Cancer Pain Pathway – Pediatric (Age 1 month to < 18 Years)

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Note: This consensus algorithm excludes patients who are in the Pediatric Intensive Care Unit (PICU), Neonatal Intensive Care Unit (NICU), perioperative or pre-procedural settings, or are currently receiving epidural or intrathecal analgesia.

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Pain Assessment and Treatment – Inpatient

Assess for pain[1] using appropriate pain scale and personalized pain goal (PPG)[2]

Mild pain and/or PPG met

Consider consulting Child Life and other Complementary/Integrative therapies (Appendix B)

For patients not currently taking opioids:

- Consider non-opioids (Appendix C) or if contraindicated, consider opioids (Appendix D), as needed for pain

For patients currently taking opioids:

- Continue current analgesic regimen or consider dose changes as clinically indicated
- If patient is currently taking a long-acting opioid, consider adding a short-acting opioid for breakthrough pain. The breakthrough dose is calculated as 10-20% of the total daily dose, given every 1 to 4 hours
- Manage opioid induced side effects as clinically indicated (Appendix E). For patients on opioids, ensure a scheduled bowel regimen.

Reassess pain, PPG and opioid side effects as indicated[2]

Is pain adequately controlled?

Yes → Continue current analgesic regimen → Reassess pain, PPG and opioid side effects as indicated[2]

No

Moderate pain[2] and/or PPG met

Consider consulting Child Life and other Complementary/Integrative therapies (Appendix B)

For patients not currently taking opioids:

- Administer short-acting opioids (Appendix D)
- Start bowel regimen with first dose of opioid

For patients currently taking opioids:

- Consider increasing scheduled opioid dose by 30-50%. If scheduled opioid is increased, recalculate the breakthrough dose as 10-20% of the total daily dose, given every 1 to 4 hours.
- If initial escalation by 30 - 50% with the breakthrough doses exceeding 3 per day, do not adequately relieve pain, assess for non-physiologic cause of pain and use non-pharmacologic therapies where appropriate.
- Manage opioid induced side effects as clinically indicated (Appendix E). For patients on opioids, ensure a scheduled bowel regimen.
- Consider specialty consult[3]

- Reassess pain and opioid side effects as indicated[2]
- If short-acting opioids given, reassess pain within 1 hour

Is pain adequately controlled?

Yes → Continue current analgesic regimen

No →

- Titrate scheduled and short-acting opioids
- Consult specialty service[3]

→

- Reassess pain, PPG and opioid side effects as indicated[2]
- If short-acting opioids given, reassess pain within 1 hour

Severe pain or pain crisis, **see next page**

[1] See Appendix A for Comprehensive Pain Assessment.
[2] Refer to Pain Management Policy.
[3] Consultation services that specialize in pain management: Acute Pain, Chronic Pain, Pediatric Palliative/Supportive Care, PICU, and Integrative Medicine. See Appendix F for description of services.

Note for all patients:

- Consider using appropriate adjuvants (Appendix G) and/or Complementary/Integrative therapies (Appendix B), bowel regimen (Appendix E), Patient Education (Appendix H), and psychosocial support as appropriate (Appendix F).
- If frequent prn doses required and pain anticipated for greater than one day, consider patient controlled analgesia (PCA). See Appendix I.

Cancer Pain Pathway – Pediatric (Age 1 month to < 18 Years)

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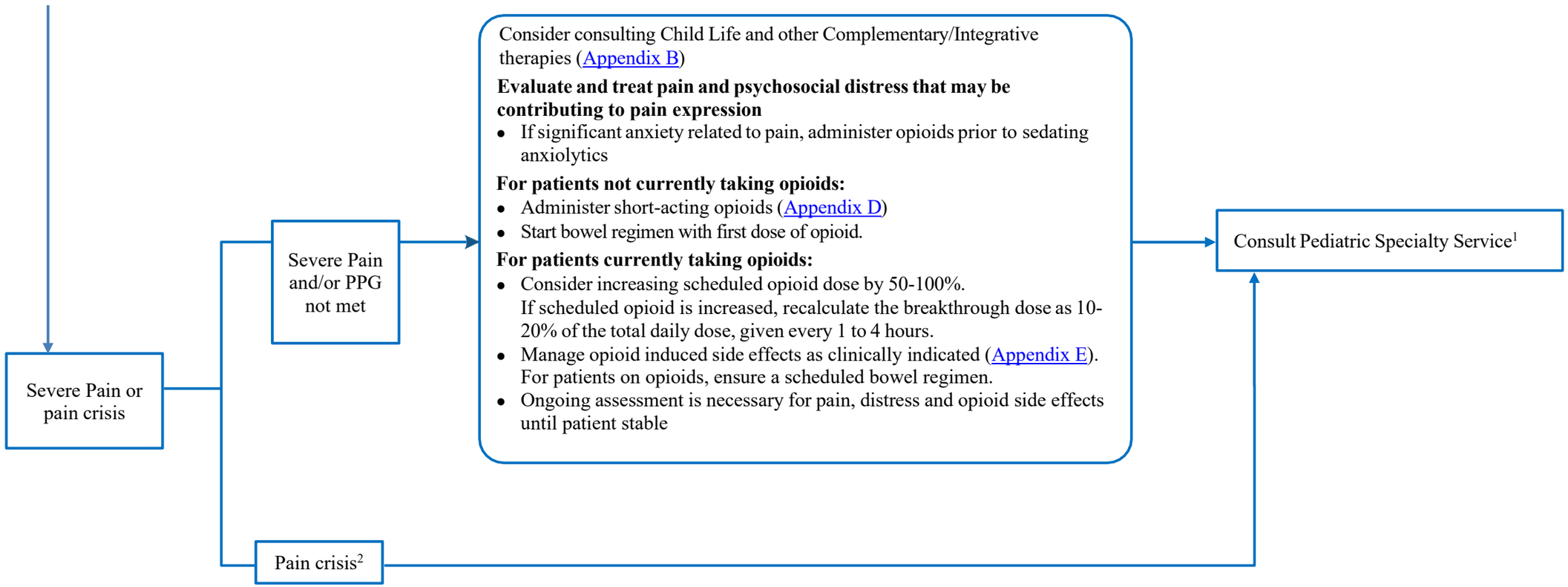
Pain Assessment and Treatment – Inpatient – Continued



[1] Consultation services that specialize in pain management: Acute Pain, Chronic Pain, Pediatric Palliative/Supportive Care, PICU, and Integrative Medicine. See Appendix F for description of services.

