The Royal College of Emergency Medicine

Best Practice Guideline

Procedural Sedation in the Emergency Department

Royal College of Emergency Medicine

August 2022

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Summary of Recommendations

1. Every emergency department should have a sedation lead responsible for ensuring the appropriate governance structures are in place in relation to procedural sedation.

2. Emergency departments undertaking paediatric procedural sedation should have a nominated paediatric sedation lead and specific paediatric guidelines.

3. The use of a sedation proforma or similar electronic equivalent is strongly recommended.

4. Processes should be in place for adverse incident reporting arising from procedural sedation as well as rapid investigation of significant events.

5. Emergency departments should have clear policies with regards competencies for the provision of procedural sedation in both adults and children as well as, up to date lists of those clinicians fulfilling the competencies.

6. Simulation training sessions should be used to promote safe and effective procedural sedation in line with local policies.

7. Procedural sedation should take place in a designated area of the emergency department with the requisite staffing levels and equipment e.g., resuscitation room.

8. Procedural sedation should not take place without careful consideration of the analgesic requirement for the procedure, taking into account any analgesics already administered.

9. The clinician who will be responsible for providing the procedural sedation should undertake a pre-procedure Safety Brief with the other members of the team.

10. The use of oxygen during procedural sedation is encouraged especially for at risk patient groups (e.g., ischaemic heart disease) and those undergoing deep sedation procedures (increased risk of short periods of apnoea).

11. Monitoring during procedural sedation should include: 3 lead ECG, oxygen saturations, continuous capnography, non-invasive blood pressure.

12. The use of a patient advice leaflet is encouraged.

Scope

Procedural sedation in adults and children (excluding neonates) in the Emergency Department (ED). See separate guidance regarding management of Acute Behavioural Disturbance and the need for rapid tranquilisation (Acute Behavioural Disturbance in Emergency Departments Jan 2022).

This guidance does not provide advice regarding anaesthesia or use of Entonox® or methoxyflurane or variable concentration nitrous oxide.

Reason for Development

This guidance seeks to amalgamate a number of existing Best Practice Guidance documents on the subject of procedural sedation.

Procedural sedation (PS) is a core skill for emergency department clinicians. The ED setting provides unique challenges, regarding the need for emergency and urgent (unscheduled) procedures in patients who may have co-existing injuries, illnesses, anxiety and pain who may have ingested fluid or food recently. PS may avoid the need for admission for general anaesthesia both in adults and children, but this must not be to the detriment of patient safety or quality of care.

Anecdotally, PS practice varies widely. This document provides guidance on governance structures as well as staffing, equipment and pharmacological agents and doses.

Introduction

Procedural sedation has been defined as 'the administration of one or more pharmacological agents to facilitate a diagnostic or therapeutic procedure while targeting a state during which airway patency, spontaneous respiration, protective airway reflexes, and hemodynamic stability are preserved, while alleviating anxiety and pain' [1]. The practice of procedural sedation differs from the practice of general anaesthesia, which targets an unarousable state in which airway intervention is often required and spontaneous ventilation is frequently inadequate.

Definitions that concentrate on the continuum between minimal sedation and general anaesthesia and the degree of responsiveness, have the advantage of emphasising the differing competencies required to manage any potential adverse consequences as well as the degree of monitoring required and recognise that ED PS is tailored to the individual and the intervention required (Appendix 1). Ketamine, which produces a dissociative state, does not fit neatly into the concept of the depth sedation being on a continuum.

The term ‘conscious sedation’ has fallen out of favour, which is unsurprising given most emergency physicians would recognise a desired sedation outcome for the majority of procedures performed in the ED as lying somewhere between ‘moderate’ and ‘deep’ sedation, often due to the requirement for significant muscle relaxation. This underlines the need for practitioners to be able to deal with any consequences of the patient attaining a deeper level of sedation than was anticipated.

Some of these definitions fail to take into account that the use of certain procedural sedation agents are associated with undesirable but not necessarily unexpected outcomes which can be easily anticipated and treated e.g. a short uneventful period of apnoea in a well oxygenated patient whilst using propofol.

Safe PS requires the careful consideration of patient factors (e.g., fasting, co-morbidities, potential airway risks), timing of the procedure, the nature of the procedure and the overall running of the ED. Senior emergency physicians are best placed to provide expert opinion and leadership with regards to decisions relating to procedural sedation for patients presenting to emergency departments.

RECOMMENDATIONS

1. GOVERNANCE

Every ED should have a sedation lead. The Sedation Lead should actively participate in the development and review of local Standard Operating Procedures (SOPs) for the administration of sedation. The Sedation Lead should also review adverse clinical incidents as well as having an overview of staff training and continuing professional development in sedation practice.

ED’s undertaking paediatric PS should have a nominated paediatric sedation lead and specific paediatric guidelines.

EDs should use a sedation proforma or similar to prompt safe and effective care which is auditable (Appendix 2).

All EDs should routinely audit procedural sedation focusing on compliance with the use of a sedation proforma, monitoring during sedation, drugs used for sedation, use of reversal agents as well as adverse incidents. Six monthly audits involving, as a minimum, 20-30 patients depending on departmental size are recommended.

Sedation related adverse incidents can be defined as ‘unexpected and undesirable response(s) to medication(s) and medical intervention used to facilitate procedural sedation and analgesia that threaten or cause patient injury or discomfort.’ [2].

The TROOPS reporting tool for adverse events should be considered (Appendix 3) as it focusses both on significant interventions (e.g., positive pressure ventilation) and outcomes (e.g., unplanned admission to hospital) without the need to define events in terms of 'threshold' or 'duration' which are often subject to clinician disagreement.
It should be noted that often certain interventions (e.g., airway re-positioning) are an accepted part of PS and their performance does not necessarily signify a clinical error. Box 1 contains a list Never Event relevant to PS and the ED.

Box 1. Never Event List [3]

1. Wrong site surgery

An invasive procedure performed on the wrong patient or at the wrong site (e.g., wrong knee, eye, limb). The incident is detected at any time after the start of the procedure.
Includes:
Interventions that are considered to be surgical but may be done outside a surgical environment – for example, wrong site block (including blocks for pain relief), biopsy, interventional radiology procedure, cardiology procedure, drain insertion and line insertion (e.g., peripherally inserted central catheter (PICC)/ Hickman lines).

8. Mis-selection of high strength midazolam during conscious sedation

Mis-selection refers to when:
- a patient is given an overdose of midazolam due to the selection of a high strength preparation (5 mg/mL or 2 mg/mL) instead of the 1 mg/mL preparation, in a clinical area performing conscious sedation
- excludes clinical areas where the use of high strength midazolam is appropriate; these are generally only those performing general anaesthesia, intensive care, palliative care, or areas where its use has been formally risk-assessed in the organisation.

15. Unintentional connection of a patient requiring oxygen to an air flowmeter

This applies when a patient who requires oxygen is connected to an air flowmeter when the intention was to connect them to an oxygen flowmeter.

The use of an adverse reporting system whether part of a sedation proforma or separate e.g., DATIX, is recommended. There should be prompt analysis of any sentinel events (e.g., tracheal intubation, see appendix 3 for more detail) by the sedation lead. The TROOPS reporting tool defines sentinel events as those which are life threatening and warrant immediate reporting and the highest level of peer scrutiny.

Consent (ideally written), if time permits should be gained before any procedure ensuring that the rationale, risks, and benefits for both the procedure and the procedural sedation have been explained. Written patient information should also be available addressing the likely areas of concerns a patient may have following sedation (Appendix 4).

