Guidelines
London Deanery Procedural Sedation and Analgesia (PSAA) of adult patients in the Emergency Department

Introduction:
Procedural sedation and analgesia (formerly referred to as Conscious Sedation) can be a very valuable tool in the armamentarium of the physician practicing in the emergency setting. It is a well established and a safe practice in the Emergency Department which benefits patients by reducing pain and reducing the time to procedure. It also benefits hospitals by reducing admissions. PSAA relieves anxiety, reduces pain, facilitates a procedure and provides amnesia.

Reason for development:
To standardise and improve patient care.

Scope:
Adult patients requiring PSAA in the Emergency Department.

Aim
This guideline is to help the Emergency Department clinicians safely deal with adults who need procedures requiring sedation in the emergency department.

Definition
PSAA may be administered during therapeutic, diagnostic or surgical procedures. The drugs, dosages and techniques utilized for PSAA are not intended to produce loss of consciousness. Sedation can produce a continuum of states, ranging from minimal sedation (Anxiolysis) through to general anaesthesia. This guideline relates to procedural sedation including conscious, moderate and deep sedation during which the patient retains protective airway reflexes and breaths spontaneously.

Level 1: Conscious or Minimal sedation *(The level of sedation must be such that the patient remains conscious, retains protective reflexes, and is able to respond to verbal commands)* It can be achieved with nitrous oxide or by the judicious usage of small aliquots of Opiate and anxiolytic does of Midazolam where no depression of consciousness is desired.

Level 2: Moderate sedation with intact airway reflexes and no or minimal cardiovascular or respiratory depression *(A drug-induced state, during which no interventions are required to maintain a patent airway, and spontaneous ventilation is adequate. Cardiovascular function is usually maintained.)*
This can be safely achieved by a single agent like Ketamine.

Level 3: Deep sedation (*A drug-induced depression of consciousness during which patients: 1. cannot be easily aroused 2. respond purposefully to repeated or painful stimulation. 3. Respiratory effort may be impaired. Patients may require assistance to maintain an open airway. Spontaneous ventilation may be inadequate. Cardiovascular function is usually maintained).* This is usually achieved by a combination of an Opiate and Propofol, Midazolam or more rarely Etomidate.

It is the responsibility of each department to define the level of sedation practice they can provide safely.

Safety Principles

✓ Personnel and Preparation

The recommended minimum number of personnel involved in the care of patients undergoing PSAA during the **entire** procedure should be two:
(1= Interventionist) the physician who performs the diagnostic, therapeutic or surgical procedure; and
(2=Sedation Practitioner) the individual who administer the drugs, monitors the patient and his/her response to both the sedation and the procedure and who is capable of assisting with any supportive or resuscitative measures.
One of these two personnel must be available to the patient from the time the procedure has been completed until the time the patient has adequately recovered or has been turned over to personnel performing recovery care.
Clinicians who perform PSAA should be competent in airway management and resuscitation measures (i.e., BLS, ALS). They also should be educated regarding and demonstrate knowledge in the use, side effects and complications of the medication to be given.

✓ Responsibilities

The Doctor is responsible for

1. History and physical examination. This is to include:
   review of systems specific to cardiopulmonary disease and current medications, a history of any adverse or allergic drug reactions with anaesthesia or sedation and indications for the procedure
2. Obtaining informed consent after discussing with the patient, family or legal guardian, in understandable terms, the name, nature and details of the proposed procedure, indications for the procedure, potential risks and benefits
3. Risk Assessment
4. ASA Classification
5. Airway Assessment
6. A re-evaluation of the patient just prior to planned sedation
7. Knowledge of agents to be used including indications and recommended dosage of the sedative/analgesics and antagonists
8. Selection of the appropriate agent(s) and dosage(s) as determined by the patient's age, weight, concurrent medications and clinical status
9. Establishing and maintaining IV access until Discharge Criteria met
10. The physician or his/her designee is responsible for discharging the patient from the treatment/recovery area or approving the use of pre-defined discharge criteria

The Nursing Staff is responsible for:

1. Nursing staff, in collaboration with the physician and other staff, ensure that appropriate equipment is available and in good working order
2. Documenting baseline patient assessment to include Vital Signs (heart rate, blood pressure, respiratory rate, oxygen saturation), ECG rhythm, allergy statue, pregnancy status
3. Document last time food or fluids intake occurred.
4. Intra-procedure and post-procedure monitoring and documentation of patient parameters until discharge criteria are met
5. Providing post-procedure instructions to the patient and/or accompanying adult

