

1. Introduction and Who Guideline applies to

This guideline describes the safe use of pentrox (methoxyflurane) – a potent analgesic delivered by a patient-administered inhaler device. Pentrox is **NOT** a controlled drug. Particular benefits include rapid onset and recovery, and a reduced need to use strong opiates or procedural sedation. [1-3] There is also some evidence of reduced length of stay (LOS) in certain patient groups managed with Pentrox. [4] The potential for abuse has been found to be low. [5] The guideline applies to clinicians (doctors and nurse practitioners) and qualified nursing staff working in the Adult Emergency Department, Professor Harper Trauma Clinic and Fracture Clinic.

2. Guideline Standards and Procedures

- 2.1 The guideline is presented in the format of a proforma, shown in [Appendix A](#) and [Appendix B](#).
- 2.2 Patients may continue to use pentrox during imaging and transfers within the ED but must remain on a trolley as they may become unsteady

3. Education and Training

- Sufficient numbers of ED and Fracture Clinic staff have been trained in the safe use of the pentrox inhaler by the pharmaceutical company representative prior to the implementation of this guideline, and further ad hoc training sessions will be arranged as necessary
- Staff already familiar with the device should cascade training to other staff on an opportunistic basis
- Radiographers and porters working with the ED have been informed that patients will be using pentrox during imaging / transfers within the ED

4. Monitoring Compliance

What will be measured to monitor compliance	How will compliance be monitored	Monitoring Lead	Frequency	Reporting arrangements
<ul style="list-style-type: none">• Appropriate proforma completion• Adverse reactions• Failure rate / need for alternative technique	Audit of first 30 cases managed in Professor Harper Trauma Clinic and Fracture Clinic after updated guideline approval	Alwyn Abraham	Within 3 /12 of guideline re-approval	TAS (Therapeutic Advisory Service)

5. Supporting References

1. CoffeyF, WrightJ, HartshornS et al. STOP!: a randomised, double-blind, placebo-controlled study of the efficacy and safety of methoxyflurane for the treatment of acute pain. [EMJ 2014;31:613-8](#).
2. NguyenNQ, ToscanoL, LawrenceM et al. Patient-controlled analgesia with inhaled methoxyflurane versus conventional endoscopist-provided sedation for colonoscopy: a randomized multicenter trial. [Gastrointest Endosc 2013;78:892-901](#).
3. Gray StephensC, DiasA, SkinnerE et al. Pentrox enables quicker management of fractures, dislocations and more: learning lessons from expedited care of trauma patients during the COVID-19 pandemic. [Ann R Coll Surg Engl 2023;105\(S2\):S22-S27](#).
4. Young L, Bailey GP, McKinlay JAC. Service Evaluation of Methoxyflurane Versus Standard Care for Overall Management of Patients with Pain Due to Injury. [Adv Ther. 2020 May;37\(5\):2520-2527](#).
5. FrangosJ and MikkonenA. (2013). Pentrox - Assessment of Potential for Abuse & Dependency. Richmond, Australia: Golder Associates. Retrieved from <https://tinyurl.com/y63qdwpx>.

6. Key Words

Analgesia, pain, procedure, procedural, trauma, injury, fracture, inhaled, inhaler, burn, dislocation, amputation, chemical, pentrox, methoxyflurane, emergency, ED, A&E, sedation, Fracture Clinic.

CONTACT AND REVIEW DETAILS	
Guideline Lead (Name and Title) Martin Wiese – Emergency Physician	Executive Lead Andrew Furlong, Medical Director
Details of changes made during review: <ul style="list-style-type: none">• Contemporary reference 3 added• Audit requirements updated• Proforma changes<ul style="list-style-type: none">○ ED users signposted to pentrox dose sentence within Nervecentre Meds ED formulary○ Analgesia failure to be recorded in adverse effects free text box	

LRI ED and Fracture Clinic**Pentrox (methoxyflurane)
inhaled analgesia for adults**

Intended to aid safe prescribing of procedural analgesia and/or immediate bridging analgesia prior to systemic pain relief in patients with traumatic injuries and a pain score of 7-10 or obvious severe pain

DO NOT use pentrox in non-traumatic conditions

Patient details

Full name

DoB

Unit number

(use sticker if available)

Indication (tick as applicable)

- ☐ Bridging analgesia for
- ☐ Fracture ☐ Dislocation
- ☐ Burn ☐ Chemical injury
- ☐ Amputation ☐ Soft tissue injury
- ☐ Procedural analgesia