[2] Pain crisis or emergency is defined as severe pain, new onset, or exacerbation of previously stabilized pain, accompanied by significant distress or if present for greater than 24 hours.

Cancer Pain Pathway – Pediatric (Age 1 month to < 18 Years)

Disclaimer: *This algorithm has been developed for APPHON using a multidisciplinary approach considering circumstances particular to the Atlantic Provinces specific patient population, services and structure, and clinical information. This is not intended to replace the independent medical or professional judgment of physicians or other health care providers in the context of individual clinical circumstances to determine a patient's care. This algorithm should not be used to treat pregnant women.*

Note: This consensus algorithm excludes patients who are in the Pediatric Intensive Care Unit (PICU), the Neonatal Intensive Care Unit (NICU), perioperative or pre-procedural settings, or are currently receiving epidural or intrathecal analgesia.

Pain Assessment and Treatment – Outpatient

Assess for pain[1] using appropriate pain scale and personalized pain goal (PPG)[2]

Mild pain and/or PPG met

Consider consulting Child Life and other Complementary/Integrative therapies (Appendix B)

For patients not currently taking opioids:

- Consider non-opioids (Appendix C) or if contraindicated, consider opioids (Appendix D), as needed for pain

For patients currently taking opioids:

- Continue current analgesic regimen or consider dose changes as clinically indicated
- If patient is currently taking a long-acting opioid, consider adding a short-acting opioid for breakthrough pain. The breakthrough dose is calculated as 10-20% of the total daily dose, given every 1 to 4 hours
- Manage opioid induced side effects as clinically indicated (Appendix E). For patients on opioids, ensure a scheduled bowel regimen.

Reassess pain, PPG, and opioid side effects (if using opioids)

Is pain adequately controlled?

Yes → Continue analgesic and bowel regimen, education and psychosocial support as appropriate

No

Moderate pain and/or PPG not met

Consider consulting Child Life and other Complementary/Integrative therapies (Appendix B)

For patients not currently taking opioids (pediatric oncologist assessed):

- Administer short-acting opioids (Appendix D)
- Start bowel regimen with first dose of opioid.

For patients currently taking opioids:

- Consider increasing scheduled opioid dose by 30-50%. If scheduled opioid is increased, recalculate the breakthrough dose as 10-20% of the total daily dose, given every 1 to 4 hours.
- If initial escalation by 30 - 50% with the breakthrough doses exceeding 3 per day, do not adequately relieve pain, assess for non-physiologic cause of pain and use non-pharmacologic therapies where appropriate.
- Manage opioid induced side effects as clinically indicated (Appendix E). For patients on opioids, ensure a scheduled bowel regimen.
- If opioid induced neurotoxicity (OIN)3, consider hospitalization and evaluation in the Pediatric Tertiary Center, opioid rotation (Appendix J), and/or specialty consider specialty consult[4]
- Consider specialty consultation[4]

Reassess pain, PPG, and opioid side effects (if using opioids) as clinically indicated

Is pain adequately controlled?

Yes → Continue analgesic and bowel regimen, education and psychosocial support as appropriate

No → Consider specialty consultation[4] for uncontrolled pain and/or side effect management

Severe pain or pain crisis[5] → Consider evaluation in Pediatric Tertiary Center, hospitalization, or specialty consultation[4]

Note for all patients:

- Consider using appropriate adjuvants (Appendix G) and/or Complementary/Integrative therapies (Appendix B), bowel regimen (Appendix E), Patient Education (Appendix H), and psychosocial support as appropriate (Appendix F).
- If frequent pm doses required and pain anticipated for greater than one day, consider patient controlled analgesia (PCA). See Appendix I.

[1] See Appendix A for Comprehensive Pain Assessment.
[2] Refer to Pain Management Policy
[3] Opioid induced neurotoxicity (OIN) can include drowsiness, cognitive impairment, confusion, hallucinations, and myoclonic jerks (Appendix E).
[4] Consultation services that specialize in pain management: Pediatric Palliative/Supportive Care.

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Quick Pediatric Reference Guide

- **Opioid naïve**: Includes patients who are not chronically receiving opioid analgesic on a daily basis and therefore have not developed significant tolerance.
- **Opioid tolerant**: Patients who are chronically receiving opioid analgesics on a daily basis. The pharmaceutical industry's definition of opioid tolerant for pediatric patients is generally a patient receiving the equivalent of 1 mg/kg per day of oral morphine for 1 week or longer.
- **Incomplete cross-tolerance**: Reduce dose of new opioid by 30 to 50% when switching from one opioid to another to account for tolerance to a currently administered opioid that does not extend completely to other opioids. Consequently, this phenomenon tends to lower the required dose of the new opioid.
- **Dose titration**: Adjusting the dose of an opioid should be individualized for each patient. Refer to Pages 2 to 4 of this algorithm for titration recommendations.
- **Dosing frequency**: For long-acting opioids, dosing frequency is typically every 12 hours to 24 hours depending on the agent. Refer to Appendix D for Opioid Dose Considerations.
- **Breakthrough pain**: Doses of short-acting opioids for breakthrough pain should be 10 to 20% of the total daily dose given every 1 to 4 hours as needed. Breakthrough opioids can be given as frequently as every 1 hour for oral doses or every 30 minutes if SubQ or every 15 minutes if IV (assuming normal renal/hepatic function).
- **Organ dysfunction**: Use additional caution when converting opioids in patients with hepatic, renal, or pulmonary dysfunction. Morphine and hydromorphone should be used with caution in patients with decreased renal function.
- **Opioids NOT recommended for cancer pain**: Meperidine and mixed agonist-antagonists (pentazocine, nalbuphine, butorphanol) should be avoided.
- **Opioid disposal**: Return unused opioids to the pharmacy for destruction.
- **Withdrawal symptoms**: Nausea, vomiting, diarrhea, anxiety, and shivering are common symptoms of opioid withdrawal. A gradual taper is recommended when discontinuing opioids.
- **Overdose:** Respiratory depression is a symptom of overdose, in addition constricted pupils, and decreased responsiveness may be symptoms. Naloxone is used to reverse the effects of an opioid. To administer, dilute naloxone 0.4 mg/mL (1 mL) ampule into 9 mL of normal saline for total volume of 10 mL to achieve a 0.04 mg/mL concentration. Give 0.04 mg (1 mL) via slow IV push every 30 to 60 seconds until symptom improvement (titrate to effect). DO NOT administer undiluted naloxone due to risk of precipitating rapid withdrawal, which may cause severe pain or seizures.
- **Chemotherapy-related, intermittent pain**: This type of pain may be managed with acetaminophen or an opioid. See Appendix D for Opioid Dose Considerations, or refer to a drug information reference for additional information.
- **Constipation** is a common side effect with opioid use. Start a bowel regimen in all patients taking opioids. Refer to Appendix E.
- **Duration of drug effect**: Any residual drug in the patient's system must be accounted for and an assessment of any residual effects from discontinued long-acting opioids must be made before any new opioid is started.