✓ Patient selection

- Patients who are ASA I, II and rarely selected ASA III can be sedated in the ED. However patients with life threatening arrhythmias will require sedation for Cardioversion and the time dependency of these conditions overrides this
- ASA III or IV patient should be referred for a procedure in theatre unless they present with life/limb threatening conditions
- There is debate over the time for pre-procedural starvation and the decision rests on the urgency of the procedure and the nature of the patient's gastric contents. By convention, the deeper the sedation the more prolonged the period of fasting. This can be 4-6h for none urgent procedures. In dentistry where conscious sedation use is widespread patients have no period of starvation prior to planned procedure
- A full anaesthetic history should be taken and recorded – including previous GAs, known airway problems, dentition, medications and allergies, recreational drug use, medical history and fasting status

✓ Location

- **Level 2 and 3 Procedural sedation should take place in the Resuscitation room or in a dedicated Sedation room/cubicle.**
- **Selected Level 1 sedation may take place in alternative areas of the department.**

✓ Equipment

- Tilting Trolley,
- Source and means for providing supplemental oxygen,
- Source of suction,
- Pulse oximeter with alarm,
- A device for monitoring blood pressure,
- Crash Trolley should be immediately accessible

✓ Monitoring

All patients who require sedation will alter their consciousness and must be on full continuous monitoring:

- Cardiac monitor with alarm (Level 2,3),
- End tidal CO2 Monitor (Level 2,3)
- NIBP every 5 min (Level 2,3)
- SpO2,
- ECG.

✓ Medication

- **Intravenous Analgesic/Sedative drugs should be given slowly – over 30 – 60 seconds and in small, incremental doses that are titrated to the desired end-point of analgesia and sedation**
- **It is best to regard procedural sedation as a 2 step process - analgesia then sedation**
- **Most importantly the team should choose an agent with which they are familiar**
- **Choice of agent:**

Level 1: We suggest nitrous oxide and or an Opiate and anxiolytic doses of a Benzodiazepine. The analgesic is given first in appropriate dose and then a bolus of Benzodiazepine. Fentanyl is the opioids and Midazolam is the Benzodiazepine of choice, anxiolytic doses are 1 – 2 mg. Elderly patients might be deeply sedated on very small doses of Midazolam, hence we suggest in the over 65 years old patients Midazolam is considered as a level 3 sedation drug

Level 2: The agents used for Level2 sedation should preserve cardio respiratory function and protective airway reflexes but alter consciousness state. The drug of choice is Ketamine

Level 3: The drugs used for this level of sedation may impair protective airway reflexes and depress respiratory function. These drugs include Propofol, Etomidate and higher doses of Benzodiazepines. A combination of Propofol and ketamine (0.5mg/kg of each) is an acceptable alternative

- All syringes must be labelled with dose and concentration and time
- All drug doses agreed and are called out in ml and mg prior to delivery and upon delivery
- Drugs should be drawn up by the team member who will use them and correctly labelled
    - All Analgesics in 10 ml syringes
    - All Sedatives including Midazolam in 20 ml syringes

Analgesic agents

Morphine	**Opiate analgesic**
Presentation	1ml phial with 10 mg morphine
ED use	**10 ml syringe, 1 mg/ml**
Dose	0.05-0.1 mg/kg. Administered in boli of 1 – 2.5mg titrated to effect. Usual dose range 2.5-15mg
Pharmacokinetics	Onset: 5-10 min. Duration: 2-4 h
Adverse effects	Respiratory depression, Hypotension, Nausea/vomiting

Fentanyl	**Opiate analgesic and first line choice in the ED**
Presentation	100mcg and 500mcg ampoules
ED use	diluted in a **10 ml syringe to 10mcg or 50mcg/ml**
Dose	0.5-1mcg/kg. Administered in 25mcg boli titrated to effect. Usual dose range 25 – 150 mcg
Pharmacokinetics	Onset: 2-4min. Duration: 45 min
Adverse effects	Respiratory depression, Pruritus

Sedating agents

Midazolam	**Benzodiazepine: sedative, anticonvulsant, anxiolytic, amnesic**
Presentation	2ml ampoule, 10 mg in 2ml
ED use	**20 ml syringe, 0.5mg/ml**
Dose	1mg boli, titrated to desired effect. Small doses will achieve anxiolysis and amnesia (1-2mg) while sedation requires larger doses (3 – 8mg). Conscious sedation dose: 0.05mg/kg
Pharmacokinetics	Onset: 2-5 min. Duration: 30-120min
Adverse effects	Respiratory depression, unpredictable action, hypotension, poor sedative, long half time so high risk of post procedural sedation. Caution in the elderly patient
Advantages	familiarity to most ED staff, excellent amnesic

