Treatment of Respiratory Depression

1. Establish a patent airway, apply oxygen, and ventilate patient if necessary. Comprehensive assessment is the first step to choosing appropriate interventions.

2. **FOR RESPIRATORY RATE <7/MIN:** Dilute one ampule naloxone 0.4 mg in 9 mL NS for injection (for a total of 10 mL of dilution). **Inject 2 mL of diluted naloxone q 2 minutes until respiratory rate improves (RR >7/min) and/or drowsiness abates.** Call physician. **IF PATIENT IS APNEIC:** Give naloxone 0.4 mg q 2 minutes until respiratory rate improves (RR >7/min) and call Rapid Response Team.

Sedation precedes respiratory depression. Physical stimulation may be sufficient to prevent hypoventilation since patients do not succumb to respiratory depression while awake. Careful titration of naloxone is required to avoid the onset of acute withdrawal, seizures, pulmonary edema, and severe pain. The duration of action of naloxone is shorter than that of most opioids so repeated dosing may be necessary.

Capnography (End Tidal CO2 monitoring) Normal CO2: 35-45 mmHG

Capnography monitoring should be used for all patients on PCA. Recommended for high risk patient populations: diagnosed with sleep apnea or sleep disorders; morbid obesity; older age; pre-existing cardiac, pulmonary or neurologic disorders or major organ dysfunction; smokers; increasing opioid requirements; receiving other sedating medications. **Monitoring parameters**—notify physician for modification of regimen for: PCA stopped due to low respiratory rate; EtCO2 > 50 mmHG for longer than 5 min.; increase in EtCO2 of 10 mmHg from baseline for longer than 5 min.; respiratory rate <= 7 breaths/min for adults or 12 breaths/min for pediatric patients younger than 12 yrs of age.

Signs/Symptoms of Opioid Withdrawal

Body aches, diarrhea, tachycardia, fever, chills, diaphoresis, yawning, nausea, vomiting, abdominal pain, nervousness, irritability, insomnia, runny nose, goosebumps, or weakness.

Management of Opioid Side Effects

In addition to the treatments below, consider changing opioids.

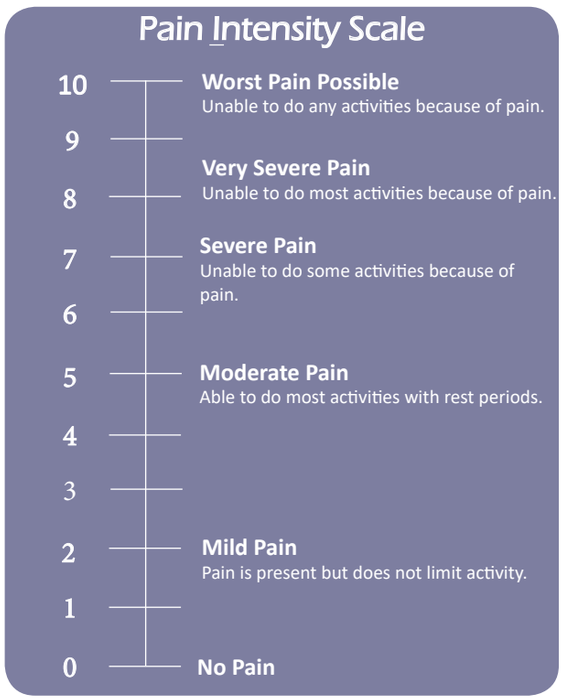
Side Effect	Treatment Considerations
Constipation	Begin bowel regimen when opioid therapy initiated. (senna/docusate, milk of magnesia, lactulose, methylnaltrexone, Miralax, naloxagol)
	Tolerance usually develops in 3-5 days. (ondansetron, prochlorperazine)
	Avoid concurrent use of sedatives/anxiolytics. (modafinil, methylphenidate)
	Consider non-sedating antihistamines (loratadine, cetirizine)
	Consideration is opioid rotation or dose reduction. Clonazepam or baclofen may be of benefit.

WILDA PAIN ASSESSMENT

Words to Describe Pain

Aching	Stabbing	Tingling
Burning	Sharp	Shooting
Dull	Throbbing	Pressure

Pain Intensity Scale



Location of Pain

Duration of Pain

Does it hurt all the time or does it come and go?