2. STAFF & TRAINING

EM clinicians providing sedation to patients for therapeutic and diagnostic procedures in the ED should undergo documented training in the knowledge, skills and competencies necessary for safe sedation, to include an understanding of comorbidities that require consideration, monitoring during sedation, the recognition of the complications of sedation, and the competencies necessary to rescue patients from these complications. Competency in relation to both adult and children should be clear. When appropriate, this training should be regularly updated [4]. Relevant online learning can be found at:
https://www.rcemlearning.org/modules/propofol-for-procedural-sedation-in-adults/
https://www.rcemlearning.co.uk/reference/ketamine-sedation-in-children/

Appendix 5 specifically addresses issues related to emergency airway management. Training and competencies requirements for the various levels of sedation are shown in the tables 1 and 2 below.

Table 1 Requirements for Adult Procedural Sedation [5]

	Moderate Sedation "conscious sedation"	**Deep Sedation**	**Dissociate Sedation**
Example	Benzodiazepines	Propofol	Ketamine
Monitoring	Pulse Oximetry Capnography ECG NIBP	Pulse Oximetry Capnography ECG NIBP	Pulse Oximetry Capnography ECG NIBP
Minimum Staffing	Nurse Sedationist Proceduralist	Nurse Sedationist Proceduralist	Nurse Sedationist Proceduralist
Competencies	ILS / ALS Level 1 sedation training local sign-off	RCoA initial assessment of competencies Level 2 sedation training local sign-off	RCoA initial assessment of competencies Level 2 sedation training local sign-off
Location	Resus room facilities (appendix 6)	Resus room facilities (appendix 6)	Resus room facilities (appendix 6)

Table 2 Training requirements for adult procedural sedation

Level 1 Sedation Training Requirements	Level 2 Sedation Training Requirements
ASA grading	As per level 1
Pre-procedural assessment incl. prediction of difficult airway	Drug selection with emphasis on potential alternative strategies and/or lighter sedation
Pre-procedural fasting and risk benefit assessment	Monitoring, complications (eg. hypoxia, hypotension) and rescue strategies
Consent and documentation	Safe use of propofol
Drug selection and preparation: benzodiazepine/opiod combiantions; increments and reversal	Safe use of ketamine
Monitoring, complications (eg. hypoxia, hypotension) and rescue strategies	Governance and audit
Governance and audit	

Monitoring equipment is not a substitute for skilled staff. When parenteral procedural sedation is taking place one emergency department clinician should be solely responsible for providing and monitoring sedation as well as a trained nurse, whilst another clinician should be responsible for the procedure. The names of the two clinicians should be included on the sedation proforma.

Both medical and nursing staff should have appropriate paediatric competencies in addition to the competencies above. Staff providing PS for paediatric patients should have been observed by a competent senior clinician prior to independent paediatric sedation. The number of observations necessary will depend on the clinician's experience and the complexity of the procedures observed.

See Appendix 7 regarding Emergency Medicine Advanced Clinical Practitioners (EM-ACPs) providing safe sedation in the adult Emergency Department. Simulation training sessions should be used to promote safe and effective procedural sedation in line with local policies. The use of regular simulation training sessions to rehearse both routine PS scenarios in the ED, as well as rarer PS events such as laryngospasm during ketamine sedation is strongly recommended.

3. ENVIRONMENT

The ED is often referred to as VUCA (volatile, uncertain, complex, and ambiguous) environment, frequently compounded by crowding. The decision to undertake PS not only requires an assessment of having the correct number of skilled staff, as well as the appropriateness of the procedure, but also whether the designated sedation area has adequate capacity without compromising whole department safety.

PS should take place in a designated area of the ED e.g., Resuscitation Room or specifically designated procedure room with appropriate equipment (Appendix 6). Patients are often anxious prior to a sedation procedure and an environment that is as calm and controlled as possible will benefit patients.

Paying particular attention to the environment in which a child is sedated (and recovered) is important. Many ED departments have a resus bay that is appropriately kitted out for paediatric emergencies but not dedicated to paediatric patients and not separated physically from other resus bays. Consequently, these bays may not provide an appropriately calm environment for routinely performing paediatric sedation; however, a pragmatic approach is required to balance patient safety against the available resource within the ED.

4. CLINICAL DECISION MAKING

a) Decision to undertake procedural sedation

Alternatives to procedural sedation should be considered e.g., regional anaesthesia. When considering PS in children, multiple strategies (distraction, topical analgesia, intra-nasal analgesia) may need to be employed to avoid the need to sedate.

Procedural sedation should only be embarked upon after the decision has taken into account
i. The urgency of the procedure
ii. Availability of appropriately trained staff for the procedure and overall safety of the ED
iii. Availability of appropriate space and equipment
iv. Patient Assessment (Appendix 8)
v. Patient consent where applicable

b) Timing of the procedure in relation to fasting

It is recognised that in the ED, patients may require emergency or urgent procedures when this is often not possible to delay the procedure. Emergency clinicians should undertake a risk assessment taking into account dynamic risk factors for aspiration e.g., alcohol ingestion, established risk factors e.g., obesity, pregnancy, proposed sedation agent (e.g., ketamine helps preserve airway reflexes; propofol reduces airway reflexes) and the procedure to be performed. There is no clear evidence that non-compliance with elective fasting guidance increases the risk of aspiration or other adverse events during procedural sedation; generally, concerns about aspiration vastly exceed the actual risk [6].

c) Preparing for Procedural Sedation

Effective procedural sedation requires:
Analgesia: Pain experienced by the patient should be treated with analgesia rather than sedation. Pain should be assessed and managed prior to starting sedation using the WHO pain ladder principles and the need for ongoing pain relief post-procedure considered.

Anxiolysis: Non-pharmacological methods of reducing anxiety are often the most effective and include consideration of the environment and patient comfort. Environment is particularly important for children and patients with dementia or learning difficulties. Family members often provide invaluable support and distraction. Most painful procedures are best performed with the patient supine.

Amnesia: A degree of amnesia will minimise unpleasant memories associated with the procedure.

In most circumstances a combination of short acting analgesics and sedatives are required as the only pharmacological agent that has the potential to provide analgesia, sedation, anxiolysis and amnesia is ketamine.

The clinician who will be responsible for providing the procedural sedation should undertake a pre-procedure Safety Brief with the other members of the team (nurse, clinician performing the procedure); ensuring that the safety brief does not cause any undue anxiety to the patient, see box 2.

Box 2. The Safety Brief should include:

- Roles
- Intended plan, including intended depth and length of sedation as well as determining when the procedure can commence.
- Confirmation of correct side of patient (where applicable)
- Confirmation of equipment checks have taken place (eg. suction working)
- Confirmation of location of rescue devices and drugs
- Anticipated problems

d) Non-Sedative drugs

i. Analgesics

Consideration must be given to the type and duration of analgesic given prior to procedural sedation as well as any analgesic which may be needed during the procedure. The synergist effects of some analgesic and sedative combinations e.g., opioids and benzodiazepines must be borne in mind and in particular combinations of short acting opioids and sedation agents which depress airway reflexes (e.g., fentanyl, and propofol). Consider reducing the dose of sedative agents in those patients who have received significant quantities of opiate medication.

Whilst not an analgesic, for certain procedures the use of local anaesthetic as well as analgesic and sedative may be beneficial.

ii. Oxygen

The use of oxygen during procedural sedation is encouraged especially for at risk patient groups (e.g., ischaemic heart disease) and those undergoing deep sedation procedures (increased risk of short periods of apnoea). Oxygen saturation monitoring as well as capnography will be required for the majority of sedation procedures, and both must be used if a decision has been made not to provide oxygen.

iii. Intravenous Fluids

The decision to use intravenous fluids or not is likely to be patient dependent as well as procedural agent specific e.g., running drip prior to commencing propofol sedation.

e) Choice of Procedural Sedation Agent

The appropriate choice of pharmacological agents for PS depends on:

i. The nature of the procedure
ii. The planned level of sedation
iii. Training and familiarity of the sedating practitioner with potential pharmacological agents
iv. Patient factors e.g., cardiovascular stability, fasting status, age
v. The local environment

Pharmacological Agents for Procedural Sedation

There are many variations in the combinations of pharmacological agents described in the literature and many different ways of delivering the pharmacological agents. The most common agents are described along with the routes and doses for which there is most supportive evidence.

