This patient group direction (PGD) must only be used by registered Paramedics or Nurse Practitioners who have been named and authorised by their organisation to practice under it. The most recent and up to date final signed version of the PGD should be used.

Patient Group Direction

for the administration of

Penthrox®

(99.9%, 3 ml inhalation vapour, liquid methoxyflurane).

by registered Paramedics / Advanced Nurse Practitioners

in Re-Pat Ltd

Version number:1.1

Change history

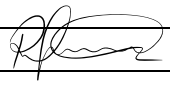
Version number	Change details	Date
1.1	Alteration to job titles on PGD development and authorisation page.	6/8/25

Document details

Reference number	2301772
Valid from	1/1/25
Renew date	31/12/2027
Expiry date	30/12/2027

PGD Development

People responsible for PGD development

Name	Job title and organisation	Signature	Date
Richard Drakeford	Director		5/12/24
Dr James Cronin	Consultant Intensivist		
Neil Hayward	Pharmaceutical Consultant		
Jordan Cronshaw	Specialist Paramedic		

PGD Authorisation

People responsible for PGD authorisation

Name	Job title and organisation	Signature	Date
Dr James Cronin	Consultant Intensivist		
Neil Hayward	Pharmaceutical Consultant		
Jordan Cronshaw	Specialist Paramedic		

Training and competency of registered Paramedics and Advanced Nurse Practitioners

Requirements of working under the PGD

Qualifications and professional registration	Current registration with the HCPC as a Paramedic. Current registration with the NMC as a Advanced Nurse Practitioner While working for Re-Pat Ltd Has successfully completed an approved university module in applied pharmacology, including individual applied pharmacology or other approved university modules that contain applied pharmacology as part of their content.

Initial training	Has undertaken appropriate training and successfully completed the competencies to undertake clinical assessment of a patient leading to diagnosis of the conditions listed.
Competency assessment	Clinicians should declare their own competence to use PGDs. Assure themselves that they have the necessary clinical skills and knowledge for the treatment of the conditions included and use of the drugs involved. Demonstrate that they understand the legislation surrounding use of PGDs, and understand their responsibilities as a PGD user
Ongoing training and competency	The clinician must meet the requirements of the prevailing level of education required for PGD use at this level of practice. attending regular medicines management update training. All ongoing regular training requirements (e.g. statutory and mandatory training) as required by Re-Pat Ltd for this role must be completed. The clinician is responsible for keeping themself aware of any changes to the recommendations for the medicine listed. It is the responsibility of the individual to keep up to date with continued professional development and to work within the limitations of their own individual scope of practice. Completion of approved familiarisation package for the use of Penthrox®. Re-Pat Ltd approves the use of Penthrox university and Galen Pharmaceuticals e-learning package for training staff to administer Penthrox.

Clinical condition

Condition-specific information

Clinical condition or situation to which this PGD applies	Conscious adult patients (18 years and older) with moderate to severe pain with traumatic injuries
Inclusion criteria	Conscious adult patients (18 years and older) with moderate to severe

