Patients receiving analgesia and/or sedation for longer than 5-7 days may suffer withdrawal if these drugs are suddenly stopped. To prevent this happening drug doses are slowly reduced while observing the patient for signs of withdrawal and treating this appropriately.

Optimise non-pharmacological measures to reduce withdrawal. This includes reducing environmental stimuli, ensuring adequate hydration, frequent feeds for infants, and optimising patient position.

**WEANING**

A decision is made to cease opioids and benzodiazepines when they are no longer required. This may involve stopping them immediately or decreasing the dose over a number of days (weaning).

If a patient has received analgesia or sedation for:

- Less than 5 days - drugs may be stopped without gradual weaning.
- 5 to 10 days – stop drugs and perform WAT-1 scoring. If weaning required, doses should be reduced by 20% every 24 hours and stopped after 6 days.
- >10 days - doses should be reduced by 10% every 24 hours and stopped after 10 days.

**NB: This is 10 or 20% of the ORIGINAL dose**

Withdrawal is highly variable so these patients all need to be observed closely for signs of withdrawal during the weaning and cessation of sedatives and opiates. We use the WAT-1 scoring tool (Withdrawal Assessment Tool – 1). Scoring is performed 12 hourly near the start of each shift. If there has been evidence of withdrawal and intervention was required repeat WAT-1 scoring 1 hour post intervention.

If a child is being enterally fed, change to equivalent doses of oral medications for weaning. See Appendix for dose equivalence.

Reduce analgesia and sedation together but if there are signs of withdrawal it may be beneficial to reduce one at a time. Agents should then generally be weaned in the following order:

1. Morphine, fentanyl or methadone (unless on long-term opioid use)
2. Midazolam or diazepam
3. Chloral Hydrate
4. Clonidine

Clonidine (oral or IV) 1-2mcg/kg tds may be added to facilitate weaning (if the patient is not already receiving it). This should allow more rapid weaning of both opiates and benzodiazepines. It may also prevent withdrawal symptoms in patients weaning from chloral hydrate and promethazine.

**Once the drug(s) has been ceased the patient needs to be observed for signs of withdrawal for the next 72 hours.**
**MIDAZOLAM / DIAZEPAM**

The IV dose can be decreased as above if remaining on an infusion OR the patient converted to IV or oral diazepam and then weaned.

If converting to diazepam calculate equivalent 24hr dose as per Appendix and divide into Q4H dosing (Q6H if < 1yr).

If on IV midazolam infusion – halve infusion rate by 50% after 1st dose of diazepam given. Cease IV Midazolam with 2nd dose of diazepam.

**OPIOIDS**

The preferred agent is oral morphine. If appropriate a long acting morphine derivative may be used and dosed every 12 hours e.g. m-Eslon. **NB:** These capsules cannot be crushed so are only suitable for children who are old enough to swallow capsules.

Calculate the total dose of opioid administered in the last 24 hours and convert to morphine equivalent. Give oral morphine if the enteral route is available and divide 24hr dose into Q4H doses (Q6H if < 1 year).

Treat breakthrough pain with other analgesics or bolus morphine. Decrease the dose according to the above guidelines.

**CHLORAL HYDRATE**

Patients who have been receiving regular chloral hydrate for more than 5-7 days may also experience withdrawal. If they show signs of withdrawal, start oral diazepam at 0.1mg/kg/Q6H then treat as per the benzodiazepine weaning instructions. Chart a small prn dose of chloral hydrate (10-20mg/kg) for the first few days while the diazepam dose is being optimized.