Aggravating and/or Alleviating factors+

What makes the pain better?
What makes the pain worse?

Non-Pharmacologic Interventions

Heating pad	Ice/Cold packs	Compression wraps
Elevation	Repositioning	Massage
Imagery	Music	Humor
Distraction	Aromatherapy	Activity
Environmental	Rest	Spiritual care
Therapeutic	Splinting	Relaxation

CLINICALLY ALIGNED PAIN ASSESSMENT

	Intolerable Tolerable with discomfort Comfortably manageable Negligible pain
	Getting worse About the same Getting better
	Inadequate pain control Partially effective Fully effective
	Can't do anything because of pain Pain keeps me from doing most of what I need to do Can do most things, but pain gets in the way of some Can do everything I need to do
	Awake with pain most of night Awake with occasional pain Normal sleep

Patient Controlled Analgesia (PCA) Guidelines for Acute Pain

- For safety, avoid short-acting opioids in patients concurrently on PCA
- For high-risk patients (elderly, obese, those receiving other sedatives) consider closer monitoring-recommend end tidal CO2 monitor
- Start with demand dose only PCA unless patient is on chronic opioids-they may require a continuous infusion if unable to take home medicines
- Fentanyl is not generally a good option in opioid tolerant patients

Pt Demand Dose	1-2 mg	10-20 mcg	0.2-0.4 mg
PCA Delay Lockout Interval	8-15 min	6-15 min	8-15 min
Basal Rate (Continuous dose) **USE WITH CAUTION	0-1 mg/hr	0-20 mcg/hr	0-0.2 mg/hr

Example: hydromorphone standard concentration, 0.2 mg/mL (11 mg/NS 55 mL)
PCA Dose: 0.2 mg per dose (Pt. Demand Dose)
PCA Delay: 10 min (Lock out Interval)
PCA Basal Rate: 0 mg/h (Continuous Dose)
PCA 1 Hour Limit: 1.2 mg/hr =
(Basal Rate + (PCA Dose x 60min/PCA Delay))

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Massachusetts Pain Initiative (2004). Pain management pocket tool.

Principles of Analgesic Use in the Treatment of Acute Pain and Cancer Pain (6th ed.), American Pain Society, Glenview, IL; 2008.

See CDC guidelines for prescribing opioids for chronic pain. https://www.cdc.gov/drugoverdose/prescribing/guideline.html

Pain Management Pocket Guide

Developed by KUMC
Pain Management Resource Team

Quality Improvement Organizations
Sharing Knowledge. Improving Health Care.
CENTERS FOR MEDICARE & MEDICAID SERVICES

Great Plains Quality Innovation Network

Principles of Pain Management

1. Accept patient's report of pain.
2. Comprehensive assessment is the first step to choosing appropriate interventions.
3. Pain management regimen must be individualized. Discuss goals and plans with patient/family.
4. Use a multimodal approach by combining non-pharmacologic treatments, non-opioids, adjuvants, and opioids.
5. Aggressively manage the side effects of opioids. There is no tolerance to the constipating effect of opioids (see chart).
6. Assess the need for pain treatment such as nerve blocks, epidurals, joint blocks, etc. Contact Anesthesia/Pain Management for a consult.
7. The use of opioids should be initiated as a trial. Long-term use may prove to be poorly tolerated or ineffective.
8. Persistent pain usually requires both scheduled (long-acting) and PRN dosing of medications. Frequent use of PRN medication may indicate a need for increased doses of scheduled medications.
9. AVOID IM injections—they are painful and are erratically absorbed.
10. Use the most least invasive route whenever possible (PO, transdermal).
11. It is recommended that methadone be used only by clinicians familiar with its use and risks.
12. If frequent IV doses are required, then consider use of patient-controlled analgesia (PCA).
13. Before prescribing opioids, review state pharmacy prescription monitoring programs (ex. K-TRACS-Kansas).
14. Ideally, patients should be on an oral regimen for 24 hours prior to discharge to make sure they can replicate at home.

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Adjuvant Analgesic Drugs

Most commonly used drugs. Consideration should be given to comorbidities, hepatic/renal insufficiency, and age.