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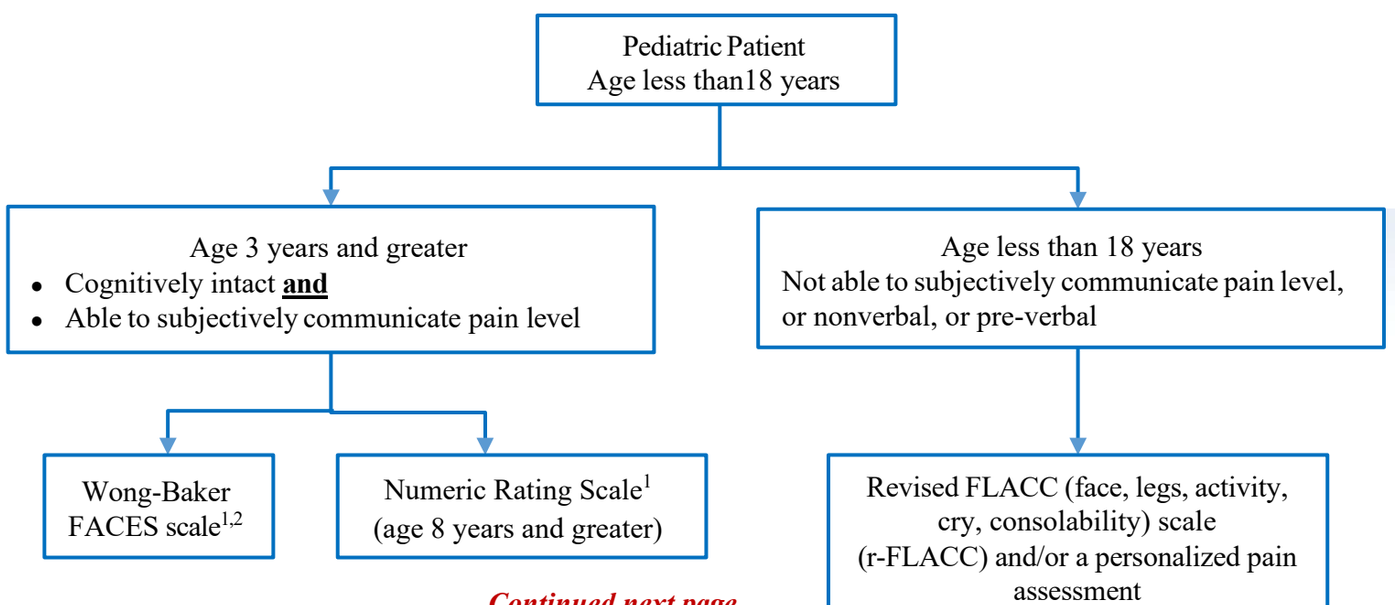
APPENDIX A: Comprehensive Pediatric Pain Assessment

The comprehensive pain assessment should include the following:

1. **Pain:**
   a. For each site of pain, determine intensity level using the appropriate pain assessment tool (see below). Tools using 0-to-10-point scales can be categorized as follows: 0 = no pain, 1-3 = mild pain, 4-6 = moderate pain, 7-10 = severe pain
   b. Assess the following at rest and with activity: location and orientation, type (acute, chronic, acute exacerbation of chronic pain), onset, pathophysiology (somatic, visceral, neuropathic), frequency (continuous, intermittent, breakthrough, incidental), temporal factors such as aggravating and alleviating factors, duration, and etiology (e.g., tumor, non-tumor related, fracture)
   c. Evaluation of medical history includes: oncologic or other significant medical illnesses, medication history, relevant imaging, and laboratory studies
   d. Physical examination
   e. Assess for presence of sedation and other opioid side effects (Appendix F)

Pediatric Pain Assessment Tools

Selection of the Appropriate Pain Assessment Tool



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[1] For the pediatric patient, the selection between WBF and NRS for patients age 8 years or greater will be dependent on patient preference and nursing clinical assessment
[2] WBF is the preferred pain scale for Pediatric Early Recovery Program

Note: This consensus algorithm excludes patients who are in the Pediatric Intensive Care Unit (PICU), the Neonatal Intensive Care Unit (NICU), perioperative or pre-procedural settings, or are currently receiving epidural or intrathecal analgesia.

APPENDIX A: Comprehensive Pain Assessment – continued

2. **Function**:
   a. Evaluate patient's ability to ambulate, perform activities of daily living (ADL), range of motion (ROM), deep breathing, and coughing.
   b. Assess restrictions related to pain.
   c. Document patient's functional ability.
3. **Psychosocial issues**:
   a. Evaluate patient distress, family support, psychiatric history, patient/family knowledge and beliefs surrounding pain and its management, and risk factors for undertreatment of pain including: underreporting, prior treatment of pain and response to other pain medications, concerns about addiction to pain medications or side effects, extremes of age, gender, cultural barriers, communication barriers, and prior history of drug abuse.
   b. Document patient's assessment of psychological distress.
4. **Personalized Pain Goal (PPG):**
   Determine the verbal or written goal stated by the patient describing the desired level/intensity of pain that will allow the patient to achieve comfort in physical, functional, and psychosocial domains.

