

Mild to moderate pain

Name of Drug Route	Pediatric Dose (< 60 kg)	Maximum Dose
Acetaminophen PO	10-15 mg/kg q 4-6 hrs	75 mg/kg/day Do not exceed 5 doses/day
Acetaminophen IV	< 2 yrs: 7.5 – 15 mg/kg q 6 hrs > 2 yrs: 15 mg/kg q 6 hrs	60 mg/kg/day 75 mg/kg/day
Naproxen PO	5 mg/kg q 8-12 hrs	20 mg/kg/day
Ibuprofen PO	10 mg/kg q 6-8 hrs PO	40 mg/kg/day
Ketorolac IV	> 1 month to 2 yrs: 0.5 mg/kg q 6-8 hrs 2 – 16 yrs: 0.5 mg/kg q 6hrs	No more than 3 days No more than 5 day
Ketorolac PO	No pediatric studies exist for oral dosing	No more than 5 days

- All above drugs are anti-pyretic and should be used with caution in patients who are neutropenic or recently transplanted. An alternative for mild pain would be codeine 0.5 to 1 mg/kg/dose PO q 4-6 hrs.
- Naproxen, ketorolac, and ibuprofen should be used with extreme caution in patients with thrombocytopenia due to their anti-platelet effect, which may prolong bleeding time.
- All nonsteroidal anti-inflammatory drugs should be used with extreme caution in patients with any renal dysfunction, concomitant diuretic use, or hypovolemia as they may precipitate renal failure.
- Use with caution in patients with decreased hepatic function; closely monitor patients with abnormal LFTs; severe hepatic reactions (eg, fulminant hepatitis, liver failure) have occurred with NSAID use. Discontinue if signs or symptoms of liver disease develop or if systemic manifestations occur.
- Use with caution in patients with asthma; patients may have aspirin-sensitive asthma which may be associated with severe and potentially fatal bronchospasm when aspirin or NSAIDs are administered.
- Use with caution and monitor carefully in patients with coagulation disorders or those receiving anticoagulants.
- NSAIDs may increase the risk of GI inflammation, ulceration, bleeding, and perforation. These events can be fatal and may occur at any time during therapy and without warning. Use either an H2 antagonist or proton pump inhibitor to protect the GI mucosa while on NSAIDs. Use with caution in patients with other risk factors: concurrent therapy with aspirin, anticoagulants, and/or corticosteroids, and longer duration of therapy.
- Avoid all NSAIDs in patients receiving high-dose methotrexate.

Moderate pain: In addition to acetaminophen or NSAID (i.e.: treatment of mild pain):

Name of Drug	Pediatric dose	Remarks
Codeine	0.5 – 1.0 mg/kg/dose PO q 4 hrs.	Codeine is a prodrug which must be hepatically metabolized to the active form. Because of this, some patients may have either an exaggerated effect (i.e. too much analgesia and potentially excess toxicity) due to rapid metabolism, or ineffective analgesia due to poor metabolism.
Oxycodone	0.1mg/kg/dose PO q 4 hrs	When prolonged pain is expected (ie: early mucositis), it may be more appropriate to provide a PCA
Morphine	0.15-0.3 mg/kg/dose PO q 4 hrs	

Moderate to severe pain

Name of Drug	Pediatric dose	Remarks
Morphine	0.3mg/kg/dose PO q 3-4 hrs or 0.1 mg/kg/dose IV q 3-4 hrs	When prolonged pain is expected (ie: early mucositis), it may be more appropriate to provide a PCA

Severe acute pain

Name of Drug	Pediatric dose	Remarks
Morphine	0.05mg/kg boluses every 5-10 minutes	Physician should be at bedside until pain is controlled. Once controlled, begin continuous infusion and boluses

Neuropathic pain

Name of Drug	Pediatric dose	Remarks
Gabapentin	5-10 mg/kg per day divided TID (if < 50 kg) or 100 mg PO TID	Increase dose every 3 days to a maximum of 70 mg/kg/day not to exceed 3600 mg/day. When gabapentin dose is maximized, add amitriptyline 0.1 mg/kg PO at bedtime if neuropathic pain not well controlled. Increase by doubling dose every 3-5 days to a maximum of 1mg/kg at bedtime. Also requires hepatic metabolism to the active form.

Recommended Starting Doses for Patient-Controlled Analgesia (PCA)

- Consider boosts only for opioid naïve patients for the initial 12-24 hours.
- An order is required to indicate the boost designee. Documentation of teaching of the boost designee is required before the PCA is initiated.
- Morphine is the standard opioid to use in a PCA. However, if the patient is allergic to morphine or unacceptable side effects occur, the other opioids may be used as indicated. After the PCA is started, titrate the dose to desired effect.

Opioid	Infusion/hour	Boost dose	Interval between boosts
Morphine	0.02 mg/kg/hr	0.02 mg/kg	15 minutes
Hydromorphone	0.004 mg/kg/hr	0.004 mg/kg	15 minutes
Fentanyl	0.5 mcg/kg/hr	0.5 mcg/kg	10-15 minutes

Equianalgesic Table

This table represents the equianalgesic dosages to be used when changing routes or changing between opioids.

Drug	Equianalgesic dose (doses in mg)	
	IM/IV	PO
Morphine	10	30
Hydromorphone	1.5	7.5
Fentanyl	0.1	Not available
Oxycodone	Not available	15-30

Sustained-release opioids

Sustained-release opioids provide a more consistent blood level and more uniform pain relief. This can result in a lower 24-hour opioid dose than when the same drug is given in a short-acting form requiring multiple dosing. Short-acting opioids are characterized by a rapid rise and rapid decline in serum levels, which may be beneficial for the treatment of acute pain and breakthrough pain, whereas long-acting drugs or sustained-release formulations provide a more effective means of controlling chronic pain. Opioids with long half-lives or extended-release formulations are preferred for the management of chronic pain. These drugs may facilitate patient adherence with treatment regimens, increase convenience for caregivers, provide consistent levels of analgesia, and allow the patient to focus less on pain and pain medications.

When using the SR preparations:

- Careful determination of the previous daily dose of opioids must be used to determine the safe and effective dose of the SR preparation.
- When using transdermal fentanyl (Duragesic® Patches) consider the following:
 - Transdermal fentanyl should not be used in opioid-naïve patients.
 - Patients receiving transdermal fentanyl should be monitored closely for signs of fentanyl overdose.
 - Patient education is particularly important when using transdermal fentanyl.
 - Patients should be educated not to use heat sources such as heating pads or electric blankets when wearing the patch since heat may increase the amount of fentanyl that reaches the blood and cause an overdose.
- Note that for the 12 mcg/hr fentanyl patch to be used the patient needs to have been taking approximately 30 mg IV/day or 90 mg PO/day of morphine or its equivalent (see Equianalgesic Table).
- When transitioning from a PCA to transdermal fentanyl:
 - Decrease the basal rate of the PCA by 50% six hours after the fentanyl patch was placed.
 - Discontinue the basal rate of the PCA 12 hours after the fentanyl patch was placed.

Opioid/route	SR Preparation	Available dosages	Dosage frequency
Morphine	Kadian®	10 mg, 20 mg, 30 mg, 50 mg	Every 12 or 24 hours
Oxycodone/PO	Oxycontin®	10 mg, 20 mg, 40 mg, 80 mg	Every 12 hours
Fentanyl/ Transdermal	Duragesic® Patches	12 mcg/hr, 25 mcg/hr, 50 mcg/hr, 75 mcg, 100 mcg	Every 72 hours