**CLONIDINE**

If a patient has received clonidine for:

- Less than 7 days and the dose prescribed is less than 1mcg/kg/dose every 6 hours (or 0.2microg/kg/hr) - this may be stopped without gradual weaning. This equates to 4mcg/kg/24hrs.
- Less than 7 days and the dose prescribed is more than 1mcg/kg/dose every 6 hours (or 0.2microg/kg/hr) - the dose should be reduced by 50% every 24 hours for 3 days then stopped.
- 7 days or more - the dose should be reduced by 1mcg/kg/dose (or 0.2microg/kg/hr) every 24 hours until the dose reaches 1microg/kg/dose. This dose should then be continued until other agents are stopped, then weaned by 50% every 24 hours for 3 days.
- If the patient has been on a clonidine patch at a dose > 4mcg/kg/day they need weaning by switching to IV/PO preparation and weaning as above.

During withdrawal of clonidine the patient should have their blood pressure monitored and documented every 6 hours (at the same time the sedation withdrawal score is documented). If the mean BP increases by more than 50% over 24 hours, contact the primary team registrar for review and slow down the weaning of clonidine. A patient must continue to have 6 hourly measurement of BP until 24 hours after the last dose of clonidine.
WEANING ADJUNCTS

1. **Clonidine**

Clonidine is also a useful adjunct when weaning opioids or benzodiazepines. The usual dose is 1-2mcg/kg PO or IV Q4-6H. It can also be given as an infusion at doses up to 2mcg/kg/hr or as a transdermal preparation which comes as 100, 200, or 300mcg/24 hour patches which last for 1 week.

Choose a patch size that delivers around 6-10mcg/kg/24hrs. Do not exceed 12mcg/kg/24hrs.

Elimination of clonidine is decreased in patients with renal impairment.

2. **Dexmedetomidine (PICU only)**

A selective alpha-2 agonist like clonidine but has much greater receptor affinity. Not affected by renal impairment as almost all is metabolised in the liver. Expensive and usually used for <48 hours. Produces a state of sedation and analgesia without depressing respiration and patients can be weaned from benzodiazepines and opioids while on a dexmedetomidine infusion.

Given by infusion – usual dosing is load IV 0.5-1mcg/kg over 15 minutes then infuse at 0.1-1mcg/kg/hr titrating to effect. After prolonged use (>24 hours) stopping the infusion abruptly can cause withdrawal. Main side effects are bradycardia and hypotension.

**DOCUMENTATION**

WAT-1 chart should be filled in 12 hourly, or when clinically indicated, by the attending nurse.

The pain service will be informed of all patients going to the ward on a withdrawal plan. Contact the Acute Pain Service by calling the anaesthesia registrar on 021 938 273 and giving them the patient details.

Patients undergoing weaning of analgesia or sedation in the ward will have this reviewed daily by the primary team and will not be routinely reviewed by the pain service.

If the patient has either

- a persistently low WAT-1 Score (<2)
- OR is not weaning according to the algorithm
- OR requires > 2 doses of rescue medication in 24 hours

then they should be discussed with the pain service.
APPENDIX 1: WITHDRAWAL SYNDROME = WAT-1 scores > 3

Patients undergoing sedation withdrawal should be monitored using the WAT-1 scoring system.

Assess patients to ensure that these signs are not due to another cause. WITHDRAWAL is a DIAGNOSIS of EXCLUSION.

If the patient suffers from withdrawal you need to treat this initially by increasing the dose of the drug being weaned until symptoms resolve, then slowly wean the drug. DO NOT add weaning adjuncts at this stage. There are only a small number of patients who will require weaning adjuncts to facilitate weaning.

If the patient is suffering from withdrawal then:

1. Treat as per the Withdrawal Algorithm
2. Consider the use of Clonidine as a weaning adjunct if withdrawal is an issue despite treatment as per the Withdrawal Algorithm.

NB: Weaning opioids may result in pain. This is NOT WITHDRAWAL.

Patients should have a pain score performed every shift and pain treated appropriately.