Propofol	**Anaesthetic induction agent, which also hyperpolarises GABA receptors via the chloride channel. Sedative agent of choice in the ED**
Presentation	20ml and 50ml phials as 1% (10mg/ml) or 2% (20mg/ml) white emulsion
ED use	**draw up neat in a 20 ml syringe**
Dose	0.5mg/kg bolus, then 0.25mg/kg top ups repeated at 3 – 5 min intervals as required. Please half the bolus and the top ups doses in an elderly patient
Pharmacokinetics	Onset: 10-15sec. Rapid onset of sedation within 1 arm-brain circulation. Duration: half time is by redistribution and is 3 – 8 minutes
Adverse effects	profound hypotension especially in the depleted patient, respiratory depression, opisthotonus, Caution in the elderly patient
Advantages	excellent sedation, excellent amnesia, rapid on/offset

Ketamine	**Novel agent causing dissociative anaesthesia via NMDA receptors. It is a SNS stimulant and as such a bronchodilator and inotrope**
Presentation	clear liquid at either 10mg/ml or 100mg/ml in 20ml phials
ED use	**10mg/ml in 20 ml syringe**
Dose	0.1mg/kg analgesic, 0.5-1.0mg/kg as sedation. Initial dose in young adults is 0.5-1mg/kg with 0.5mg/kg top ups as required every 5 – 10 minutes
Pharmacokinetics	Onset: 30sec. Duration: 5-10min
Adverse effects	Can increase secretions and as s such is occasionally associated with laryngospasm. Emergence phenomenon, hence consider Pre- treating adults with 1 – 2mg of Midazolam. Post use confusion – a particular problem in the elderly
Advantages	excellent analgesic, little CVS depression. Excellent safety profile in particular in pre-hospital and paediatric use

Etomidate	**Novel steroid based induction agent. It is a second line agent due to the high incidence of myoclonus and emesis**
Presentation	clear liquid 2mg/ml, 20mg in 10 ml
ED use	**neat solution in 20 ml syringe**
Dose	0.1 mg/kg for sedation
Pharmacokinetics	Onset: 30sec. Duration: 5-10min
Adverse effects	Myoclonus, Nausea and vomiting, steroid synthesis depression

Prior to Procedure

1. **<u>Contraindications to ED based procedural sedation (not absolute, consultant input required)</u>**
    - Allergy to required agent
    - SpO2 < 92% / PaO2 < 8kPa air
    - GCS < 14
    - CVS, RS, CNS active disease (i.e. progressive symptoms)
    - Any ischcaemic event within 6 weeks
    - History of airway instability, tracheal surgery or tracheal stenosis
    - abnormal facial anatomy
    - Procedures involving stimulation of the posterior pharynx
    - URTI when using Ketamine
    - Head injury associated with loss of consciousness, altered mental status or vomiting
    - Central nervous system masses, abnormalities or hydrocephalus
    - Psychosis, porphyria, thyroid disorder, or thyroid medication

2. **<u>It should be ascertained that:</u>**

- A full medical History has been taken and documented
- The patient's American Society of Anaesthesiologists Physical Status Classification (ASA) is determined (See Table 1)

I Normal Healthy individual

	II Mild systemic disease that does not limit activity	**III** Severe systemic disease that limits activity but is not incapacitating
Angina	Occasional use of GTN	Regular use of GTN or unstable angina
Hypertension	Well controlled on single agent	Poorly controlled. Multiple drugs
Diabetes	Well controlled. No complications	Poorly controlled or complications
COPD	Cough or wheeze. Well controlled	Breathless on minimal exertion
Asthma	Well controlled with inhalers	Poorly controlled. Limiting lifestyle

IV Incapacitating systemic disease which is constantly life-threatening
V Moribund, not expected to survive 24 hours with or without surgery

Table1. <u>ASA Classification</u>

Most class I, II and selected class III, patients are appropriate candidate for Procedural sedation

