3.1 General Anaesthetic Techniques

Drugs for conscious sedation

Conscious sedation, part of what is now expanded into procedural sedation, is now a routine part of ED management.

The aim is to provide analgesia, sedation, muscle relation and ideally amnesia during what might otherwise be uncomfortable procedures (wound debridement, fracture/dislocation reduction, chest tube insertion, cardioversion, FB removal, and as necessary in diagnostic procedures that require high degree of compliance e.g. LP, CT, MRI).

Most frequently a combination of drugs is employed as a single drug may not provide all the desired effects. Most often drugs are given where possible by the IV route as this is the most rapid and predictable option.

The ideal level of sedation is that where the patient:

- tolerates the procedure with no or minimal discomfort
- depressed but not full loss of consciousness
- maintains protective airway reflexes
- responds to command

There is a risk of deeper sedation which may result in depressed respiration and the loss of airway protective reflexes, so expertise and equipment for managing such a situation must be anticipated, assessed and available before commencing the procedure.

In general conscious sedation should include:

- Assessment of patient
    - ASA I or II, airway anatomy, medical status (incl. any respiratory/CVS disease), allergies, medications
- Fasting time should be ascertained - ideally from 2hrs (clear fluids) to 6hrs (solids).
- Consent should be obtained where possible.
- Often 2 dcotors may be required - one to perform the procedure and the other to manage the sedation and airway.
- Monitoring (pulse oximetry. NIBP) should be attached,
- Oxygen provided for the patient usually by Hudson mask,
- Resuscitation/intubation trolleys to hand.
- Frequent recording of vitals until dischargable - usually 1-4hrs post most procedures depending on the drugs used.
- Documentation of drugs used, procedure, complications & outcome in medical notes.

Most of the drugs used are covered in the IV induction agents and inhaled anaesthetic agents pages of this chapter. Links for them are listed below. Choice of a particular drug or combination can be dependent on:

- Patient contraindications
- Length of procedure
- Familiarity of a doctor with a drug
- Local protocols

Commonly used drugs:

- Nitrous oxide
- Midazolam
- Opioids
- Ketamine
- Propofol

Summary of doses:

Drug	Initial dose (Top-up dose is half)	Route	Onset	Duration	Notes (all bar N_2O may cause ↓RR & ↓BP)
Nitrous Oxide	50-70% mixed with O_2	Demand valve mask	3-5min	until 3-5min after removal	N & V, expansion of air-filled cavities.
Midazolam	0.05-0.1mg/kg 0.1mg/kg 0.5-1mg/kg (max 15mg)	IV IM PO	1-3min 2-5min 20-30min	1hr 1-2hr 1-2hr	Paradoxical agitation. PO route unpredictable but used in children. Usually combined with an opioid for analgesia.
Fentanyl	1-3mcg/kg	IV	1-2min	peak 10min	Bradycardia. Usually given with a sedative agent.
Morphine	0.1mg/kg	IV	3min	15-30min	Histamine release, prolonged sedation. May be given with a sedative.
Ketamine	1-2mg/kg 2-4mg/kg	IV IM	1-3min 2-3min	10-20min 30-60min	Give with atropine 0.01-0.2mg/kg.
Propofol	0.5-1mg/kg	IV	<30s	10mins per bolus	Mix with 2ml 1% lignocaine to ease pain of injection. Beware apnoea/hypotension. May be combined with an analgesic.

Sedation level scoring:

Ramsay Sedation Scale

1. Patient is anxious and agitated or restless, or both
2. Patient is co-operative, oriented, and tranquil
3. Patient responds to commands only
4. Patient exhibits brisk response to light glabellar tap or loud auditory stimulus
5. Patient exhibits a sluggish response to light glabellar tap or loud auditory stimulus
6. Patient exhibits no response

Sedation Scoring Scale (based on the Ramsey Sedation Scale, but confusingly reverses order)

6	5	4	3	2	1	0
Agitated, anxious, or in pain above baseline	Spontaneously awake without stimulus; may exhibit anxiolysis	Drowsy but easily arouses to consciousness to light tactile or verbal/tactile stimulus	Arouses to consciousness with moderate tactile or loud verbal stimulus	Arouses slowly to consciousness with sustained painful tactile stimulus	Arouses, but not consciousness, with painful stimulus	Unresponsive to painful stimulus

A sedation score of 5 corresponds to minimal sedation. Sedation scores of 4-3 correspond to moderate sedation. Sedation scores of 3-2 correspond to deep sedation.

Another Sedation Score

1) Awake = fully alert and oriented
2) Mild - Arousable with verbal stimulation = drowsy/ eyes closed but rousable to command
3) Moderate - Arousable with tactile stimulation = eyes closed but rousable to mild physical stimulation
4) Severe - Not arousable by tactile stimulation = to mild physical stimulation

Yet Another Sedation Score

Score	Description	Definition
0	Unresponsive	Does not move with noxious stimuli
1	Responds to noxious stimuli	Opens eyes, raises eyebrows or turns head towards stimulus, move limbs with noxious stimulus (fingernail pressure, sternal rub)
2	Responsive to touch or name	Opens eyes, raises eyebrows or turns head towards stimulus, move limbs when touched or name is spoken (shake and shout)
3	Calm & cooperative	No external stimulus is required to elicit movement, and patient appears calm and follows commands

References:

1. Dunn R. The Emergency Medicine Manual 3rd Ed.
2. Katung B. Basic & Clinical Pharmacology 8th Ed.
3. Cameron P. et al. Textbook of Adult Emergency Medicine 2nd Ed.
4. Mahadevan S. & Garmel G. An Introduction to Clinical Emergency Medicine
5. Neal M. Medical Pharmacology at a Glance 3rd Ed.