Having selected the appropriate drugs for the needs of the patient, doses of the pharmacological agents need to be tailored to the individual patient, as does the speed of administration (titration). Great care should be used when administering sedatives because of:

i. Slow and variable onset time
ii. Inter-patient variability in dose requirement
ii. Synergistic action between drugs

Appendix 9 provides information regarding common pharmacological agents used for PS and Appendices 10 and 11 provide adult and paediatric doses.
There is a paucity of evidence for the superiority of any one agent over another, and similarly there is no evidence that any agent has greater safety. There is some limited evidence of higher procedural success rates for some procedures with easily titratable sedative drugs.

f) Monitoring during AND after procedure

Full monitoring post-procedure should continue (with the same facilities available including staffing) until the patient has regained consciousness. Monitoring should include:

i. 3 lead ECG,
ii. Oxygen saturations,
iii. Continuous capnography,
iv. Non-invasive blood pressure

The clinician performing the PS should remain with the patient until the patient has ‘woken up’. A nurse should remain with the patient until they have regained consciousness and the requirement for additional supportive interventions e.g., oxygen is no longer required.

A senior EP should be responsible for making the decision when a patient's care can be 'stepped down' to another area within the ED e.g., observation ward, paediatric area.

The decision to provide procedural sedation without any one of the above 4 key components needs to be justifiable in terms of patient safety based on the depth of intended sedation, length of sedation and the use of supplemental oxygen.

The reversal agents Flumazenil® and Naloxone® are likely to have a shorter half-life than their respective benzodiazepine or opiate agonist; therefore, patients who have required a reversal agent should be monitored for a longer period post-sedation than those not receiving a reversal agent. The use of a reversal agent is a 'TROOP' recordable 'intervention' and should trigger local review.

Following PS patients should be reviewed by a clinician significantly experienced enough to be able to ensure the effects of sedation have worn off and that the patient is safe to go home. An alternative approach is 'nurse led discharge criteria', an example is shown in Box 3 below. The use of a patient advice leaflet is strongly encouraged (example - Appendix 4). The patient or their carer needs to be clear with regards any follow-up that may be required (e.g., fracture clinic) following the procedure as well as the need for any additional medication (e.g., analgesics).

Box 3. **Example of Minimum Discharge Criteria**

- Vital signs returned to baseline (no additional oxygen requirement)
- Alert & Orientated
- Able to tolerate oral fluids
- Adequate analgesia
- No / minimal nausea
- 2 hours elapsed since use of reversal agent**
- Appropriate care available at home

**Flumazenil, naloxone

5. CONSIDERATIONS IN YOUNGER PATIENTS

Children under the age of 1yr are not normally sedated in the ED. Procedural sedation in the 1-5yr age group in the emergency department needs to involve senior emergency medicine clinical decision makers and be delivered by clinicians with the requisite additional competencies and experience as determined by local governance arrangements.

Paediatric PS can reduce admission rates, reduce length of hospital stay and avoid the need for procedures to be performed in theatre. Procedures for which paediatric sedation is most frequently used in UK ED's generally include suturing of lacerations, manipulation of dislocation and fractures, foreign body removal and imaging (CT) [7]. For many paediatric procedures that require sedation involvement of partner specialities such as plastics, max fax, orthopaedics is warranted to ensure optimum outcome.

Ensuring the child or young person is prepared psychologically for PS is essential. Offer age-appropriate information about the procedure itself, what the child or young person should do, what the healthcare professional will do, the sensations associated with the procedure, how to cope with the procedure.

Offer parents and carers the opportunity to be present if appropriate and offer them advice about their role during the procedure.

When parenteral sedation is used it is recommended that insertion of the cannula is achieved in a departmental location away from the area used for sedation and temporally separated from the sedation process.

Provision of age-appropriate distraction techniques is strongly recommended, for example using a large computer screen / tablet or a parent's mobile phone to play videos. A parent accompanying the child is also strongly recommended, except where the parent is unable to provide calm support. Where available, play specialists are invaluable.

The use of analgesia prior to and during the procedure should always be considered.

The most frequently used sedation agent in the UK for paediatric patients is intravenous ketamine followed by variable concentration nitrous oxide. Sedation given should be the minimum necessary to facilitate the procedure.

a) Ketamine Procedural Sedation and Children

UK EDs have had significant experience in using ketamine sedation in children, initially using the intra-muscular route but latterly intravenously. Whilst the use of IM ketamine is still recognised as a pragmatic option when used by a senior decision maker, clinicians should be mindful of the perceived safety benefits of having intravenous access from the start of the procedure to mitigate a rare adverse event. IM ketamine has a higher risk of emesis and a longer recovery time. IV access also facilitates repeat dosing for longer procedures. Please see separate RCEM guideline on Ketamine Procedural Sedation for Children in EDs. (also contains another example of a sedation proforma and a paediatric patient information leaflet).

6. CONSIDERATIONS IN OLDER PATIENTS

When performing procedural sedation in the elderly patient, due care needs to be exercised in relation to drug choice, dosage and interactions (analgesics, sedatives and patient's regular medications) as well as the need to take into account the often delayed onset time for sedation agents in this group. In general, slower rates of administration and repeated doses at less frequent intervals are recommended e.g., halving the dose of propofol seems both safe and effective [8].

This group of patients are much more likely to have co-morbidities which impact their respiratory and cardiovascular functional reserves and these factors, as well as the patient's regular medications, need to be considered during PS decision making; especially when considering fluid and oxygen supplementation.

It is especially important to undertake an airway assessment which also includes the degree of neck movement, prior to undertaking procedural sedation. The need for a prolonged recovery time in a suitable area should also be anticipated.

The incidence of SIVA sentinel adverse events[1] in this high-risk group (over 75yr of age) has been reported as 2.6% (0.5% hypoxia rate), with no adverse outcomes (77% receiving propofol) whilst the SIVA sentinel adverse event rate for those aged 15-97 years of age undergoing sedation with propofol has been reported as 1.1% [9,8]. Decision making regarding undertaking procedural sedation in this older age group should carefully balance the risk of sedation (or other options) versus the impact on the patient's quality of life and the prevention of significant rapid functional decline if procedure not carried out.

7. CONSIDERATIONS IN PREGNANT PATIENTS

Procedural sedation in pregnant patients especially in the second and third trimester should be considered to be high risk and requires the early involvement of a senior clinical decision maker.

Considerations include positioning, oxygenation, foetal monitoring, and pre-procedural medication. In late second and third trimester, placing the patient on their left side will reduce the risk of hypotension and foetal hypoxaemia (left lateral displacement of the uterus may be an alternative manoeuvre). Oxygenation should be provided. Pre-procedural administration of antacid and anti-emetic such as metoclopramide should be considered.

Note:
1. SIVA sentinel adverse events are slightly different to TROOPS sentinel events and include; Oxygen desaturation, severe or prolonged (defined as any oxygen saturation <75% or an oxygen saturation <90% for >60 s), apnoea, prolonged (defined as cessation of respirations for >60 s); cardiovascular collapse/shock (defined as clinical evidence of inadequate perfusion); or cardiac arrest (defined as an absent pulse) and atropine to treat bradycardia; as well as the TROOPS sentinel events [2].

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Acknowledgements

RCEM Quality in Emergency Care Committee

Review

Further review usually within three years or sooner if important information becomes available.