In addition to Comprehensive Pain Assessment, rule out or treat pain related to oncologic emergencies[1]

[1] Pain related to an oncologic emergency requires assessment and treatment (*e.g.,* surgery, steroids, radiotherapy, antibiotics) along with an emergent consultation.
Examples of oncologic emergencies include:

- Bowel obstruction/perforation
- Brain metastasis
- Leptomeningeal metastasis
- Fracture or impending fracture of weight-bearing bone
- Epidural metastasis/spinal cord compression
- Pain related to infection

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APPENDIX B: Complementary and Integrative Therapy

Pediatric Integrative Medicine Program and Integrative Medicine Center

Integrative Medicine refers to an evidence-informed approach to bringing these complementary approaches into conventional medical care. Complementary approaches may be provided safely by individuals with proper training. Such approaches can provide support to patients and their caregivers. Benefits can include relief for symptoms such as: pain, nausea, and anxiety. Complementary approaches may also offer opportunities for increased socialization, motivation, and improving coping skills.

Child Life, Adolescent and Young Adult Life Program

The Child, Adolescent and Young Adult Life Program assists in reducing the impact of cancer, painful procedures, and hospital stays through relationship building, diagnosis education, procedural support, special events and activities, and opportunities for emotional expression. Services can be accessed via consults or informal referrals where available:

Child Life Services: https://pulse.iwk.nshealth.ca/subsites/page/?id=68

Pediatric Clinical Psychology Services

Pediatric clinical psychology services are initiated by consultation. Psychological interventions can be provided to patients who are struggling through acute or chronic pain.

Note: This consensus algorithm excludes patients who are in the Pediatric Intensive Care Unit (PICU), the Neonatal Intensive Care Unit (NICU), perioperative or pre-procedural settings, or are currently receiving epidural or intrathecal analgesia.

APPENDIX C: Non-opioids for Pediatric Pain Management

CAUTION: All of these agents are antipyretic and may mask fever; use caution in patients receiving myelosuppressive chemotherapy. Non-steroidal anti-inflammatory drugs (NSAIDs) may have antiplatelet effects that can increase the risk of bleeding in patients who are thrombocytopenic or receiving myelosuppressive chemotherapy and likely to become thrombocytopenic. The COX-2 selected NSAID (celecoxib) may have less effects on platelets but should still be used with caution in a patient receiving myelosuppressive chemotherapy.

Non-opioids include: acetaminophen and NSAIDs. Non-opioids may be used alone or in combination with opioids for pain management. NSAIDs are useful adjuvant analgesics for bone pain.

Recommended Starting Doses: The choice of non-opioid must depend on the individual risk/benefit balance for each patient. The mechanism of action & side effect profile of each option is different.

Drug	Recommended Starting Dose	Maximum Daily Dose	Comments
Acetaminophen	10 - 15 mg/kg (max 1000 mg) PO every 4 - 6 hours	Oral: 75 mg/kg/day or 4,000 mg daily[1]	Available PO, IV or per rectum[2]. At higher doses, can cause fatal hepatotoxicity and renal damage. Avoid use in hepatic dysfunction. Does not have anti-inflammatory effect.
	Less than 50 kg: 15 mg/kg (max 750 mg) IV every 6 hours Equal to or greater than 50 kg: 15 mg/kg (max 1,000 mg) IV every 6 hours	IV: less than 50 kg: 3000 mg/day IV: equal to or greater than 50 kg: 4000 mg/day	IV acetaminophen is formulary restricted to those unable to take oral medications and rectal route is not an option.
Ibuprofen	5-10 mg/kg (max 800 mg) PO every 6 - 8 hours	Age 1 month to less than 12 years: 40 mg/kg/day Age equal to or greater than 12 years: 3200 mg/day[3]	Inhibits platelet aggregation and can cause gastrointestinal side effects or renal failure. Use with caution in patients at high risk[4]. For frequent use consider an acid suppressor. Not indicated for children on active cancer therapy. Not recommended for children with a single kidney.
Celecoxib	10 to 25 kg: 3 mg/kg PO twice daily Greater than 25 kg and less than 50 kg: 100 mg PO twice daily Greater than or equal to 50 kg: 200 mg PO twice daily	400 mg/day	May not affect platelet aggregation. Can cause renal insufficiency gastrointestinal bleeding and toxicity. For frequent use consider an acid suppressor. Not indicated for children on active cancer therapy. Not recommended for children with a single kidney.
Ketorolac	Single-dose treatment: 0.2 - 0.5 mg/kg (max 15 mg) IV once Multiple-dose treatment: 0.2 - 0.5 mg/kg (max 30 mg) IV every 6 hours	Less than 50 kg: 60 mg/day Greater than or equal to 50 kg: 120 mg/day Max 5 days	Evaluate after 8 doses and limit treatment to 5 days. Use is contraindicated in patients with advanced renal impairment or patients at risk for renal failure due to volume depletion. Inhibits platelet aggregation; can cause gastrointestinal side effects. For frequent use consider an acid suppressor. Not indicated for children on active cancer therapy. Not recommended for children with a single kidney.

[1] Manufacturers of over-the-counter acetaminophen recommend no more than 4000 mg daily

[2] Rectal route is contraindicated in neutropenic patients and those on active cancer or immunosuppressive therapy

[3] Due to increased adverse effects with higher doses, recommended maximum daily dose for chronic use is 2,400 mg

[4] Patients at high risk of serious gastrointestinal side effects or renal damage from NSAIDs include: patients on active myelosuppressive therapy, previous history of peptic ulcer, currently receiving corticosteroids, anticoagulants, or presence of existing renal disease, cardiac or liver impairment.