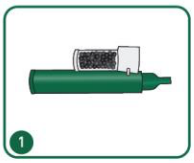
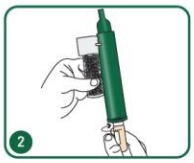
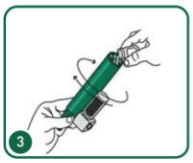
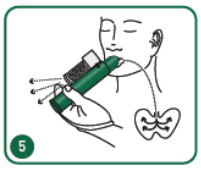
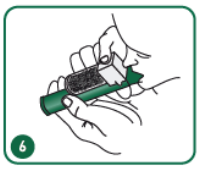
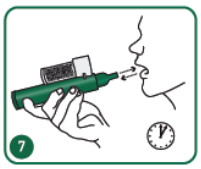
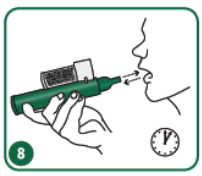
Exclusion criteria	Patients with pain from a non-traumatic cause. Age below 18 years. Reduced consciousness due to any cause including head injury, drugs or significant alcohol consumption. Acute back pain associated with muscular spasm (Consider oral analgesia and PP referral) Mild pain. Use as an anaesthetic agent Clinically evident cardiovascular instability (Blood pressure and Heart rates outside normal limits) Clinically evident respiratory depression, reduced lung capacity. Hypersensitivity to Penthrox, any fluorinated anaesthetic or to butylated hydroxytoluene (E321). Established or genetically susceptible to malignant hyperthermia (Take a personal and family history of anaesthetic problems). Patients with a known family history of severe adverse reactions after being administered with inhaled anaesthetics. Kidney impairment (clinically significant, such as (but not limited to) CKD stage 3, 4 or 5) Current prescription for nephrotoxic drugs (tetracycline, gentamicin, colistin, amphotericin, polymyxin B). Patients who have a history of showing signs of liver damage after previous methoxyflurane use or halogenated hydrocarbon anaesthesia. Administration within the previous 24 hours, or more than 15mL in a week.
Cautions (including any relevant action to be taken)	Concomitant use of Penthrox with CNS depressants, such as opioids, sedatives or hypnotics, general anaesthetics, phenothiazines, tranquillisers, skeletal muscle relaxants, sedating antihistamines and alcohol may produce additive depressant effects. If opioids are given concomitantly with Penthrox, the patient should be observed closely, as is normal clinical practice with opioids. Use with caution in elderly or other patients with known risk factors for renal disease, hypotension and tachy/brady arrythmias.

Arrangements for referral for medical advice	Patient should be conveyed to the nearest appropriate hospital or handed over to an enhanced care team who are able to manage a patient who has been treated with Penthrox. Penthrox device must be taken from the patient if they refuse conveyance against advice, or at the time of hospital handover, and dispose appropriately as instructed in this PGD.
Action to be taken if patient excluded	Provide alternative analgesia. Ensure that all findings and actions are recorded on the patient's clinical record.
Action to be taken if patient declines treatment	Offer alternative analgesia. Ensure a full handover is provided and that all findings and actions are recorded on the patient's clinical record**.**

Details of the medicine

Medicines information

Name, form and strength of medicine	Penthrox (Methoxyflurane) 99.9%, 3 mL inhalation vapour, liquid
Legal category	Prescription Only Medicine (POM)
Indicate any off-label use (if relevant)	N/A

Route/method of administration	For inhalation only Slow and steady inhalation (The patient should take gentle breaths at first (to adjust to the smell and taste of methoxyflurane) and then breath normally through the inhaler). Penthrox is self-administered under supervision of a person trained in its administration, using the handheld Penthrox Inhaler. Onset of pain relief is rapid and begins after 6 – 10 inhalations. Patients should be instructed to inhale intermittently to achieve adequate analgesia with the minimum amount of agent.  Ensure the Activated Carbon (AC) Chamber is inserted into the dilutor hole on the top of the PENTHROX Inhaler.  Remove the cap of the bottle by hand. Alternatively, use the base of the PENTHROX Inhaler to loosen the cap with a ½ turn. Separate the Inhaler from the bottle and remove the cap by hand.  Tilt the PENTHROX Inhaler to a 45° angle and pour the total contents of one PENTHROX bottle into the base of the Inhaler whilst rotating.  Place wrist loop over patient's wrist. Patient inhales and exhales PENTHROX through the mouthpiece to obtain analgesia. First few breaths should be gentle and then breathe normally through Inhaler.  Patient exhales into the PENTHROX Inhaler. The exhaled vapour passes through the AC Chamber to adsorb any exhaled methoxyflurane.  If stronger analgesia is required, patient can cover dilutor hole on the AC chamber with finger during use.  If further pain relief is required, after the first bottle has been used use a second bottle if available. Alternatively use a second bottle from a new combination pack. Use in the same way as the first bottle in step 2 and 3. No need to remove the AC Chamber. Put used bottle into the plastic bag provided.  Patient should be instructed to inhale intermittently to achieve adequate analgesia. Continuous inhalation will reduce duration of use. Minimum dose to achieve analgesia should be administered.  Replace cap onto PENTHROX bottle. Place used PENTHROX Inhaler and used bottle in sealed plastic bag and dispose of responsibly.