Medication	Uses	Starting Dose	Dose Range	Comments
Antidepressants (often use lower doses to treat pain than to treat depression)				
Amitriptyline (Elavil)/ Nortriptyline (Pamelor)/ Desipramine (Norpramin)	Neuropathic pain	25mg po hs (10mg or less for elderly) Titrate dose every few days to minimize side effects	75-150 mg po hs	Side effects include dry mouth, drowsiness, dizziness, constipation, orthostatic hypotension, urinary retention and confusion. Obtain baseline EKG for history of cardiac disease.
Selective Serotonin and Norepinephrine Reuptake Inhibitor (SSNRI) Antidepressant				
Duloxetine (Cymbalta)	Diabetic peripheral neuropathy	30 mg	60 mg daily	Should not use with MAOIs (ex.Zyvox). Consider lower starting dose for patients for whom tolerability is a concern.
Antiepileptics				
Gabapentin (Neurontin)	Neuropathic pain	100-300 mg po q 8 hours Increase by 100-300 mg q 3 days.	300-3600 mg/day	Adjust dose for renal dysfunction. Can cause drowsiness and ataxia.
Pregabalin (Lyrica)	Neuropathic pain	150mg po in 2-3 divided doses	150-600 mg/day (depending on indication)	Similar to gabapentin, often more rapid response than gabapentin; Schedule V controlled substance.
Topical Preparations				
Lidoderm Patch (topical lidocaine)	Post herpetic neuralgia	1-3 patches over painful area(s)	12 hrs on, 12 hrs off	Patch may be cut to fit painful area(s). Place only on intact skin.
Emu oil	Inflammation Swelling	Apply to painful area(s)	May be used liberally PRN	Topical use only.
Capsaicin	Neuropathy pain	Apply to painful area(s)	Apply regularly 3-4 times a day; rub in well	Topical use only.
Muscle Relaxants				
Baclofen (Lioresal)	Muscle spasm	5 mg po tid	80 mg po in 24h-divided doses	Caution in renal insufficiency.
Tizanidine (Zanaflex)	Muscle spasm	4mg daily-may be divided	36 mg/day	Gradually increase in 2-4mg increments over 4 weeks; caution in elderly and renal insufficiency.
Methocarbamol (Robaxin)	Muscle spasm	Up to 8 gm daily in severe cases, decreasing as symptoms improve	4-4.5 gm/day in 3-6 divided doses	Available IV 100 mg/mL or PO 750 or 500 mg tablets. IV should be given for maximum of 3 days only, but may be repeated 48 hours later.

Other Analgesics

Medication	Average Dose	Dosing Interval	Maximum Dose in 24h	Comments
Acetaminophen (Tylenol)	500-1000 mg	4-6 h	4000 mg/24 h from all sources	Toxic to the liver in overdose. Caution with hepatic disease and alcohol.

Non Steroidal Anti-Inflammatories (NSAID) *(use extreme caution in elderly and renal dysfunction)*

Aspirin	500-1000 mg	4-6 h	3900 mg	Monitor for common adverse effects: GI bleeding, decreased platelet aggregation, and renal toxicity.
Ibuprofen (Motrin)	200-400 mg	4-6 h	3200 mg	See above
Naproxen (Naproxyn, Aleve)	500 mg initial, 250 mg subsequent	6-8 h	1200 mg	See above
Meloxicam (Mobic)	7.5 mg	24 h	15 mg	Highly selective to COX2.
Ketorolac (Toradol)	30 mg IV initial, 15-30 mg subsequent	6 h	120 mg	Use restricted to 5 days. Extreme caution with renal disease. PO ketorolac has limited oral bioavailability.
Celecoxib (Celebrex)	100-200 mg	12-24 h	200-400 mg	Contraindicated in sulfonamide allergy. No platelet effects. Lower incidence of adverse GI effects.

Other Narcotics

Buprenorphine patch (Butrans Patch)	5-20 mcg/hour	7 days (weekly)	20 mcg/hour	Controlled Substance. Higher affinity for opioid receptor than other opioids. Oral buprenorphine is indicated for opioid dependence.
Tapentadol (Nucynta, Nucynta ER)	50-100 mg IR	4-6 h IR 12 h ER	IR: 600 mg ER: 500 mg	Controlled Substance. Opioid agonist and norepinephrine reuptake inhibitor. Less nausea, vomiting and constipation than other opioids.
Tramadol (Ultram, Ultracet)	50-100 mg	4-6 h	400 mg	Controlled Substance. Opioid agonist and blocks serotonin and norepinephrine reuptake. Caution with concurrent use of SSRI and SNRIs. Theoretically may decrease seizure threshold. Renal and Hepatic dosing adjustments.