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APPENDIX D: Pediatric Opioid Dose Considerations[1]

Note: For age less than 6 months, reduce initial dose by 50%

Opioid	Initial Short-Acting Dose in an Opioid Naïve Patient		Onset (minutes)	Peak Effect (hours)	Duration (hours)	Initial Scheduled Dosing in Opioid Naïve Patients	Available Oral Dose Formulations	Comments
	Route	Dose						
Morphine	PO	PO:0.2 - 0.5 mg/kg, typically 0.3 mg/kg (max 5 - 10 mg)	30	0.5 - 1	3 - 6	Short-acting: PO: every 3 - 4 hours Long acting varies by product	Short-acting[1]: 5,10 mg IR tablets; 1 mg/mL liquid Long-acting[2]: 15, 30, 60, 100, 200 mg tablets and 10, 15, 30 mg capsules	Oral formulations available as tablet or liquid preparation. Avoid use in renal dysfunction. Use with caution in liver dysfunction.
	IV/SC	IV/SC:0.05 - 0.1 mg/kg (max 2 - 3 mg)	5 - 10	N/A	N/A	IV: every 3 - 4 hours		
Hydromorphone	PO	0.03 - 0.06 mg/kg, typically 0.05 mg/kg (max 2 mg)	15 - 30	0.5 - 1	3 - 5	Short-acting: every 4 hours	Short-acting[1]: 1, 2, 4, 8 mg tablets; 1 mg/mL liquid Long-acting[2] (Contin): 3, 4.5, 6, 12, 24 and 30 mg tablets	Oral formulations available as tablet or liquid preparation. Use with caution in renal and/or liver dysfunction.
	IV/SC	0.01 - 0.015 mg/kg (max 0.5 mg)	15 - 30	N/A	4 - 5	IV/SC: every 4 hours		
Fentanyl Transdermal patch[3]	transdermal	12 (delivers 12.5), 25, 37, 50, 75, 100 micrograms/hour	12 - 24 hours	24 - 72 hours	48 - 72 hours			Bioavailability 90%: Do not cut patch, apply heat, cover with occlusive bandage, or use in patients who develop fever – results in faster onset, shorter duration, and possible overdose. Not recommended for initial use in opioid naïve patients.

[1] Short acting formulations may be given via enteral tubes (*e.g.*, nasogastric tube, percutaneous endoscopic gastrostomy (PEG) tube, gastric tube).

[2] Do not crush, chew, or dissolve long-acting formulations.

[3]Transdermal fentanyl should only be used in patients with stable opioid requirements. Due to the long systemic half-life of 17 hours, the dose may be difficult to titrate if pain is not well-controlled. After transdermal patch removal, continued absorption of fentanyl occurs from the skin. Delayed administration of another long-acting opioid should be considered due to persistent serum levels of fentanyl. Due to differences in bioavailability, fentanyl products are not interchangeable on a mcg-to-mcg basis.

When initiating transdermal fentanyl, patients should use short-acting opioids as needed until efficacy is obtained (peak effect 24 - 72 hours)

- Titrate patients on transdermal fentanyl no more frequently than every 3 days after initial dose, and then every 6 days thereafter. Initial evaluation of maximum analgesic effect should not be made before 24 hours.
- Caution use with CYP450 3A4 inhibitors, which can increase fentanyl plasma concentrations.
- May be used in patients with renal dysfunction.

See Appendix J for additional transdermal fentanyl information.

Note: This consensus algorithm excludes patients who are in the Pediatric Intensive Care Unit (PICU), the Neonatal Intensive Care Unit (NICU), perioperative or pre-procedural settings, or are currently receiving epidural or intrathecal analgesia.

APPENDIX E: Pediatric Opioid Side Effects – Prevention and Management

Side Effect	Prevention	Management
Sedation Inpatient setting: Assess sedation using the Richmond Agitation Sedation Scale (RASS) as indicated	• Discontinue other sedating medications if appropriate • Educate all patients receiving opioids that drowsiness may occur for a few days following initiation or increase in opioid regimen	• Consider opioid rotation (see Appendix J) or dose reduction of opioid if sedation persists • Consider psychostimulant: 1. Methylphenidate 2.5 – 5 mg PO once or twice daily (last dose no later than 4 pm to avoid insomnia). Suggested time 8 am and 12 noon daily. **or** 2. Modafinil 100 mg once or twice daily. Consider as second line for children age greater than 6 years.
Respiratory depression	• Monitor sedation and respiratory status (respiratory rate and oxygen saturation) during the first 24 hours in opioid naïve patients • Titrate opioids cautiously • Consider dose reduction or opioid rotation if patient has excessive sedation	• Call primary team, HOLD opioids, and provide supplemental oxygen • If patient minimally responsive or unresponsive and respiratory rate 6 bpm or less, administer naloxone. Recommended naloxone dose: naloxone 0.4 mg diluted in 9 mL saline, 1 mL IV push, repeat 1-2 minutes until patient more awake and respiratory status improves. *(Half-life of naloxone is short and patient may need naloxone infusion for long-acting opioids. If no change with naloxone, rule out other causes for the respiratory depression.)* • If patient is actively dying, DNR (do not resuscitate) and receiving comfort care, naloxone administration may not be appropriate
Opioid Induced Neurotoxicity (OIN) Risk factors: • High opioid dose • Dehydration • Renal failure • Preexisting borderline cognition and/or delirium • Use of other psychoactive drugs Symptoms: confusion, drowsiness, hallucinations, delirium, seizures.	Eliminate nonessential CNS activating or depressing drugs (*e.g.*, benzodiazepines)	• Consider reversible causes such as metabolic disorders, liver or renal dysfunction, dehydration, hypercalcemia, organic brain disease; treat as appropriate. • Consider one or more of the following: 1. Opioid rotation (see Appendix J) 2. Opioid dose reduction or discontinuation 3. Discontinue other offending drugs (benzodiazepines) 4. Hydration • Avoid using naloxone even if delirium is thought to be due to opioid use
Nausea, Vomiting	• Titrate opioid dose slowly and steadily • Provide antiemetics with opioid prescription • Ondansetron 0.15 mg/kg (maximum 8 mg) PO every 8 hours as needed If high risk of nausea, consider scheduled antiemetics for 5 days and then adjust as needed	1. Investigate for other causes of nausea (e.g., constipation, bowel obstruction, chemotherapy or other medications) and treat per guidelines. Initiate scheduled antiemetics, if indicated. 2. Add or increase non-opioid or adjuvant medications for additional pain relief so opioid dose can be reduced 3. If analgesia is satisfactory, reduce opioid dose by 25% Consider opioid rotation if nausea remains refractory (see Appendix J)