Declaration of Interest

None

Disclaimers

The College recognises that patients, their situations, Emergency Departments and staff all vary. This guideline cannot cover all possible scenarios. The ultimate responsibility for the interpretation and application of this guideline, the use of current information and a patient's overall care and wellbeing resides with the treating clinician.

Research Recommendations

None

Audit standards

Use of a sedation proforma 100%
Consent written or verbal 100%
Adverse event monitoring 100%
Use of reversal Agents 100%
Evidence of pre-procedure assessment 100%
Measurement of patient's pain or satisfaction post procedure 50%
Departmental Sedation Lead and evidence of individual clinician's competencies

Key words for search

Procedural Sedation, Sedation, Ketamine sedation, Dissociative sedation, Safe sedation, Propofol sedation, Paediatric sedation, Adult sedation, Conscious sedation

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Appendix 1

[10]

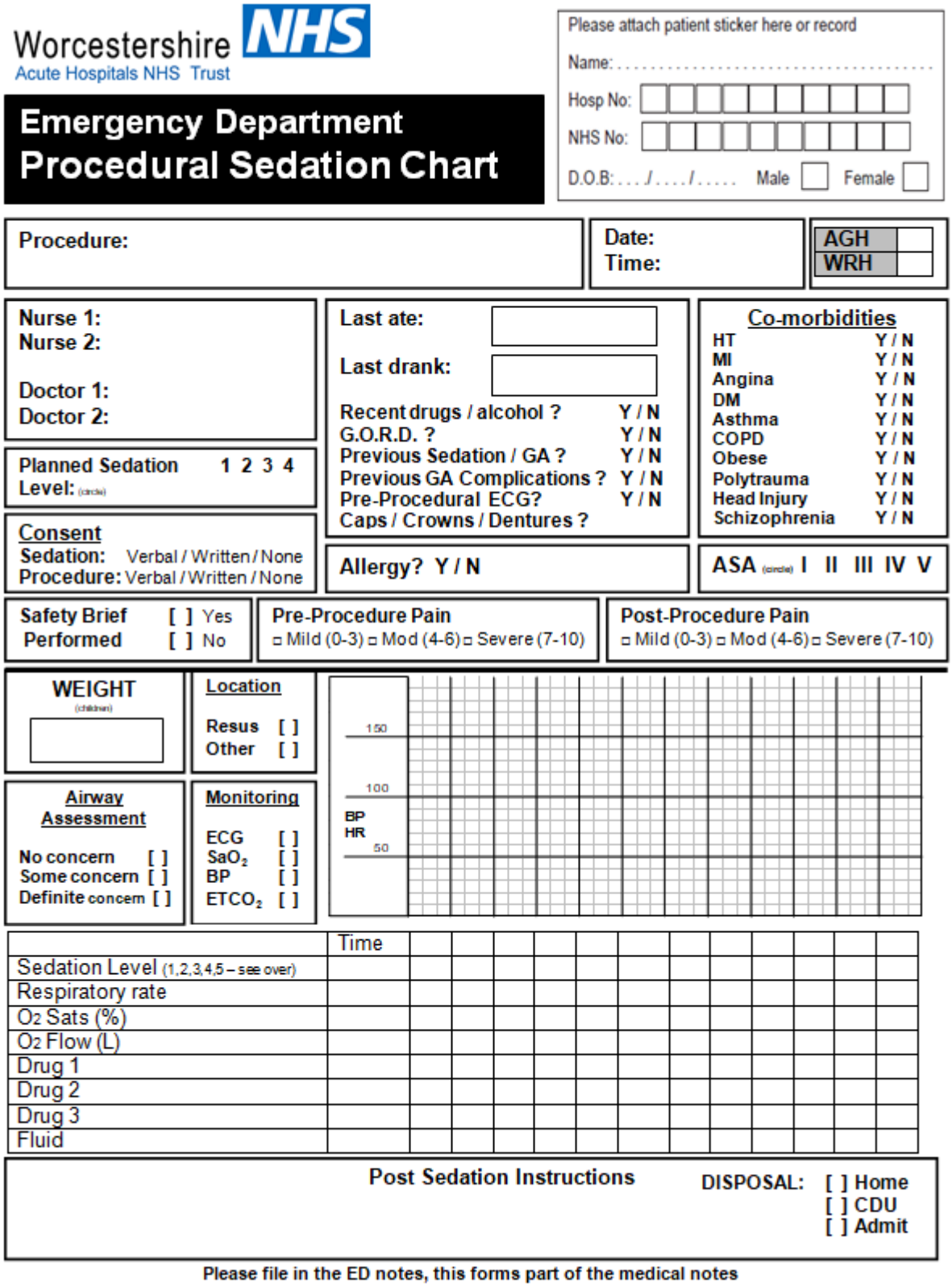
	Minimal Sedation Anxiolysis	Moderate Sedation/ Analgesia "Conscious Sedation"	Deep Sedation/ Analgesia	General Anesthesia
Description	is a drug-induced state during which patients respond normally to verbal commands. Although cognitive function and physical coordination may be impaired, airway reflexes, and ventilatory and cardiovascular functions are unaffected.	is a drug-induced depression of consciousness during which patients respond purposefully (not reflex withdrawal) to verbal commands, either alone or accompanied by light tactile stimulation.	is a drug-induced depression of consciousness during which patients cannot be easily aroused but respond purposefully (not reflex withdrawal) following repeated or painful stimulation.	is a drug-induced loss of consciousness during which patients are not arousable, even by painful stimulation.
Airway	Unaffected	No intervention required	Intervention may be required	Intervention often required
Spontaneous Ventilation	Unaffected	Adequate	May be inadequate	Frequently inadequate
Cardiovascular Function	Unaffected	Usually maintained	Usually maintained	May be impaired

Dissociative Sedation

Ketamine is a unique drug in sedation practice because it causes a dissociative state that does not fit the standard definitions of sedation listed above. Dissociative sedation is defined as 'a trance like cataleptic state characterized by profound analgesia and amnesia, with retention of protective airway reflexes, spontaneous respirations, and cardiopulmonary stability.'

Appendix 2

Example of a Procedural Sedation and Analgesia (PSA) Checklist and Monitoring Proforma



Worcestershire NHS
Acute Hospitals NHS Trust

Emergency Department
Procedural Sedation Chart

Please attach patient sticker here or record
Name: . . . . . .
Hosp No:
NHS No:
D.O.B: . . . / . . . . / . . . . . Male Female

Procedure:

Date:
Time:

AGH
WRH

Nurse 1:
Nurse 2:

Doctor 1:
Doctor 2:

Last ate:

Last drank:

Recent drugs / alcohol ? Y / N
G.O.R.D. ? Y / N
Previous Sedation / GA ? Y / N
Previous GA Complications ? Y / N
Pre-Procedural ECG? Y / N
Caps / Crowns / Dentures ?