Dose and frequency	A single dose (one 3 mL bottle) will provide analgesia for 25-30 minutes if used continuously. Intermittent inhalation may provide longer analgesic relief. A maximum of two doses of Penthrox (6 mL) can be administered in a single day however the lowest effective dose should always be administered. It should not be administered on consecutive days and a maximum of 5 doses (15 mL) can be administered to a patient in one week.

Administration notes	Patients should be instructed to inhale from the device intermittently to achieve adequate analgesia, however they can inhale continuously and/or occlude the dilutor hole on top of the Activated Carbon chamber to increase the level of analgesia, if required. Methoxyflurane is self-administered by patients via the inhaler under supervision of a person trained in its administration. **Interactions:** There are no reported drug interactions when used at the analgesic dosage (3 – 6 mL). It is possible that enzyme inducers increase the rate of methoxyflurane metabolism might increase its potential toxicity so avoid concomitant use with: • Alcohol • Isoniazid • Phenobarbital • Rifampicin • Carbamazepine • Efavirenz • Nevirapine Concomitant use of methoxyflurane with medicines (e.g. contrast agents and some antibiotics) which are known to have a nephrotoxic effect should be avoided as there may be an additive effect on nephrotoxicity. Antibiotics with known nephrotoxic potential include: • Tetracycline • Gentamicin • Colistin • Polymyxin B • Amphotericin B. CNS depressants may produce additive depressant effects: Avoid concomitant use: Opioids (Ex: codeine, tramadol, morphine, fentanyl, oxycodone, buprenorphine) Sedatives or hypnotics (Ex: benzodiazepines) General anaesthetics (Ex: propofol, isoflurane, benzodiazepines) Phenothiazines Tranquillisers (Ex: Lorazepam, Diazepam, Alprazolam...) Skeletal muscle relaxants Sedating antihistamines and alcohol Concomitant use of methoxyflurane with medicines (e.g. contrast agents and some antibiotics) which are known to have a nephrotoxic effect should be avoided. Antibiotics with known nephrotoxic potential include tetracycline, gentamicin, colistin, polymyxin B and amphotericin B. It is advisable to avoid using sevoflurane anaesthesia following methoxyflurane analgesia, as sevoflurane increases serum fluoride **Utilisation by Non-registrants** A patient using Penthrox must be accompanied by a Registered Paramedic who is authorised in the use of Penthrox at all times. Therefore, it is not acceptable for a Paramedic to start Penthrox therapy, and the patient conveyed by a Technician / AAP / ECSW crew to hospital – the Paramedic must always stay with the patient whilst Penthrox is being administered.