Continued next page

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APPENDIX E: Pediatric Opioid Side Effects – Prevention and Management – continued

Side Effect	Prevention	Management
Constipation	Unless alterations in bowel patterns such as bowel obstruction or diarrhea exist, all patients receiving opioids should be started on laxative bowel regimen and receive education for bowel management. 1. Polyethylene glycol (Lax-a-day®) Less than or equal to 15 kg: 0.4 - 1 g/kg (maximum 17 g/dose) Greater than 15 kg: 17 g/dose in 4 - 8 ounce beverage daily 2. Ensure adequate fluids, dietary fiber and exercise if feasible 3. Prune juice followed by warm beverage may be considered	1. Assess potential causes of constipation (such as recent opioid dose increase, use of other constipating medications, new bowel obstruction) 2. Continue or initiate polyethylene glycol (Lax-a-day®) and add one or both of the following: • Senna Age 2 to 5 years: 4.3 mg (as tab) or 4.25 mg (as liquid) nightly (maximum 8.6 mg twice daily) Age 6 to 11 years: 8.6 mg (as tab) or 8.5 mg (as liquid) nightly (maximum 17.2 mg twice daily) Age 12 years or greater: 17.2 mg nightly (maximum 34.4 mg twice daily) • Lactulose (667 mg/mL) children: 5 - 10 mL/day once daily to QID (double the daily dose until stool is produced) maximum 60 mL/day **OR** Milk of Magnesia oral concentrate (magnesium hydroxide) (400 mg/5 mL): Age 2 to 5 years: 0.4 - 1.2 g/day, once or divided Age 6 to 11 years: 1.2 - 2.4 g/day, once or divided Age 12 to 18 years: 2.4 - 4.8 g/day, once or divided[1] • If NPO, metoclopramide 0.1 - 0.2 mg/kg IV every 6 hours (maximum 5 mg for age 15 years or less; 10 mg for age greater than 15 years) 3. Methylnaltrexone may be given to patients who meet the following criteria: • Patient experiencing opioid-induced constipation • Patient has not demonstrated an adequate response to other laxative therapy • Patient does not have a known or suspected mechanical gastrointestinal obstruction 4. PICO-Salax (sodium picosulfate, magnesium oxide and citric acid): Picosulfate (a pro-drug) is a stimulant cathartic active locally in the colon. Age 2 to 6 years: ¼ sachet Age 7 to 12 years: ½ sachet Age 12 years to adult: 1 sachet. Give each dose with at least 150 mL of water. May repeat dose in 6 - 8 hours (avoid 6 hours prior to bedtime) and give for 2 days maximum. If no result investigation for obstruction and ileus should be considered. 5. If no response to above consult pediatric pain specialty service.

[1] ESPGHAN/NASP GHAN functional constipation 2014 Evaluation and Treatment of Functional Constipation in Infants and Children

Note: This consensus algorithm excludes patients who are in the Pediatric Intensive Care Unit (PICU), the Neonatal Intensive Care Unit (NICU), perioperative or pre-procedural settings, or are currently receiving epidural or intrathecal analgesia.

APPENDIX F: Pediatric Specialty Services Consultation Guidelines

IWK/Janeway offer several coordinated pain specialty core services, consisting of Pain Service, Pediatric Palliative/Supportive Care. Guidelines for consultation to these services include the following:

Consult to one of the specialty core services should be considered for *any* patient whose pain remains uncontrolled for greater than 24 hours. Special patient populations in which pain assessment and management may be especially challenging include the following:

- Developmental disabilities
- Emotional, behavioral, and mental disorder
- Vision and hearing impairments and disabilities
- Cognitive disorders
- Refractory symptoms and dying patient
- Communicative disorders

Type of Pain	Specialty Services Consultation
Postoperative and perioperative pain	Acute Pain and/or Pediatric Palliative/Supportive Care
Acute pain in inpatients	
Evidence of active cancer with pain as the sole or predominant symptom	
Need for continuous infusions of medications when other measures have failed and pain is therefore intractable	
Chronic pain and no evidence of active cancer	Chronic Pain and Pediatric Palliative/Supportive Care
Evidence of active cancer and pain accompanied by multiple symptoms	Pediatric Palliative/Supportive Care
Pain in the context of cancer in the palliative stage or end of life	

Note: This consensus algorithm excludes patients who are in the Pediatric Intensive Care Unit (PICU), the Neonatal Intensive Care Unit (NICU), perioperative or pre-procedural settings, or are currently receiving epidural or intrathecal analgesia.

APPENDIX G: Adjuvant "Co-analgesics" for Pediatric Neuropathic Pain (NP) Syndromes and Chronic Pain[1]

Drug Class and Uses	Medication	Recommended Starting Dose	Maximum Daily Dose	Comments
Anticonvulsants (various NP types)	Gabapentin	**Day 1:** 5 mg/kg (max 300 mg) PO at bedtime **Day 2:** 5 mg/kg (max 300 mg) PO twice a day **Day 3:** 5 mg/kg (max 300 mg) PO three times daily OR May escalate to three times daily after one week based on tolerability and response	Dose may be further titrated to a maximum of 3,600 mg/day or 35 mg/kg/day	Used in post herpetic neuralgia and NP. May cause drowsiness, dizziness, and peripheral edema. Dose adjust for renal impairment.
	Pregabalin	4 years and less than 30 kg: 1.75 mg/kg/dose PO BID	14 mg/kg/day	Used in post herpetic neuralgia and NP. May cause drowsiness, dizziness, and peripheral edema.
		30 kg or greater: 1.25 mg/kg/dose PO BID OR 75 mg PO BID whichever is less	10 mg/kg/day OR 600 mg/day, whichever is less	
		Age 12 years and greater: 25 mg PO at bedtime for 7 days, then 25 mg PO twice a day and titrate up to 50 mg PO twice a day and titrate up as tolerated in weekly intervals	10 mg/kg/day OR 600 mg/day	
Tricyclic Antidepressants (TCA) (various NP types)	Amitriptyline	0.2 mg/kg (max 10 mg/dose) PO at bedtime; titrate as tolerated every 2 weeks.	2 mg/kg/dose up to 50 mg/day	Consider for continuous and shooting neuropathic pain. Caution use in frail patients, those with glaucoma or arrhythmias. May cause sedation, arrhythmias, dry mouth, orthostasis, and urinary retention.

