil,
Fentanyl,
Remifentanyl,
Sufentanil

Why not some of the fentanyl family?

Remifentanyl

- Tachyphylaxis

Alfentanyl

- Even shorter acting than Fentanyl

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Context Sensitive Half Lives

How long for a
drug to drop its
concentration
by 50% after
continuous
infusion

Remifentanyl 3-
4 minutes

Fentanyl or
morphine >6
hours

Sufentanyl is
the longest

Is Fentanyl a good PCA choice?

NO

- Half life is 6 minutes
- Patients are always on their buttons
- Lipophilic so excellent for buprenorphine (sufentanil better)

YES

Doesn't
accumulate

Metabolites
fairly
innocuous

Different

Sufentanil

Less suitable for long term PCA than opioids



Why? Longer context sensitive half life



More potent than fentanyl



What about the other Fentanyls- Remifentanyl, Sufentanyl, Alfentanyl...?

Remifentanyl has tachyphylaxis

Sufentanyl is very good for buprenorphine. Why?

Alfentanyl is probably too short-lived

And what about Fentanyl?

What about renal dysfunction?

- Hydromorphone does have metabolites- less potent

Use
hydromorphone-
least metabolites

This goes for oral
and IV




Fun PCA Fact

- **The sensitivities to opioids, between opioid classes, are less with PCA administered opioids than orals.**

How Long to Wait?

After neuraxial opioids, wait approximately 12 hours to start PCA



Longest with morphine



And shortest with.....

Pregnancy and Buprenorphine and Large Spine Cases

- 1 ug/ml or 2 ug/ml
- Usually, 1 or 2 ug every 8-10 minutes.

For pregnancy on buprenorphine, sufentanil PCA is best

Recommend this dosing:

Children and Adults

Adults

Bolus dosing only



Always use remote telemetry especially if continuous rate



Rarely use continuous

Children

- First age of PCA use 5-7 years
- In children, continuous tends to be better even if 5-7 years of age

Let's practice converting to morphine

Convert
everything to
morphine

Then reduce 30-
50%

Morphine



When should I not do morphine?

What level of renal dysfunction precludes morphine?

What are the morphine metabolites that build up?

How toxic are they?

- This process yields two major, pharmacologically distinct metabolites:
 - **Morphine-6-glucuronide (M6G)**
 - **Morphine-3-glucuronide (M3G)**
 - **Some people just use morphine 6 by itself for its great analgesia properties**
 - **Morphine toxicity is clinically RARE**
 - **More of a textbook concern**

How to Wean?

Recommend basal only to start

If continuous, remove that first

Then reduce dose overextending time. Tends to be more successful

Can add in orals when get below starting doses.

Thank You!

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