GitHub: <https://github.com/sthomas2878/map4484-project1>

Brainstorm possible Factors:

* Age (Age groups vs continuous)
* Weight (Groups vs continuous)
  + BMI
* Race (Difficult)
* Gender
* Risk Factors:
  + Smoker
  + Drinker
  + Immunocompromised
  + Other drug use
* Capsule release system
* Pain Level
  + Low
  + Moderate
  + Severe
* Drug half life
* absorption in body
* Clearance from body

Patient #1 (Oxycodone):

Age: Elderly patients more prone to effect of oxycodone

Pain Level: Moderate to Severe

Half life: 3 - 5hrs

Therapeutic Range: 10-100 ng/mL depending on dosage

General Guidelines - Assuming no previous narcotic medicine use or narcotic tolerance ([Link](https://www.mayoclinic.org/drugs-supplements/oxycodone-oral-route/proper-use/drg-20074193))

1. Severe Pain
   1. Extended Release
      1. Adults: 9mg every 12hrs -> Dose generally not >288mg per day
2. Moderate to Severe Pain
   1. Capsules
      1. Adults: 5 - 15mg every 4 - 6hrs
   2. Extended-release tablets
      1. Adults: 10mg every 12 hours
      2. Older Adults: 3 - 5mg every 12 hours
   3. Immediate-Release tablets
      1. Adults: 5 - 15mg every 4 - 6hrs
      2. Children: 0.05 - 0.15mg / kg every 4 - 6hours
      3. Liver Impairment: ⅓ - ½ usual dose
      4. Elderly: ⅓ - ½ usual dose

Graphs: Graph for children - Relationship between dose (y) and weight (x), put adults and elderly on same plot (maybe with half-lives)

Matrix to keep track of concentration of each dose from half-life

Tapering: Not needed “A tapering plan may be beneficial for patients who have been taking opioid medications multiple times a day for more than two weeks but less than six months” ([Link](https://www.hss.edu/conditions_patient-guide-opioid-tapering.asp))

Extended release - Do not need to worry since “The extended-release formulation is FDA approved for the management of pain severe enough to require continuous long-term opioid treatment and for which there are no alternative options to treat the pain.” ([Link](https://www.ncbi.nlm.nih.gov/books/NBK482226/))

Immediate Release

Onset of action: 10-30min

Peak Effect: 1-2 hours

Duration range: 3 to 6 hours

Half life: 3 - 5hrs -> Stable plasma levels: 24 - 36hrs

Available in 5mg, 10mg, 15mg, 20mg, 30mg

Weight: Obesity does not affect dosing needs ([Link](https://medsask.usask.ca/documents/mednews-docs/Benzodiazepine-Dosing-in-Obesity.pdf))

Race: Lack of effect (Maybe)

Gender: Lack of effect

Look into Oxycodone MME (1.5) ([Link](https://www.cdc.gov/drugoverdose/pdf/calculating_total_daily_dose-a.pdf))

* 50 mme per day medium dose
* 90 mme/day high dose

Conversion of mg/L to ng/ml

* Dose between 5 - 15mg
  + 5L blood in human body

=> 1 - 3 mg/L -> 1000 - 3000 ng/ml

Patient #2 (Ibuprofen):

[Link](https://www.mayoclinic.org/drugs-supplements/ibuprofen-oral-route/proper-use/drg-20070602)

For mild to moderate pain:

* Adults and teenagers—400 milligrams (mg) every four to six hours, as needed.
* Children over 6 months of age—Dose is based on body weight and must be determined by your doctor. The dose usually is 10 milligrams (mg) per kilogram (kg) of body weight every six to eight hours, as needed, up to 40 mg per kg per day.
* Infants younger than 6 months of age—Use and dose must be determined by your doctor.

Half life: 1.2 -2 hours

Onset of action (fasting): 30-60 minutes

Onset of action (non-fasting): about 20–30% slower [Link](https://academic.oup.com/jpp/article/64/4/465/6135247) - also depends on type of food eating

Duration range: 4-6 hours

Therapeutic Range: 10 - 50 mg/L (toxic >100 mg/L) [Link](https://www.aae.org/specialty/communique/ibuprofen-well-know-favorite-drug/#:~:text=The%20maximum%20recommended%20daily%20dose,%3E100%20mg%2FL)

Weight: Obesity does not affect dosing needs

Race: Lack of effect

Gender: Lack of effect

Patient #3 (combination):

[Link](https://www.mayoclinic.org/drugs-supplements/oxycodone-and-ibuprofen-oral-route/proper-use/drg-20062031)

For oral dosage (tablets)

* Adults and children 14 years and older - one tablet every 4 to 6 hours as needed. No more than 4 tablets per day and no longer than 7 days
* 5 mg of oxycodone and 400mg of ibuprofen [Link](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6494203/)

Oxycodone half life: 3.1 hr to 3.7 hr

Ibuprofen half life: 1.8 hr to 2.6 hr

Oxycodone onset of action: 10-15 min

Ibuprofen onset of action: 30 min

Oxycodone duration range: 3-6 hr

Ibuprofen duration range: 4-6 hr

Weight: Obesity does not affect dosing needs

Race: Lack of effect

Gender: Lack of effect

<https://accp1.onlinelibrary.wiley.com/doi/full/10.1002/cpdd.672>