Continued next page

[1] https://www.appm.org.uk/formulary/

NP = neuropathic pain

TCA = tricyclic antidepressent

Note: This consensus algorithm excludes patients who are in the Pediatric Intensive Care Unit (PICU), the Neonatal Intensive Care Unit (NICU), perioperative or pre-procedural settings, or are currently receiving epidural or intrathecal analgesia.

APPENDIX G: Adjuvant "Co-analgesics" for Pediatric Neuropathic Pain (NP) Syndromes and Chronic Pain[1] – continued

Drug Class and Uses	Medication	Recommended Starting Dose	Maximum Daily Dose	Comments
Muscle Relaxants (muscle pain, spasm)	Baclofen	**Age less than 2 years:** 2.5 - 5 mg PO every 8 hours; titrate dose every 3 days to maximum daily dose **Age 2 to 7 years:** 7.5 - 10 mg PO every 8 hours; titrate dose every 3 days in increments of 5 - 15 mg/day to maximum daily dose **Age 8 years and greater:** 10 - 15 mg PO every 8 hours; titrate dose every 3 days in increments of 5 - 15 mg/day to maximum daily dose	**Age less than 2 years:** 40 mg **Age 2 to 7 years:** 60 mg **Age 8 years and greater:** 80 mg	Caution use in patients with seizures, cardiovascular disease, glaucoma, myasthenia gravis, renal or hepatic impairment, patients on TCAs or MAOIs. May cause anticholinergic effects and significant drowsiness.
	Cyclobenzaprine	**Age 15 years and greater:** 5 mg PO three times daily	30 mg	Recommended maximum duration of therapy is 2-3 weeks
Corticosteroids (inflammation, nerve compression)	Dexamethasone	0.25 mg/kg IV or PO BID up to 5 days. Standard dose 4 - 16 mg/day	16 mg	May cause impaired healing, infection, thrush, hyperglycemia, weight gain, myopathy, stomach upset, psychosis, emotional instability.

[1] https://www.appm.org.uk/formulary/

Note: This consensus algorithm excludes patients who are in the Pediatric Intensive Care Unit (PICU), the Neonatal Intensive Care Unit (NICU), perioperative or pre-procedural settings, or are currently receiving epidural or intrathecal analgesia.

APPENDIX H: Pain Management Education for Pediatric Patients and Family Prior to Discharge

Management of cancer pain is an integral component of cancer care. Patient education in the following areas should be provided to patients.

1. **General Pain Education:** Education should include the following:
    a. Relief of pain is important and there is no benefit to suffering with pain.
    b. Expect optimal treatment for pain and side effects.
    c. Pain can usually be well controlled with oral medications. There are many options available to control pain.
    d. Communication with the healthcare team is critical to pain management and avoiding serious side effects. Communication should include:
        - Patient/Family understanding about how to rate their pain type, severity/intensity. An age specific, physiologic condition appropriate pain scale should be provided with explanation.
        - Potential problems or side effects of pain medications.
        - Concerns about difficulty in obtaining medications (such as cost or inadequate quantity of tablets).

2. **Specific information related to Opioid Use** (such as morphine and related medications):
    a. Morphine and morphine-like medications are often used to relieve pain.
    b. When opioids are used to treat cancer pain, addiction is rarely a problem.
    c. Taking opioids now will not alter later effectiveness.
    d. Discuss potential side effects of opioids, and their prevention and management.
    e. Prevention of constipation will be needed by most patients.
    f. Opioids are controlled substances that need to be properly safeguarded in the home.
    g. Opioids must be used with caution, and should not be mixed with alcohol or illicit substances.

3. **Pain Education Discharge/Resource Checklist:**
    a. A written plan for pain medications, listing all medications to be used with dosage and frequency. Provide patient with print out of updated medication reconciliation.
    b. Written information on who to call (provider, service, phone number) for pain issues and plan for follow-up care. Instruct patient/caregiver to call if:
        - Problems in obtaining prescriptions or taking the medication
        - New pain, change in pain, or pain not relieved with medication
        - Nausea and vomiting that prevents eating for 1 day
        - No bowel movements for 3 days
        - Difficulty arousing the patient from sleep easily during daytime
        - Confusion
    c. Resources and programs related to pain management. For information and a complete list of resources, please refer to your healthcare provider.

Note: This consensus algorithm excludes patients who are in the Pediatric Intensive Care Unit (PICU), the Neonatal Intensive Care Unit (NICU), perioperative or pre-procedural settings, or are currently receiving epidural or intrathecal analgesia.

APPENDIX I: Pediatric Patient Controlled Analgesia (PCA)

Assess for non-physiologic causes of pain (psychological distress, anxiety, etc.)

Suggested initial PCA settings: All opioid doses must be individualized

1. **Opioid naïve patients**

Opioid	Demand (PCA) Dose (Dose Range)	Lock-out Interval	Continuous Dose (Basal)	Nurse Bolus as needed for pain	Nurse Bolus Interval
Morphine (milligrams)	0.01 - 0.02 mg/kg	10 - 30 minutes	See below	Twice the dose of Demand (PCA) Dose	2 - 4 hours
Hydromorphone (milligrams)	0.002 - 0.004 mg/kg	5 - 10 minutes	See below	Twice the dose of Demand (PCA) Dose	2 - 4 hours

   a. Patient should be alert and demonstrate ability to administer demand dose for pain. If concerns about cognitive failure or significant anxiety, consider Specialty Consultation: Acute Pain, Chronic Pain, Pediatric Palliative/Supportive Care (Appendix G for description of services).
   b. Carefully consider adding continuous (basal) dose after 12 - 24 hours if using frequent demand doses or if pain not controlled. Suggested basal dose is 30 - 50% of average hourly dose. Example: The 12-hour total morphine demand dose is 20 mg, calculate continuous dose as 20/12 = 1.7 mg/hour then 1.7 X 0.3 (30%) = 0.5 mg/hour basal rate.
   c. Nurse bolus as needed for pain; nurse bolus interval (hours) per physician discretion