Record specific indication

Contraindications include

- ☐ **C** Cardiovascular instability (shock)
- ☐ **H** Hypersensitivity to methoxyflurane or any other inhaled anaesthetic
- ☐ **E** Elevated temperature from an anaesthetic (i.e. personal or family history of malignant hyperthermia)
- ☐ **C** Consciousness reduced e.g. from head injury, illness, drugs causing drowsiness such as opiates, or alcohol
- ☐ **K** Kidney impairment (i.e. regular renal OPD patient, very dehydrated, or taking nephrotoxic antibiotics such as tetracycline, amphotericin B, gentamicin, colistin, or polymyxin B)
- ☐ **A** Age below 18 years
- ☐ **L** Lung or respiratory impairment, including obstructive sleep apnoea and current respiratory depression
- ☐ **L** Liver impairment due to jaundice or chronic liver disease, or at risk from alcohol misuse or from taking enzyme inducers such as isoniazid, rifampicin or phenobarbital, or history of liver damage after use of methoxyflurane or other inhaled anaesthetic
- ☐ **L** Last pentrox administration – 6mL already used today, used yesterday or 15mL total used within last 7 days

Any unwanted effects or analgesic failure observed?

☐ No

Is pentrox contraindicated?

Y

Inform patient of potential **TEMPORARY** unwanted effects:

- Dizziness,
- Headache
- Tiredness
- Nausea (and, rarely, vomiting)
- Taste disturbance
- Dry mouth
- Coughing
- Restlessness or agitation
- Altered state of consciousness
- Blurred vision

Does patient consent to using pentrox?

N

Clinician to prescribe pentrox

- In the ED, use NC Meds; go to Emergency Medicine (ED) > Analgesia (ED) > Inhaled analgesia > Pentrox (Methoxyflurane)
- In Professor Harper Trauma Clinic / Fracture Clinic, on a paper chart as shown below:

Medicine	Dose	Route
Methoxyflurane	3mL	inhaled

(Rarely, a second dose might be needed later)

- ☐ Take a pentrox pack and a Patient Alert Card
- ☐ Hand the completed alert card to the patient
- ☐ Deliver pentrox analgesia, following the administration instructions on the next page
- ☐ **For procedural analgesia**, staff trained in pentrox administration must remain present
- ☐ Record any unwanted side effects/failure in box
- ☐ Institute follow-on analgesic strategies, e.g. nerve blocks, splinting and systemic analgesics
- ☐ File this proforma in patient's record when done

Pentrox **NOT** appropriate

Patient was managed by

Print name

Signature

Position

Date

Time completed

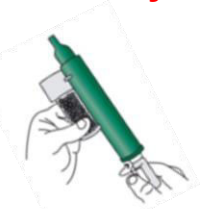
Martin Wiese . Part of pentrox (methoxyflurane) inhaled analgesia guideline for adults . Re-approved by PGC on 15Dec23 . Review due Dec26 . Trust Ref B44/2020

Administration instructions **Registered, trained staff only**

1. Insert the activated carbon chamber into the dilutor hole on the top of the inhaler



2. Use the base of the inhaler to loosen the vapour bottle cap with a ½ turn, then separate the bottle from the inhaler and remove the cap by hand



3. Tilt the inhaler to a 45° angle and pour the total contents of the bottle into the base of the inhaler whilst rotating it



4. Replace bottle cap bottle and place it in plastic bag from pack. Place bag on patient's trolley so it can later be used to safely dispose of inhaler.



5. Place loop over patient's wrist

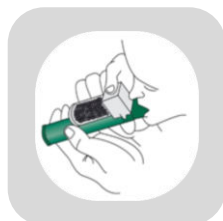
6. After use, place inhaler in the plastic bag already containing the vapour bottle, seal and dispose of it in sharps bin



For spontaneous pain

Instruct patient as follows:

- Breathe in and out through the inhaler so the exhaled vapour is captured in chamber
- Breathe gently for the first few breaths and then breathe normally through inhaler (i.e. big breaths are **NOT** required)
- You will feel pain relief after 6-10 breaths
- Continuous inhalation provides pain relief for up to 25-30 minutes, but it is usually **NOT** necessary to inhale constantly and this might also cause unwanted drowsiness
- Inhale intermittently, at the lowest possible dose to achieve pain relief – you will soon get the hang of it!



NB: Patient must remain on trolley including during imaging or transfer as they might become unsteady

For procedural analgesia

Instruct patient as follows:

- Breathe in and out through the inhaler so the exhaled vapour is captured in chamber
- Breathe gently for the first few breaths and then breathe normally through the inhaler (i.e. big breaths are **NOT** required)
- Keep going like this for a few minutes to ensure the vapour reaches its maximum effect; we will then start the procedure

If patient becomes uncomfortable, stop procedure, deepen analgesia then restart; instruct them to do the following:

- Take deeper breaths now while covering the dilutor hole of the chamber with one finger
- Hold each breath in your lungs for a few seconds before breathing out
- You might become drowsy and lose awareness, but this will make you stop inhaling the vapour and you will then become fully conscious again very rapidly

NB: Trained staff to remain with patient throughout Pentrox use
Remove inhaler from their mouth if they are getting too sedated (recovery should then be rapid)