- Regular paracetamol and/or NSAID
- Give prn dose of opioid
- Reassess appropriateness of wean.
APPENDIX DRUG EQUIPOTENT DOSES

OPIOIDS

1. Converting IV Morphine to Oral Morphine
   - Add up total dose of IV morphine in 24 hours.
   - Multiply this number by 3 to give total daily enteral dose of morphine.
   - Divide into Q4H or Q6H dosing.

   \[ \text{__mg/24hr IV Morphine \times 3 = __mg/24hr oral Morphine (divide and give Q4H or Q6H)} \]

2. Converting IV Fentanyl to Oral Morphine
   - Add up total dose of Fentanyl in micrograms in 24 hours.
   - Divide this number by 1000 to convert to milligrams.
   - Multiply this number by 70 to get equivalent dose of IV Morphine in 24 hours.
   - Multiply above by 3 to get oral Morphine dose in 24 hours then divide this into Q4h or Q6h dosing.

   \[ \text{__mcg/24hr IV Fentanyl \div 1000 \times 70 \times 3 = __mg/24hr oral morphine (divide and give Q4H or Q6H)} \]

   Maximum Dose for Oral Morphine = 15mg/dose

3. Converting Oral Morphine to Oral Methadone
   - \[ \text{__mg/24hr oral morphine \times 0.25 = __mg/24hr oral methadone (divide by 2 and give Q12H)} \]

4. Converting IV Oxycodone to Oral Oxycodone
   - \[ \text{__mg/24hr iv oxycodone \times 1.25 = __mg/24hr oral oxycodone (divide by 4 and give Q6H)} \]

5. Converting IV Fentanyl to Oral Oxycodone
   - \[ \text{__mcg/24hr iv fentanyl \times 0.075 = mg/24hr oral oxycodone (divide by 4 and give Q6H)} \]

BENZODIAZEPINES

1. Converting IV Midazolam to IV or Oral Diazepam
   - Calculate total dose of IV Midazolam in 24 hours.
   - Divide this number by 3 to give total dose of IV or Oral Diazepam in 24 hours.
   - Divide into Q6h dosing.

   \[ \text{__mg/24hr IV Midazolam \div 3 = __mg/24hr Diazepam (divide into Q4H or Q6H)} \]

2. Converting IV Diazepam to Oral Diazepam

   IV dose 24/hr = Oral dose 24/hr

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References


2. ANAND KJS, INGRAHAM J (1996). Tolerance, Dependence and Strategies for Compassionate Withdrawal of Analgesics and Anxiolytics in the Pediatric ICU. Critical Care Nurse. 16;6; 87-93.


10. GALINKIN J et al Recognition and Management of Iatrogenically Induced Opioid Dependence and Withdrawal in Children. Pediatrics 133; 152-155


Algorithm for Weaning Combined Opioids and Benzodiazepines

Opioids/Benzodiazepines <5 days: Stop drugs, no withdrawal scoring required

Opioids/Benzodiazepines 5-10 days

- Stop drugs and order WAT-1 withdrawal scoring
  - WAT-1 Score ≤ 3
    - Convert drugs to equivalent 24hr doses of morphine and diazepam
    - Chart diazepam and morphine Q4H PO (Q6H if <1yr)
    - Chart rescue doses as follows:
      - Morphine 0.05mg/kg IV or 0.2mg/kg PO PRN
      - Diazepam 0.1mg/kg IV or PO PRN
      - Chloral hydrate 20mg/kg PO PRN
  - WAT-1 Score >3

Opioids/Benzodiazepines >10 days

- Order WAT-1 withdrawal scoring and start weaning protocol

- Use 5-10 days
  - Wean by 20% Q24H
  - Continue WAT-1 scoring for 72 hours after drugs ceased

- Use >10 days
  - Wean by 10% Q24H

PRN use required – revise weaning plan
If WAT score persistently low, consider accelerating weaning

Notes:
1. If at any time during wean WAT-1 ≥ 3 or is trending upwards then:
   - Eliminate alternative diagnoses
   - Treat as per the Withdrawal Algorithm
2. Use paracetamol and NSAIDs if pain is an issue.
3. Dose reductions are a percentage of the original dose.
4. If enteral route not available wean benzodiazepine/opioid infusions in a similar manner.

