



ANALGESIA AND SEDATION

Aims

- Discuss the principles of pre-hospital analgesia and sedation
- Describe the analgesic and sedative drugs carried by HEMS
- Describe indications and contraindications for use
- Describe dose and dilution of drugs

Analgesia

Principles

- Alleviating/relieving pain is a fundamental humanitarian aim for HEMS.
- Analgesia may reduce heart rate, blood pressure and thus blood loss.
- Masking of clinical signs is not a reason to withhold analgesia.
- Omitting analgesia is not an appropriate time-saving measure during extrication/procedures
- Immobilisation is a simple but effective form of pain relief in fractures

Most patients attended by HEMS will require some form of intravenous analgesia. **Morphine** is the gold standard for ongoing pain, although **fentanyl** is also used and has the benefit of a more rapid onset. Effect time is shorter, however, and paramedics will not transfer patients who have received **fentanyl** unaccompanied by ambulance. This is relevant where several casualties are treated on scene and the HEMS team can take only one or two. For short periods of intense pain (e.g. chest drain insertion, fracture manipulation, extrication), **ketamine** is an ideal choice. An alternative is **entonox** where there are no contraindications to use.

Where intravenous access is not possible, **intraosseous** access is an alternative route. The same drugs and doses can be given with rapid effect.

Intramuscular morphine is not ideal pre-hospital due to the slower onset and unpredictable dose/effect (dependent on circulation to the muscle injected). Ketamine can be used intramuscularly if IV access is not possible due to entrapment, thus allowing pain free extrication.

Intranasal fentanyl is an alternative, however, UK HEMS do not currently carry fentanyl 150mcg/ml, so appropriate doses require relatively large intranasal volumes, which are less likely to be fully absorbed.

Sedation

The aims of sedation

1. Relieve distress/agitation to facilitate procedures
2. After intubation to:
 - Prevent awareness/recall
 - Prevent hypertension and tachycardia
 - Reduce cerebral oxygen requirement

Sedative drugs

Several agents can be used to sedate patients. Short acting agents e.g. **Propofol**, must be given by infusion to avoid large variations in blood pressure. Bolus doses or large changes in infusion rate are not recommended as they can lead to cardiovascular instability. Infusion pumps, however, require batteries or an external power source and introduce an additional complexity to the handling of patients.

Longer-acting agents e.g. **Midazolam** can be administered by intermittent bolus dose. Bolus dosing of midazolam can also lead to hypotension (although not as profound as with propofol); careful attention should be paid to the blood pressure after each bolus. It is recommended that a small dose should be given initially followed by careful titration depending upon patient response and blood pressure.

Morphine and Midazolam mixed in a 1:1 ratio is a well-recognised technique and provides analgesia and sedation at the same time. Titration for maintenance remains 1-2mg. This is the recommended technique for Primary HEMS transfers of < 20mins. It can be used for longer transfers; however, the extra time to set up an infusion pump becomes less significant and outweighed by the potential for a more constant sedation and cardiovascular state.

As already mentioned, adequate sedation may result in hypotension. This is most noticeable in hypovolaemic patients who have been relying on endogenous catecholamine production to maintain their blood pressure whilst awake. This effect is predictable and may be managed with a fluid bolus and/or bolus dose of a vasoactive drug e.g. ephedrine 3– 6 mg. Care should be taken not to over treat, as surges of blood pressure may worsen haemorrhage.

Administration

Principles

- All drugs drawn up into **syringes are labelled** with drug and concentration. **Concentration** is particularly important when using ketamine and when using smaller syringes in children.
- All sedative and analgesic drugs should always be **titrated to effect**, flushing with saline between aliquots.
- Drugs should ideally be delivered **intravenously**. This route provides the most rapid effect and thus shorter titration times.

Monitoring of sedation

All patients receiving sedation should have respiratory rate, heart rate and blood pressure (or radial pulse) measured as a minimum. SpO₂ and ECG should be attached as soon as is feasible.

It is important for someone to maintain regular verbal and visual contact with a patient receiving sedation (unless intubated).

Intubated patients should have clinical signs monitored as above. In addition, signs of **inadequate sedation** should be looked for:

Tachycardia and hypertension
Pupil dilatation and lacrimation
Perspiration