Co-morbidities

HT	Y / N
MI	Y / N
Angina	Y / N
DM	Y / N
Asthma	Y / N
COPD	Y / N
Obese	Y / N
Polytrauma	Y / N
Head Injury	Y / N
Schizophrenia	Y / N

Planned Sedation Level: (circle) 1 2 3 4

Consent
Sedation: Verbal / Written / None
Procedure: Verbal / Written / None

Allergy? Y / N

ASA (circle) I II III IV V

Safety Brief Performed [ ] Yes [ ] No

Pre-Procedure Pain
□ Mild (0-3) □ Mod (4-6) □ Severe (7-10)

Post-Procedure Pain
□ Mild (0-3) □ Mod (4-6) □ Severe (7-10)

WEIGHT (children)

Location
Resus [ ]
Other [ ]

Airway Assessment
No concern [ ]
Some concern [ ]
Definite concern [ ]

Monitoring
ECG [ ]
SaO_2 [ ]
BP [ ]
$ETCO_2$ [ ]

150
100
BP
HR
50

	Time												
Sedation Level (1,2,3,4,5 – see over)													
Respiratory rate													
O_2 Sats (%)													
O_2 Flow (L)													
Drug 1													
Drug 2													
Drug 3													
Fluid													

Post Sedation Instructions

DISPOSAL: [ ] Home
[ ] CDU
[ ] Admit

Please file in the ED notes, this forms part of the medical notes

Level of Sedation

1. **Minimal Sedation (anxiolysis):** patient responds normally to verbal commands, cognitive and co-ordination functions may be impaired.
2. **Moderate Sedation & analgesia:** patient responds purposefully to verbal commands or when accompanied by light touch
3. **Deep Sedation & analgesia:** patient cannot easily be roused but responds purposefully to noxious stimulation. Assistance may be required to ensure airway is protected and adequate ventilation maintained. Cardiovascular function remains stable.
4. **Dissociative Sedation:** trance-like cataleptic state associated with retention of airway reflexes, ventilator function, CVS stability and amnesia
5. **General Anaesthesia:** patient cannot be roused and often requires assistance to protect the airway and maintain ventilation. Maybe CVS ↑↓

ASA Physical Status Classification System

I. A normal healthy patient.
II. A patient with mild systemic disease.
III. A patient with severe systemic disease.
IV. A patient with severe systemic disease that is a constant threat to life.
V. A moribund patient who is not expected to survive without the procedure.

Adverse Event Reporting

Any Adverse Event(s) during the procedure or recovery?

NO [ ] - AE Report now complete

YES [ ] - Unplanned, interventions or outcomes occurred . Complete Box 1 & 2 below.
- Complete a DATIX for any Sentinel Events

For definitions see www.TROOPS-sedation.com or 10.1016/j.bja.2017.08.004

Box 1. Intermediate	Sentinel
▫ Positive Pressure Ventilation ▫ Naloxone or Flumazenil ▫ Oral Airway	▫ Tracheal intubation ▫ Neuromuscular blockade ▫ Pulmonary aspiration
▫ Bolus IV Fluid	▫ Chest compressions ▫ Vasoactive drug administration ▫ Death
▫ Anticonvulsant administration	▫ Neurological deficit
▫ Sedation insufficient ▫ Escalation of care or delayed d/c ▫ Provider dissatisfied ▫ Patient or family dissatisfied	
▫ Other (state)	

Box 2. Suspected Etiology

▫ Apnoea	▫ Seizure or seizure-like movements
▫ Respiratory depression	▫ Patient active resistance or need for restraint
▫ Upper airway obstruction	▫ Sedation complication
▫ Laryngospasm	▫ Paradoxical response
▫ Hypotension	▫ Unpleasant recovery reaction / agitation
▫ Bradycardia	▫ Unpleasant recall
▫ Cardiac Arrest	▫ Other

AIRWAY ASSESSMENT

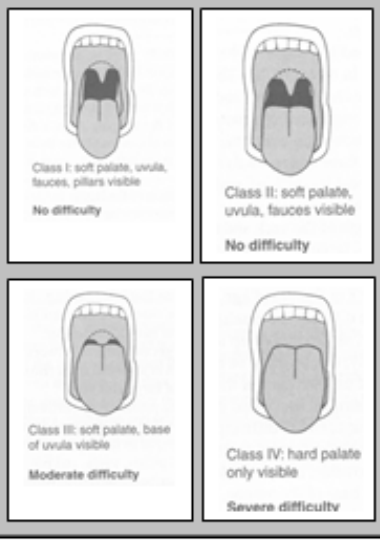
Look
eg.Obesity, short neck, beard, trauma, cachexia – BMV could be a problem

Evaluate
3 MOUTH OPENING
3 Chin to hyoid
2 Floor of mouth to thyroid cartilage

Mallampati
see below

Obstruction
eg. peritonsillar abscess, haematoma, tumours

Neck Mobility
eg. arthirits, ankylosing spondylitis, trauma, elderly



Minimum Discharge Criteria

(all boxes must be ticked for safe discharge. *naloxone, flumazenil (Anexate®))

Observations stable		Alert & Orientated		Appropriate care available at home	
Able to tolerate oral fluids		Able to pass urine		2 hrs elapsed since use of a reversal agent*	
No / minimal nausea		Adequate analgesia		**Written discharge advice given**	

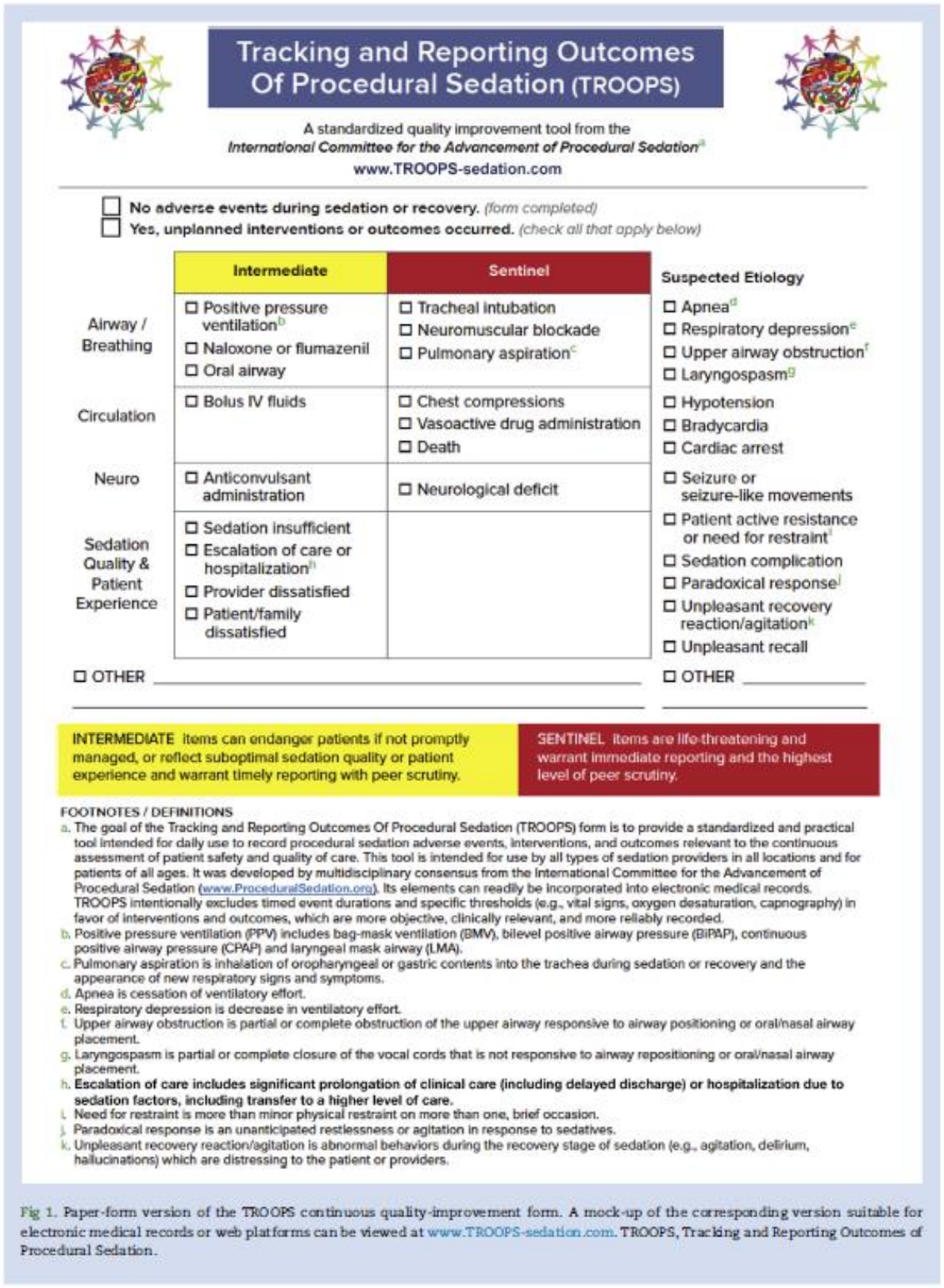
To be completed by healthcare professional responsible for assessing & completing discharge