Dosing Guidelines for breakthrough PRN medications

- Patients using a long-acting opioid agent will usually require medication for breakthrough pain.
- The breakthrough dose is 10-20% of the 24h total daily opioid use.
- Breakthrough doses should be available every 2-3 hours.
- If patient is consistently using 3 or more breakthrough doses daily, consider increasing the long-acting agent. The breakthrough dose should be recalculated if there is an increase.

Example: Patient is on MS Contin 75 mg q12 h.

1. Total daily dose (75 mg x 2 = 150 mg morphine/24h)
2. Calculate 10-20% of 24h dose for breakthrough dose (10% = 15 mg; 20% = 30 mg short-acting morphine IR)
3. Breakthrough dose = 15-30 mg of morphine IR q 2h PRN

Opioid Equianalgesia Table

(NOT a comprehensive list of all opioids available in the US)

Medication	Equianalgesic Dose Multiply x factor to equal oral morphine equivalent (OME) Ex. hydromorphone IV 1.5 mg (x 20) = 30 mg OME	Dose Interval	Various Non-Parenteral Forms Available (Every effort should be made to replace patient s home pain medication without substitution.) *(Not an all-inclusive list of opioids)*	Comments
Morphine	PO/PR: 30 mg IV: 10 mg (x3)	2-4 hrs 2-4 hrs	Tablets - MSIR: 15, 30 mg Liquid-Morphine Solution: 20 mg/10 mL Roxanol Concentrate: 20 mg/mL	Side effects include dry mouth, drowsiness, dizziness, constipation, orthostatic hypotension, urinary retention, confusion. Obtain baseline EKG for history of cardiac disease.
Hydromorphone	PO/PR: 7.5 mg (x4) IV: 1.5 mg (x20)	2-4 hrs 2-4 hrs	Tablets – hydromorphone (Dilaudid): (1), 2, 4, (8) mg Liquid - Dilaudid: (1) mg/mL	May cause systemic vasodilation due to histamine release. Roxanol-T is colored orange and has a fruit taste.
Oxycodone	PO: 20-30 mg* (x1-1.5)	2-4 hrs	Tablets - OxyIR, Roxicodone, Dazidox : 5, (10),15,(20),30 mg Oxycodone/Acetaminophen- Percocet, Endocet (2.5/325), 5/325, (7.5/325), 10/325 mg Oxycodone/Aspirin- Percodan: (5/325) mg Oxycodone/Ibuprofen - Combunox (5/400) mg Liquid - Roxicodone: 1 mg/mL, (20) mg/mL OxyFAST: (20) mg/mL	*Equianalgesic doses of oxycodone vary with different sources. Maximum daily dose of combination products limited by maximum acetaminophen/ibuprofen daily dose.
Fentanyl	IV: 100 mcg (see comment) OTFC: unknown	30-60 min 30-60 min	Oral Transmucosal - Actiq: 200, 400, (600), 800, 1200, (1600) mcg Fentora: (100), (200), (300), (400), (600), (800) mcg Subsys: (100), (200), (300), (400), (600), (800) mcg/spray	Oral transmucosal fentanyl is restricted to non-opiate naive patients. IV Fentanyl duration of action is much shorter than other opioids—consider when converting.
Oxymorphone	PO: 10 mg (x3)	2-4 hrs	Tablets - Opana 5, 10 mg	Do not drink alcohol. Administer 1 hour prior to or 2 hours after eating
Hydrocodone	PO: 30 mg (x1)	3-4 hrs	Tablets - Hydrocodone/Acetaminophen- Norco, Vicodin, Zydone, Lortab: 5/325, (7.5/325), 10/300, (10/325) mg Hydrocodone/Ibuprofen - Vicoprofen: (7.5/200) mg Liquid - Hydrocodone/Acetaminophen- Lortab Elixir: (10/300/15 mL); Hycet (7.5/325/15 mL)	Only available in combination products that include acetaminophen or ibuprofen. The maximum daily dose is limited by these components.
Codeine	PO: 200mg (x0.15)	3-4 hrs	Tablets - Codeine 15 mg, 30 mg, 60 mg Tylenol #3 300/15, 300/30 mg Liquid- Acetaminophen/codeine 120mg/12 mg/5ml	Maximum daily dose limited to 360mg/day of codeine. Acetaminophen/codeine products limited by maximum acetaminophen daily dose of 4000 mg.
Morphine ER/CR/SR	PO: 30 mg	8-12 hrs (Avinza 24 hrs)	Tablets Avinza: 30, (45), (60), (75), 90, (120) mg Oramorph SR: 15, 30, 60, 100 mg MS Contin: 15, 30, 60, 100, (200) mg Kadian: (20), (30), (50), (60), (100) mg Arymo: (15), (30), (60) mg Embeda: (20/ 0.8), (30/1.2), (50/2), (60/2.4), (80/3.2), (100/4)	Avinza capsules may be opened, diluted and immediately administered through a G-tube. Do not allow contents to dissolve. Do not crush or cut MS Contin, Kadian, Arymo, or Oramorph tablets.
Oxymorphone ER	PO: 10 mg**	12 hrs	Tablets - Opana ER (5), (7,5), (10), (15), (20), (30), (40) mg	Do not crush or cut tablet.
Oxycodone CR	PO: 20-30 mg**	8-12 hrs	Tablets OxyContin: 10, (15), 20, (30),40, (60), (80) mg Tariniq: (10 mg/5 mg), (20 mg/10 mg), (40 mg/20 mg) Xtampza: (9), (13.5), (18), (27), (36) mg	Do not crush or cut tablet.
Fentanyl patch	TD: 12 mcg/hr** patch is roughly 24 mg oral morphine equivalent/24 hours	72 hrs	Transdermal Patch Duragesic: 12, 25, 50, 75, 100 mcg/hr	Onset of action is 12-24 hrs. Should not be used in opiate-naive patients. Do not cut patches. Some patients require dosing every 48 hours.
Methadone	Consult Pain Service	---	Tablets Dolophine: 5, 10 mg Methadone: 40 mg Liquid- Methadose: 1mg/ml, 10 mg/mL	Long half-life (unpredictable). Accumulates with repeated dosing and maximum effect may not be seen until day 2-5. Pain management consult recommended.
Hydromorphone ER	PO: 8 mg**	24 hrs	Tablets and Capsules Exalgo: (8), (12), (16) (32)mg	Once daily extended release tablet or capsule. Do not crush, cut, open or dissolve.
Hydrocodone ER	PO: 30 mg**	12 hrs	Capsules Zohydro ER: (10), (15), (20), (30), (40),(50) mg Hysingla ER: (20), (30), (40), (60), (80), (100), (120) mg	Starting dose 10 mg every 12 hours. Do not crush, open or dissolve.