	Disposal Inhalers are for single patient use only. After pouring the content of the bottle into the inhaler device, this must be disposed into the yellow sharps bin, or sealed into the accompanying plastic bag (provided in the pack) and disposed along with the Penthrox inhaler device, which should then be placed in the clinical waste bin as per Trust Policies. Occupational Exposure Multiple use of the inhaler without the AC chamber creates additional risk. The vapour may be irritating to the upper respiratory tract. Exposure to low vapour concentrations can cause headache and nausea. (High vapour concentrations, such as when used as an anaesthetic, have a depressant action on the central nervous system producing loss of consciousness.) To avoid occupational exposure: The PENTHROX inhaler should always be used with the Activated Carbon (AC) Chamber which adsorbs exhaled methoxyflurane. Maintain the vehicle ventilated, opening the top window. Ensure patients self-administer methoxyflurane correctly and always exhale through the mouthpiece of the inhaler. Once the contents of the methoxyflurane bottle have been tipped into the inhaler replace the cap on the bottle. Place used methoxyflurane bottles and inhalers into the sealed plastic bag provided and dispose as stated in disposal section. If a member of staff feels that the patient is not using the device correctly and needs to withdraw Penthrox as in the sections above it needs to be made clear to the patient, why and explain that other pain relief will be used if appropriate. Prolonged or repeated skin contact with the liquid may cause irritation, if this happens wash contaminated skin with plenty of soap and water. If irritation occurs seek medical attention. Remove contaminated clothing and wash before re-use. If leakage occurs: Absorb with liquid-binding material. The liquid is irritating to the eyes and may cause pain and redness. If eye- contact occurs immediately irrigate with copious amounts of water for at least 15 minutes. Eyelids to be held open. In all cases of eye contamination, it is a sensible precaution to seek medical attention. If the liquid is swallowed accidentally, may be discomforting to the gastrointestinal tract and may cause nausea and vomiting. DO NOT INDUCE VOMITING. Rinse mouth with water and then give water to drink. Seek immediate medical assistance.

Adverse effects	Very common ≥1/10: Dizziness Common ≥1/100 to <1/10: Headache Drowsiness Dry mouth Nausea For rare and very rare reactions, refer to patient information leaflet or summary of product characteristics: PENTHROX 99.9%, 3 ml inhalation vapour, liquid - Summary of Product Characteristics (SmPC) - (emc) (medicines.org.uk) levels and nephrotoxicity of methoxyflurane is associated with raised serum fluoride.
Records to be kept	The administration of any medication given under a PGD must be recorded within the patient's medical records

Patient information

Information for patients

Written information to be given to patient or carer	Explain why treatment is required and what the drug is for Explain potential side-effects Patient cannot be left with the device, so the Paramedic must take it back from the patient at handover and dispose appropriately as instructed in the PGD. The patient should be given the Patient Information Leaflet (provided in the pack) and a Penthrox Patient Alert Card which also contains information on potential side effects. The date and time of the treatment, as well as the number of vials, needs to be documented on the alert card.

Follow-up advice to be given to patient or carer	Patient should be conveyed to the nearest appropriate hospital or handed over to an enhanced care team who are able to manage a patient who has had Penthrox supplied. The receiving clinical team must be verbally informed, and the patient record should clearly show: • At what time the patient had Penthrox administered. • Dose administered. • Whether the patient had capacity to provide informed consent .

Appendices

Appendix A: key references

1. Penthrox 99.9%, 3mL inhalation vapour, liquid, UK Summary of Product Characteristics (SPC), Apr 2023 -Accessed Dec 2024 https://www.medicines.org.uk/emc/product/1939

2. British National Formulary

https://bnf.nice.org.uk/drug/methoxyflurane.html#indicationsAndDoses

3. Coffey F, Wright J, Hartshorn S 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

4. NguyenNQ,ToscanoL,LawrenceMetal.Patient-controlledanalgesiawithinhaled methoxyflurane versus conventional endoscopist-provided sedation for colonoscopy: a randomized multicentre trial. Gastrointest Endosc 2013;78:892-901

5. FrangosJ and MikkonenA. (2013). Penthrox - Assessment of Potential for Abuse & Dependency. Richmond, Australia: Golder Associates. Retrieved from https://tinyurl.com/y63qdwxp

6. For the emergency relief of moderate to severe pain in conscious adult patients with trauma and associated pain -

Formulary Inclusion Material. (www.penthrox.co.uk)
Galen,May 2021

7. JRCALC guidelines.

Appendix B: Paramedics / Advanced Nurse Practitioners agreement to practise

I have read and understood the patient group direction and agree to administer this medicine only in accordance with this PGD.

Details of participating individual

Name	Signature	Senior authorising representative	Date