Patient Satisfaction (Scale 1-10) ☐

Name (print) **Date & time**

Signature **Designation**

Appendix 3 – Tracking and Reporting Outcomes of Procedural Sedation (TROOPS) Quality Improvement Tool [11]



Tracking and Reporting Outcomes Of Procedural Sedation (TROOPS)

A standardized quality improvement tool from the
International Committee for the Advancement of Procedural Sedation[a]
www.TROOPS-sedation.com

☐ **No adverse events during sedation or recovery.** *(form completed)*
☐ **Yes, unplanned interventions or outcomes occurred.** *(check all that apply below)*

	Intermediate	Sentinel	Suspected Etiology
Airway / Breathing	☐ Positive pressure ventilation[b] ☐ Naloxone or flumazenil ☐ Oral airway	☐ Tracheal intubation ☐ Neuromuscular blockade ☐ Pulmonary aspiration[c]	☐ Apnea[d] ☐ Respiratory depression[e] ☐ Upper airway obstruction[f] ☐ Laryngospasm[g]
Circulation	☐ Bolus IV fluids	☐ Chest compressions ☐ Vasoactive drug administration ☐ Death	☐ Hypotension ☐ Bradycardia ☐ Cardiac arrest
Neuro	☐ Anticonvulsant administration	☐ Neurological deficit	☐ Seizure or seizure-like movements
Sedation Quality & Patient Experience	☐ Sedation insufficient ☐ Escalation of care or hospitalization[h] ☐ Provider dissatisfied ☐ Patient/family dissatisfied		☐ Patient active resistance or need for restraint[i] ☐ Sedation complication ☐ Paradoxical response[j] ☐ Unpleasant recovery reaction/agitation[k] ☐ Unpleasant recall
☐ OTHER _____			☐ OTHER _____

INTERMEDIATE items can endanger patients if not promptly managed, or reflect suboptimal sedation quality or patient experience and warrant timely reporting with peer scrutiny.

SENTINEL items are life-threatening and warrant immediate reporting and the highest level of peer scrutiny.

FOOTNOTES / DEFINITIONS

a. The goal of the Tracking and Reporting Outcomes Of Procedural Sedation (TROOPS) form is to provide a standardized and practical tool intended for daily use to record procedural sedation adverse events, interventions, and outcomes relevant to the continuous assessment of patient safety and quality of care. This tool is intended for use by all types of sedation providers in all locations and for patients of all ages. It was developed by multidisciplinary consensus from the International Committee for the Advancement of Procedural Sedation (www.ProceduralSedation.org). Its elements can readily be incorporated into electronic medical records. TROOPS intentionally excludes timed event durations and specific thresholds (e.g., vital signs, oxygen desaturation, capnography) in favor of interventions and outcomes, which are more objective, clinically relevant, and more reliably recorded.
b. Positive pressure ventilation (PPV) includes bag-mask ventilation (BMV), bilevel positive airway pressure (BiPAP), continuous positive airway pressure (CPAP) and laryngeal mask airway (LMA).
c. Pulmonary aspiration is inhalation of oropharyngeal or gastric contents into the trachea during sedation or recovery and the appearance of new respiratory signs and symptoms.
d. Apnea is cessation of ventilatory effort.
e. Respiratory depression is decrease in ventilatory effort.
f. Upper airway obstruction is partial or complete obstruction of the upper airway responsive to airway positioning or oral/nasal airway placement.
g. Laryngospasm is partial or complete closure of the vocal cords that is not responsive to airway repositioning or oral/nasal airway placement.
h. **Escalation of care includes significant prolongation of clinical care (including delayed discharge) or hospitalization due to sedation factors, including transfer to a higher level of care.**
i. Need for restraint is more than minor physical restraint on more than one, brief occasion.
j. Paradoxical response is an unanticipated restlessness or agitation in response to sedatives.
k. Unpleasant recovery reaction/agitation is abnormal behaviors during the recovery stage of sedation (e.g., agitation, delirium, hallucinations) which are distressing to the patient or providers.

Fig 1. Paper-form version of the TROOPS continuous quality-improvement form. A mock-up of the corresponding version suitable for electronic medical records or web platforms can be viewed at www.TROOPS-sedation.com. TROOPS, Tracking and Reporting Outcomes of Procedural Sedation.

Appendix 4 - Example of a Patient Information Leaflet

Patient Advice Leaflet

Sedation

Worcestershire Acute Hospitals NHS Trust

It is hoped that this leaflet will help you understand a little more about sedation. If you have any further questions, please do not hesitate to ask a member of the nursing or medical staff. They will be happy to help you.

What is sedation?

Sedation is the use of small amounts of anaesthetic or similar drug to produce a 'sleepy-like' state. It makes you physically and mentally relaxed during a procedure (eg. putting a dislocated shoulder back into joint) which may be unpleasant or painful but where your cooperation is needed. You may remember a little about what happened but often you will remember nothing.

What should I expect to happen whilst I am being sedated ?

You will be given an injection in the back of your hand or arm which will make you feel sleepy and relaxed. It will also reduce any anxiety you have about your treatment. You will not be asleep in the sense of a general anaesthetic. You should not feel any pain during the procedure.

What happens during the procedure ?

A nurse and doctor will stay with you to check your level of drowsiness and your vital signs (pulse, blood pressure and respiration). Your oxygen level will be checked continuously with a device that clips onto your finger or ear. Your heart will be monitored by 3 leads which will be attached to the front of your chest. You will feel very relaxed and may even begin to sleep but you will awaken easily and be able to talk with the doctor and nurse. You will not loose control and "say the wrong thing".

What are the risks of sedation ?

After the procedure you may feel very sleepy for several hours.
People respond differently to sedation. Your breathing may become very slow. Your doctor or nurse may give you oxygen to help you breath.
Your blood pressure may become lower. If this occurs you may be given intravenous fluids ("put on a drip") for a short time.
Some people can feel sick (nausea) due to the drugs used in sedation.

What happens after the procedure ?

You will be closely watched by a nurse until you have recovered from the effects of the sedative drugs. Your oxygen level will be measured with the device attached to your finger or ear. As you recover a nurse will closely monitor your vital signs at regular intervals.

Appendix 4 continued

Will I be in pain after the procedure ?

You may have some discomfort. The doctor / nurse looking after you will be able to give you pain relief medication (analgesics). A supply of analgesics will be given to you to take home if necessary.

Will I be able to go home after the procedure ?

The doctor or nurse looking after you will be able to tell you this. It may be that only after the procedure has been performed that the doctor will be able to answer this question.

How soon will I be able to go home ?

This depends on several things:

- You must be awake, alert and know where you are.
- Your blood pressure, pulse and breathing must be back to normal.
- You must be able to drink (water, coffee, tea) without being sick.

How long will the effects of the sedation last?

You will recover quickly from the main effects of the sedation after only a few hours. People often feel "more tired" than usual and have slower "reactions" for up to 48 hours after the sedation.

Are there any special precautions I should take following the procedure ?

- You should not drive or operate heavy machinery for 48 hours.
- You must be accompanied home by a responsible person.
- You must have a responsible person to care for you for 24 hours after the procedure.
- You must not drink alcohol for 24 hours.
- You must not be alone in charge of a baby or young child for the first 24 hours after the procedure.
- You must not make any important decisions or sign any documents for 24 hours.
- You should take things easily and avoid strenuous exercise eg. do not lift children, vacuum carpets or carry heavy shopping.
- You should drink plenty of non-alcoholic fluids and eat alight diet, avoiding any heavy or greasy food for 24 hours.