2. **Opioid tolerant patients (currently receiving opioid therapy)**
   PCA orders should take into account the patient's current opioid regimen, clinical situation (severity and etiology of the pain, side effects from opioids, baseline drowsiness, need for opioid rotation). If there are significant side effects, drowsiness, confusion, respiratory or central nervous system concerns, it is recommended to call for Specialty Consultation: Acute Pain, Chronic Pain, Pediatric Palliative/Supportive Care (see Appendix F for description of services) for PCA ordering.
   a. Calculate total dose of opioid (scheduled and breakthrough doses) used in the previous 24-hour period.
   b. Use equianalgesic opioid dose conversion table (Appendix J) to calculate dose of IV opioid being considered for PCA. Decrease dose by 30 - 50% to adjust for lack of complete cross tolerance to obtain new IV dose.
   c. Divide new IV dose (from above step) by 24 hours, to obtain hourly (basal) dose.
   d. Calculate demand (PCA) dose as 10 - 20% of new IV opioid dose to use as needed every hour for breakthrough pain.

Note: This consensus algorithm excludes patients who are in the Pediatric Intensive Care Unit (PICU), the Neonatal Intensive Care Unit (NICU), perioperative or pre-procedural settings, or are currently receiving epidural or intrathecal analgesia.

APPENDIX J: Equianalgesic Opioid Dose Conversion[1]

Note: The equianalgesic doses (oral and parenteral) can be affected by interpatient variability, type of pain (for example, acute versus chronic), chronic administration, and tolerance. The following table should serve as a guide when switching from one opioid to another. It is **recommended to reduce the dose of the new opioid by 30 to 50%** to account for incomplete cross tolerance, and to periodically monitor for efficacy and adverse reactions and the dose adjusted accordingly.

Opioid	Oral Dose (PO)	Parenteral Dose (IV/SC)	Conversion Factor: Parenteral to Oral Opioid	Conversion Factor: Oral Opioid to Oral Morphine
Morphine	30 mg	10 mg	3	1
Hydromorphone	7.5 mg	1.5 mg	5	4-7
Methadone and buprenorphine should only be initiated and managed by clinicians experienced in pain management. Consider consult to pain and palliative care specialists if needed.				

Steps for Opioid Rotation:

1. Stop current opioid regimen.
2. Calculate total dose of current opioid (scheduled and breakthrough doses) used in the previous 24-hour period.
3. Calculate the dose of the new opioid using the equianalagesic dose conversion table (from previous page) and conversion equation (below).

$$\frac{\text{Equianalgesic dose per route of CURRENT opioid}}{\text{24-hour dose per route of CURRENT opioid}} = \frac{\text{Equianalgesic dose per route of NEW opioid}}{\text{24-hour dose per route of NEW opioid}}$$

4. Calculate for incomplete cross-tolerance between opioids. Decrease the target dose from step 3 by 30 - 50% to obtain the new opioid dose.
5. Calculate scheduled pain dose. Divide the new opioid dose (from step 4) by number of doses to be given over 24 hours and administer as scheduled doses.
6. Calculate breakthrough pain dose as 10 - 20% of calculated new opioid dose to administer as needed every 1 hour.
7. Titrate new opioid regimen until adequate analgesia is achieved.

[1] This Equianalgesic Opioid Dose Conversion chart is based on the Centers for Disease Control and Prevention (CDC) recommendations (https://www.cdc.gov/overdose-prevention/communication-resources/index.html)

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Note: This consensus algorithm excludes patients who are in the Pediatric Intensive Care Unit (PICU), the Neonatal Intensive Care Unit (NICU), perioperative or pre-procedural settings, or are currently receiving epidural or intrathecal analgesia.

APPENDIX J: Equianalgesic Opioid Dose Conversion[1] – continued

Transdermal fentanyl should be initiated and managed by clinicians experienced in pain management. Consider consult to pain and palliative care specialists if needed.

Transdermal Fentanyl (TDF) Dosing:

Option 1: 2 mg oral morphine is approximately 1 mcg ***per hour*** transdermal fentanyl
Example: Total daily dose of morphine 100 mg translates to approximately 50 mcg transdermal patch, to be applied every 72 hours

Option 2: calculate the total daily dose of morphine and then use the following table to select the appropriate patch strength

Oral Morphine (mg/day)	Transdermal Fentanyl (mcg/hour)
25	12
50	25
75	37
100	50
125	62
Each additional 25 mg/day	An additional 12 mcg/hour

Note: This table should **NOT** be used to convert from TDF to other therapies because this conversion to **TDF** is conservative. Use of this table for conversion to other analgesic therapies can overestimate the dose of the new agent.

- To convert patients to another opioid, remove the transdermal fentanyl patch and titrate the dose of the new analgesic based upon the patient's report of pain until adequate analgesia has been attained. Upon system removal, 17 hours or more are required for a 50% decrease in serum fentanyl concentrations.
- Must prescribe short-acting opioid for breakthrough pain
- See Appendix D for additional information

[1] This Equianalgesic Opioid Dose Conversion chart is based on the Centers for Disease Control and Prevention (CDC) recommendations (https://http://www.cdc.gov/drugoverdose/resources/data.html)

Note: This consensus algorithm excludes patients who are in the Pediatric Intensive Care Unit (PICU), the Neonatal Intensive Care Unit (NICU), perioperative or pre-procedural settings, or are currently receiving epidural or intrathecal analgesia.

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Development Credits

This practice consensus has been *adapted with permission from the University of Texas MD Anderson Medical Center*. The practice consensus statement is based on majority opinion of the Pediatric Pain and Oncology experts at the IWK and Janeway for the patient population. These experts included:

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Expert Reviewers

Reviewers from all four Atlantic Provinces included:
Pediatric Anesthesia and Acute Pain, Pediatric Palliative Care, Pediatric Hematologists/Oncologists, Pediatric Hematology/Oncology Nurse Practitioner, Pediatric Nurse, and Pediatric Pharmacists.

External stakeholder review was completed.

Evidence regarding specific clinical outcomes associated with the use of this or similar pain algorithms applied in comprehensive cancer centers is sparse. Other algorithms or approaches may produce similar or better outcomes.