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Algorithm for Weaning Opioids

Opioids <5 days: Stop drugs, no withdrawal scoring required

Opioids 5-10 days
- Stop drugs and order WAT-1 withdrawal scoring
  - WAT-1 Score ≤ 3
  - WAT-1 Score >3

Opioids >10 days
- Order WAT-1 withdrawal scoring and start weaning protocol

Convert opioid to equivalent dose of morphine and chart Q4H PO (Q6H if <1yr)

Chart rescue drugs as follows:
- Morphine 0.05mg/kg IV or 0.2mg/kg PO PRN
- Chloral hydrate 20mg/kg PO PRN

Wean morphine

Use 5-10 days
- Wean by 20% Q24H

Use >10 days
- Wean by 10% Q24H

Continue WAT-1 scoring for 72 hours after drugs ceased

Notes:
1. If at any time during wean WAT-1 > 3 or is trending upwards then:
   - Eliminate alternative diagnoses
   - Treat as per the Withdrawal Algorithm

2. Use paracetamol and NSAIDs if pain is an issue

3. Dose reductions are a percentage of the original dose:
   e.g. Original dose = 40mcg/kg/hr for EAP 12 days then wean at 4mcg (10% of 40) every 24 hours = 40, 36, 28, 24, 20, 16, 12, 8, 4, 0.

4. If enteral route not available, wean opioid infusion at similar rate.
Algorithm for Weaning Benzodiazepines

Benzodiazepines <5 days: Stop drugs, no withdrawal scoring required

Benzodiazepines 5-10 days

Stop drugs and order WAT-1 withdrawal scoring

WAT-1 Score ≤ 3

WAT-1 Score >3

Convert BZ to equivalent dose of diazepam and give Q4H PO (Q6H if <1yr)

Chart rescue drugs as follows:
- Diazepam 0.1mg/kg PO or IV PRN
- Chloral hydrate 20mg/kg PO PRN

Wean diazepam

Use 5-10 days

Use >10 days

Wean by 20% Q24H

Wean by 10% Q24H

Continue WAT-1 scoring for 72 hours after drugs ceased

Benzodiazepines >10 days

Order WAT-1 withdrawal scoring and start weaning protocol

PRN use required – revise weaning plan

If WAT score persistently low, consider accelerating weaning

Notes:

1. If at any time during wean WAT-1 > 3 or is trending upwards then consider:
   - Eliminate alternative diagnoses
   - Treat as per the Withdrawal Algorithm

2. Dose reductions are a percentage of the original dose:
e.g. If 20kg patient on dose of 2 mcg/kg/min midazolam for 12 days.
   Daily dose = 2 x 60 x 24 = 2880 mcg/kg/24hrs = 2880 x 20 = 57600mcg/24hr
   This = 57.6mg/24hr divide by 3 to get equivalent dose of diazepam = 19mg
   Divide by 4 to get initial 6hr dosing. This is approximately 5mg Q6H of diazepam which can be given IV or orally.
   Decrease at 10% per day = 2mg/24h = 0.5mgQ6H.

3. If enteral route note available wean benzodiazepine infusion at similar rate.
Withdrawal Algorithm

**WAT-1 scoring 12-hourly**

- **WAT-1 ≤ 3**
  - Continue weaning as per protocol

- **WAT-1 > 3**
  - Rescue dose opioid (or BZ if only BZ weaning)
  - Rescore WAT-1 in 1 hour

**WAT-1 < 3**

- Hold wean for 24 hours
- Halve weaning rate

**WAT-1 ≥ 3**

- **Opioid and BZ weaning:** Give rescue dose of BZ and return to previous step in weaning plan
- Rescore WAT-1 in 1 hour

**WAT-1 < 3**

- Halve weaning rate

**WAT-1 ≥ 3**

- **Opioid or BZ weaning:** Give rescue dose of opioid or BZ
- Rescore WAT-1 in 1 hour