What to do if you have any problems.

If you need advice, please contact:

Observation Ward: 01905 733453
Emergency Department: 01905 733065

Appendix 5

[12]

Emergency Airway Management:
A joint position statement from the Royal College of Emergency Medicine and the Royal College of Anaesthetists, 2015.

Building on the report of the 4th National Audit Project of the Royal College of Anaesthetists and the Difficult Airway Society on major airway complications (2011), which made several recommendations, the Royal College of Emergency Medicine and the Royal College of Anaesthetists recommend the following:

ENVIRONMENT

In the Emergency Department (ED) patients with airway emergencies are initially managed in the resuscitation room.

Waveform capnography is always used
(i) during intubation
(ii) in patients who remain intubated
(iii) during transfer of intubated patients.

Rescue airway devices are immediately available and standardised within the hospital.

All equipment is properly maintained and serviced regularly.

PERSONNEL

EDs should at all times have immediate availability of staff trained and skilled in rapid sequence induction and tracheal intubation and assistants skilled in assistance of such.

PROCESS

A checklist is used before intubation in the ED. This should identify appropriate preparation of the patient, the correct range of equipment and drugs, suitable team members for each role and plans for management of failure and complications.

CLINICAL GOVERNANCE

Designated leads from the ED and the Department of Anaesthesia/Intensive care should agree plans for the management of all common and predictable airway emergencies.

ED and the Department of Anaesthesia/Intensive Care should have formal processes to enable interdepartmental training, case discussion and quality improvement. Annual meetings should be a minimum.

TRAINING AND SKILLS MAINTENANCE

The formal induction of all anaesthetists who may attend the ED resuscitation room should include an inspection of its facilities.

Opportunities for the maintenance of rapid sequence induction and tracheal intubation skills by emergency physicians should be provided within each acute hospital.

Appendix 6

[5]

Equipment required for Designate Procedural Sedation Room

- Full resuscitation equipment for the administration of basic and advanced life support (including airway adjuncts, and equipment for intubation – ETT, laryngoscope, bougie etc.). Equipment should be cheked daily, and after each use. Auitable record of checks should be kept.
- Continuous high flow oxygen and appropriate devices for administration (eg. non-rebreath oxygen masks, bag-valve-mask)
- High pressure suction and appropriate suction catheters
- Trolley capable of beng tiped head down
- Monitoring: pulse oximetery, ECG, NIBP, continuous quantitative capnography
- Apprpriate range of intrvenous cannulae
- Appropriate range of intravenous fluid and infusion devices
- Difficult airway equpment
- Manual handling devices
- Clock / event timer
- Ability to summon help immediately if required

Emergency Drug List (not exhaustive)

- Adrenaline
- Atropine
- Dextrose 10% or 20%
- Amiodarone
- Naloxone
- Flumazenil
- Drugs for emergency intubation

Appendix 7

[13]

Abbreviated RCEM Position Statement EM-ACPs and PS

The Royal College of Emergency Medicine

Patron: HRH Princess Royal
7-9 Bream's Buildings
London
EC4A 1DT

Tel +44 (0)20 7404 1999
Fax +44 (0)20 7067 1267
www.rcem.ac.uk

Position Statement

Emergency Medicine Advanced Clinical Practitioners (EM-ACPs) providing safe sedation in the adult Emergency Department.

30 November 2020

Scope

This document explains the reasoning behind EM-ACPs being supported to provide safe sedation of **adult** patients within Emergency Departments (EDs), including regarding how to develop and maintain safe sedation practice by their EM-ACP workforce.

Recommendations for EM-ACPs

- Should have emergency airway skills up to but not including drug assisted intubation
- Must have completed the Advanced Life Support (ALS) course or equivalent
- Must have attended an approved educational programme on safe sedation
- Must comply with local guidance and policies with respect to PSA
- Must complete a log book of all sedations performed including adverse events and outcomes
- Must undergo a yearly assessment / WPBA on airway management skills

Recommendations for Organisations / EDs

- Local guidelines for PSA (including non-medical practitioners) should be developed, approved and implemented, which identifies competencies rather than profession
- All sedation (including that undertaken by ACP workforce) must be regularly audited, results presented at local governance meetings, and quality improvement action undertaken if needed
- Safe sedation training and competency sign off by Consultant should be in-situ for the EM-ACP
- Ensure a Consultant or Tier 4 practitioner must be immediately available when EM-ACP providing sedation

Appendix 8

Examples Pre-Procedural Sedation Assessment

Any isues with previous sedation procedures / general anaesthesia ?
Allergies, medication, past medical history, last ate & drank, recent alcohol or drugs, pregnant.

Assessment to include looking for any issues which may lead to airway obstruction, difficulties manipulating the airway or problems ventilating. There are various acronyms which may be helpful eg. LEMON, BOOTs as well as formal grading systems eg. Mallampati

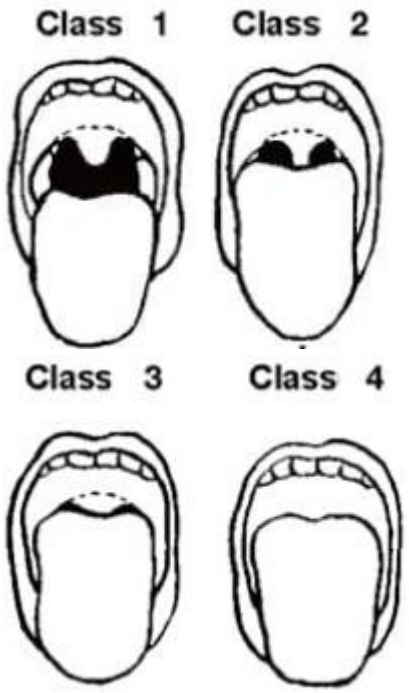
Look
eg.Obesity, short neck, beard, trauma, cachexia – BMV could be a problem

Evaluate
3 MOUTH OPENING
3 Chin to hyoid
2 Floor of mouth to thyroid cartilage

Mallampati
see below

Obstruction
eg. peritonsillar abscess, haematoma, tumours

Neck Mobility
eg. arthirits, ankylosing spondylitis, trauma, elderly



Risk of aspiration and hypotension should also be considered.

Using the ASA physical status classification is a useful risk assessment tool, with senior involvement in those cases ASA III and above, if procedural sedation canot be deferred.

American Society of Anaesthesiologists Physical Status (ASA PS) Classification System

ASA I	Normal health
ASA II	Mild systemic disease
ASA III	Severe systemic disease
ASA IV	Severe systemic disease that is a constant threat to life
ASA V	Moribund, not expected to survive without operation

Appendix 9

Commonly used pharmacological agents for Procedural Sedation

Propofol:

Properties: Phenol derivative, highly lipophilic, crosses blood brain barrier rapidly. Action thought to be through positive modulation of GABA inhibitory neurotransmission. Used widely for induction and maintenance of anaesthesia.

Uses: Sedation and amnesia.

Administration: Much smaller doses are required for sedation than for general anaesthesia, with initial doses as low as 10 mg in the elderly or those with significant co-morbidities although the initial action may be seen within 30 s, the peak effect may take 2 min or more, particularly in the elderly. An alternative technique is to use a computer-controlled infusion, which estimates the administration profile required for a target plasma concentration, normally 0.5-1.5 μg/ml for sedation.

Children: Propofol is not licensed for use in sedation in children, however the NICE Guideline Development Group recommend off-license use of propofol for sedation in children

Side effects: Hypotension, respiratory depression, pain at site of injection
Allergens: soya and egg lecithin in formulation

Midazolam:

Properties: Short-acting benzodiazepine metabolised in the liver commonly used for sedation, it is also a powerful amnesic.