Opioid Conversion

- Equianalgesic dosing: When comparing opioid pain medications, the equianalgesic dose is the amount of medication needed to produce a similar amount of pain relief. These are APPROXIMATE.
- **Equianalgesic doses are used for conversion.** **Equianalgesic doses do not represent starting doses!**
- When converting from one opioid to another:
  If pain is well controlled → reduce the new opioid dose by 25%
  If pain is not controlled → give 100% of the new opioid dose
- For all opioids, the IV dose may be given IM in emergencies if no other route of administration is available.

**Equianalgesia dose for long-acting opioids is a suggested guideline. Consult package insert for conversion factor.

Acute Pain Dosing and Tapering Opioids

- Patients who require opioid pain medications around-the-clock, may be candidates for a long-acting opioid agent.
- It is expected that as the pain resolves, the medication will no longer be required, and a taper will be necessary.
- Replace 15-30% of the total 24h opioid intake in a long-acting agent.
- Tapering opioids: 10-25% reduction every 1-3 days for a short-acting opioid; weekly for a long-acting opioid to prevent opioid withdrawal symptoms.

Range Orders

Medication orders that vary over a prescribed range according to patient situation/ status. "Rolling Clock Method" -The total dose amount cannot be exceeded within a specified time interval, starting at the time of each individual dose, rather than the first dose. Example: *Oxycodone 5-15 mg PO q 3 h PRN. Oxycodone dose may not exceed 15 mg in any 3-hour time period.*

If pain is not controlled when order maximized, the physician/provider will be called for new orders.