**WAT-1 < 3**

- Halve weaning rate

**WAT-1 ≥ 3**

- Arrange Medical review

**IF WAT-1 CONSISTENTLY < 2, DISCUSS WITH THE PAIN SERVICE TO REVISE WEANING PLAN**
WAT-1 ASSESSMENT

1. Five indicators are assessed during a 2 minute observation of the patient at rest are scored with 1 point if present:
   • **State behaviour** based on observation (asleep/awake/calm = 0 or awake/distressed = 1.
   • **Tremors** that are moderate to severe and cannot be attributed to another clinical cause = 1.
   • **Sweating** that is observed and not related to an appropriate temperature regulation response = 1.
   • **Uncoordinated/repetitive movements** that are moderate to severe including head turning, leg or arm flailing or torso arching = 1.
   • **Yawning/sneezing** that is observed more than once in the 2 minute observation period = 1.

2. Two indicators are assessed during a progressive arousal stimulus scored with one point if present:
   • **Startle to touch** that is severe.
   • **Muscle tone** that is increased.

3. One indicator assessed during an observation period following the stimulus scored with up to two points:
   • Time to return to calm state that is greater than 5 minutes will receive 2 points. If the time to return to calm state is 2-5 minutes, it will receive 1 point.

Higher scores indicate more withdrawal symptoms; lower scores indicate fewer withdrawal symptoms.

Interpretation is based on their trend over time. A score that is increasing, e.g. from 1 to 3, may be an indication to alter weaning plan before patient shows overt signs of withdrawal. Scoring should be done Q12H.

A total score greater than 3 indicates withdrawal.
## Withdrawal Assessment Tool (WAT-1) Instructions

- **Start WAT-1 scoring from the first day of weaning in patients who have received opioids +/- benzodiazepines by infusion or regular dosing for prolonged periods (e.g. >5 days). Continue twice daily scoring (e.g. at 08:00 and 20:00 ± 2 hours) until 72 hours after the last dose.**
- **WAT-1 should be completed at least once per shift or more frequently if clinically indicated.**

### Assessment method

- **2 minute pre-stimulus observation - patient at rest:**
  - Calm voice, call patient’s name
  - If no response call patient and gently touch patient
  - If no response assess patient response to noxious procedure such as suctioning or pressure to nail bed
- **Post stimulus recovery - observation period**

### Obtain information from patient record (this can be done before or after the stimulus):

- Score 1 if any loose or watery stools were documented in the past 12 hours; score 0 if none were noted
- Score 1 if any vomiting or spontaneous retching or gagging were documented in the past 12 hours; score 0 if none were noted
- Score 1 if the most frequently occurring temperature documented was greater than 37.8 °C in the past 12 hours; otherwise score 0

### 2 minute pre-stimulus observation:

- Score 1 if awake and distress observed during the 2 minutes prior to the stimulus; score 0 if asleep or awake and calm/ cooperative.
- Score 1 if moderate to severe tremor observed during the 2 minutes prior to the stimulus; score 0 if no tremor (or only minor, intermittent tremor).
- Score 1 if any sweating during the 2 minutes prior to the stimulus; otherwise score 0
- Score 1 if moderate to severe uncoordinated or repetitive movements such as head turning, leg or arm flailing or torso arching observed during the 2 minutes prior to the stimulus; score 0 if no (or only mild) uncoordinated or repetitive movements.
- Score 1 if more than 1 yawn or sneeze observed during the 2 minutes prior to the stimulus; otherwise score 0

### 1 minute stimulus observation:

- Score 1 if moderate to severe startle occurs when touched during the stimulus; score 0 if none (or mild)
- Score 1 if tone increased during the stimulus; otherwise score 0

### Post-stimulus recovery:

- Score 2 if it takes greater than 5 minutes following stimulus; score 1 if achieved within 2 to 5 minutes; otherwise score 0

*Sum the 11 numbers in the column for the total WAT-1 score (0-12)*