Uses: Sedation and amnesia

Administration: Can be administered orally, buccally, or as an IV infusion.

Children: Midazolam is not licensed for use in children under 6 months or for sedation either via the oral or buccal route in children. There is no UK marketing authority currently for oral or intranasal midazolam use in sedation.

Side effects: respiratory depression, hypotension, paradoxical disinhibition and agitation at low doses in children. Accumulates in adipose tissue, which can significantly prolong sedation. The elderly, obese and patients with hepatic or renal disease are at risk of prolonged sedation.

Ketamine:

Properties: Phencyclidine derivative that produces a dissociative state and profound analgesia with superficial sleep. Ketamine does not display a dose-response continuum as seen with other analgesic and sedative agents. There is a threshold dose for dissociation after which additional doses are required only to maintain the dissociative state. Sub-dissociative doses provide analgesia with disorientation rather than dissociation. The big advantage of ketamine is that airway reflexes are maintained and that it does not cause hypotension.

Uses:
1. dissociative state, amnesia, and analgesia
2. analgesia

Administration: Can be administered as a slow IV bolus titrated to effect or intramuscularly.

Side effects: tachycardia, hypertension, laryngospasm, unpleasant hallucinations (reduced by pre-medication with a benzodiazepine), nausea and vomiting, hyper-salivation, increased intracranial and intraocular pressure.

Contraindications: Absolute contraindications: age less than 3 months, known or suspected schizophrenia. Relative contraindications: age less than 1 year, active pulmonary disease or infection, known or suspected cardiovascular disease (including angina, hypertension and heart failure), CNS masses, abnormalities or hydrocephalus, globe injury or glaucoma.

Co-administered pharmacological agents
1. Prophylactic anticholinergics have been used in the past to reduce hyper-salivation; however, there is no support in the literature to any benefit of prophylactic co-administration.
2. Benzodiazepines (primarily midazolam) have been recommended in the past to minimize recovery reactions. The literature is not supportive of prophylactic use of midazolam in children but there may be benefit in adults (single controlled study). Benzodiazepines can be used, when required to treat unpleasant reactions if they occur.
3. Anti-emetics are not considered mandatory, a trial using ondansetron showed a significant decrease in emesis (8%) in children; however, this evidence was not considered strong enough to mandate the use of anti-emetics.

Ketofol:
Properties: Combination of ketamine and propofol used at a 1:1 ratio in the same syringe in the belief that the lower doses reduce side-effects (hypotension and vomiting and emergence phenomena respectively) of the agents and that the agents act synergistically.

Uses: sedation, amnesia and analgesia.

Administration: 1:1 mixture in the same syringe.
Side effects: as for propofol and ketamine

Fentanyl:
Properties: A synthetic opioid with 72-125x potency of morphine. Rapid onset (2-3 minutes) duration of effect 30-60mins.

Uses: analgesia and sedation

Administration: Best given a few minutes before sedation to maximise analgesic effect. Doses of no more than 0.5 mcg/kg with other sedation agents.

Side effects: Respiratory depression potentiated by sedatives (e.g. propofol). Patients with renal or hepatic disease and the elderly may experience more profound or prolonged effects.

REVERSAL AGENTS

Flumazenil:

Properties: Competitive antagonist at central benzodiazrpeine receptors

Use: Reversal of respiratory depression following benzodiazepine use.

Administration: 100-200mcg over 15 seconds, every minute. Maximum dose 1mg (adults), acts 30-60 seconds.

Side Effects: Use with caution in those on long tem benzo diazepines. Hypertension, dysrhythmias and vomiting.

Naloxone:

Properties: Competitive antagonist at opiate receptors

Use: Reversal respiratory depression secondary to opioid administration

Administration: Adults:100-200mcg every 1-2 minutes; Children 11month-11yrs 1-10mcg/kg (max 200mcg per dose, total max dose 2mg); children 12-17yrs 100-200mcg every 1-2 minutes (max dos 2mg). Acts within 2 minutes and lasts approximately 20 minutes. Titrate to reverse respiratory depression without reversing analgesia.

Side Effects: Precipitation of withdrawal in chronic opiate use. Arrhythmias, nausea vomitng.

Appendix 10

Adult: Pharmacological Agents for Procedural Sedation

Agent (references)	Role	Route	Initial dose - Adult	Repeat dose	Initial dose - Adult	Repeat dose	Initial onset time (min)	Peak effect time (min)
			Elderly	Elderly	Adult	Adult		
Propofol	Sedation/Amnesia	IV	10 - 20 mg (given slowly)	10 - 20 mg (given slowly)	0.5– 1.0 mg/ kg	0.5mg/kg every 3-5mins	½ - 1	1 - 2
Midazolam	Sedation/Amnesia	IV (over 1-2mins)	0.5mg	0.5mg	1 - 2 mg (max single dose 2.5mg)	After 2-5mins	1 - 2	3 - 4
Ketamine	Sedation/Amnesia/Analgesia	IV (give over 30-60secs)	10 - 30 mg		1 mg/kg	0.25-0.5mg/kg every 5-10 mins	½ - 1	1 - 2
Ketamine	Sedation/Amnesia/Analgesia	IM			4-5 mg/kg	2 – 2.5 mg/kg every 5-10 mins	½ - 1	1 - 2
Ketamine	Analgesia (sub-dissociative)	IV			0.3mg/kg		½ - 1	1 - 2
Fentanyl	Analgesia with other sedatives	IV			Up to 0.5µg/kg	Up to 0.5µg/kg every 2 mins	1 - 2	3 - 5
Fentanyl	Sedation/Analgesia	IV			Up to 0.5 to 1µg/kg	0.5 - 1.0µg/kg every 2 mins	1 - 2	3 - 5
Ketofol (ketamine and propofol)	Sedation/Amnesia/Analgesia	IV			0.5mg/kg-0.75mg/kg of both agents		½ - 1	1-2

Appendix 11

Paediatric: Pharmacological Agents for Procedural Sedation

Agent (reference)	Role	Route	Age	Initial dose - Paediatric	Maximum dose	Repeat dose	Maximum dose	Initial onset time (min)	Peak effect time (min)
Propofol	Sedation/ Amnesia	IV	6months – 2 years	1mg/kg-2mg/kg*		0.5mg/kg every 3-5mins*	3mg/kg*	½ - 1	1 - 2
			> 2 years	0.5 – 1.0 mg/kg*					
Midazolam	Sedation/ Amnesia	IV	6months - 5yrs	0.025-0.05mg/kg **	2mg (single dose)	Up to 0.2mg/kg after 2-5 mins	Total 6mg	1 - 2	3 - 4
			6 – 12yrs	0.025-0.05mg/kg	2mg (single dose)	0.1mg/kg	Total 10mg		
IM Ketamine	Sedation/ Amnesia/ Analgesia	IM	> 3months only	4-5mg/kg (many authorities/guidelines suggest 2-2.5mg/kg)		Half of first dose: 2-2.5mg/kg (1mg/kg if using lower dose). IM after 5-10mins		½ - 1	1 - 2
IV Ketamine	Sedation/ Amnesia/ Analgesia	IV (over 30-60secs)	> 3months only	1.0mg/kg***		0.5 mg/kg IV after 5-10mins		½ - 1	1 - 2
Ketofol (ketamine and propofol)	Sedation/ Amnesia/ Analgesia	IV	> 6months only	0.5mg/kg propofol and ketamine				½ - 1	1-2

*reduce dose significantly in patients who are debilitated or have decreased cardiac function
** This is BNF dosing regime, many sources suggest higher dose range of 0.05-0.1mg/kg required
*** See RCEM Ketamine Procedural Sedation for Children in EDs (Feb 2020)