- Preparatory studies appropriate to the procedure and patient have been done
- The patient has no allergy or sensitivity to the prescribed medication
- The patient's Fasting Status has been documented. A risk benefit analysis for fasting times should be considered and discussed with a senior member of staff. An urgent procedure means fasting state is not required (e.g. for Cardioversion VT) while a wrist manipulation may be delayed
- Informed consent (verbal/or written) has been obtained and documented in the medical record prior to procedure
- A physical exam has been conducted which includes assessing/measuring the patient's:
    - estimated weight
    - vital signs (baseline blood pressure; heart rate; respiratory rate, pattern and quality)
    - baseline oxygen saturation
    - a focused physical examination including auscultation of the heart and lungs

- the patient has a functioning IV line and IV Fluids
- the patient has been instructed to report any problems associated with the procedure or the PSAA (e.g., pain, difficulty in breathing)

3. **Airway Evaluation:**

- Airway Evaluation is performed in anticipation of possible intubation. The patient's airway should be assessed; this includes identifying features associated with increased risk of difficult intubation and/or ventilation. (See Table 2) HAVNOT mnemonic:

H A V N O T

History including previous AW problems

Anatomy: Features of the face, mouth and teeth that may suggest intubation will be difficult

Visual clues: Obesity, Facial hair, Age

Neck mobility and accessibility including the presence of in-line immobilization

Opening of the mouth: less than three fingers suggest potential difficult AW Trauma to the face

Table 2.HAVNOT Airway assessment tool

During the Procedure

1. The patient should have their analgesic requirements met as soon as possible:
    - **Fentanyl is the drug of choice** with morphine a close second. Boli should be given until the patient is comfortable or sedated (i.e. eyes closing, speech slurring) or there is respiratory depression (RR< 10 or ET CO_2 > 50mmHg/6.5kPa)
    - wait 3 – 5 minutes post analgesic delivery then add in the procedural sedation
    - complete the procedure and allow the patient to return to alertness

2. The individual responsible for monitoring the patient should ascertain and record:
    - all medication administered (route, site, time, drug, dose)
    - All patients must be on oxygen at 15 l minute via a non-rebreather
    - the patient's vital signs recorded every 3 minutes:
        - SpO2 should be kept above 96%
        - The ECG should record the patients rate and rhythm and unless the procedure is Cardioversion pulse should be kept 60-100bpm and the SBP>100mmHg
        - ET CO2 will pick up respiratory complications more rapidly than other signs and identifies most complications which occur
        - A small percentage of patients will require basic airway manoevers or BMV to maintain a non-obstructed airway and appropriate oxygen saturations

    - the patient's head position should be checked frequently to ensure a patent airway
    - If the patient becomes unstable during the procedure, appropriate medical consultation should be sought immediately
    - The level of sedation monitored and recorded as classified by the ASA. (See Table3)

	Responsiveness	Airway	Ventilation	CVS
Minimal sedation (anxiolysis) **Level 1**	Normal response to verbal communication	Unaffected	Unaffected	Unaffected
Moderate sedation/Analgesia **Level 2**	Purposeful response to verbal or tactile stimulation	No intervention required	Adequate	Usually maintained
Deep Sedation/Analgesia **Level 3**	Purposeful response following repeated or painful stimulation	Intervention may be required	May not be adequate	Unusually maintained
General anaesthesia	Unarouseable even with painful stimulation	Intervention usually required	Usually not adequate	May be impaired

Table 3. ASA Level of Sedation

3. **Possible Complication**
   Although this may occur in level 2 and 3 sedation they should never be encountered in level 1

    - Laryngospasm/stridor (< 0.3%): this is a rare and alarming problem. It usually subsides as the patient wakes. Apply BVM with PEEP valve if patient apnoeic or obtunded and be ready to paralyse and

intubate if required. If occurring post procedure with spontaneously ventilating patient treat with adrenaline nebs (5ml of 1:1000)
- Apnoea – expect 15-30 s apnoea in around 1:20 patients in level 3 sedation. This is treated by manipulation of a misaligned airway first and followed if necessary by a gentle BMV. It should be detected early by monitoring ET CO2
- Hypoxia from respiratory depression (SpO_2<90mmHg). Provide high flow O2
- Transient hypotension – SBP <100mmHg; this is common and if persistent should be treated with fluid boli 250-500ml
- Bradycardia (HR<50bpm). Be prepared to monitor and treat with Atropine 500mcg if compromising patient
- Level of sedation. The relief of pain consequent upon a successful procedure often means the patient will be increasingly sensitive to sedative agents. If the patient wakes to voice or tactile stimulus then no action is required other wise consider the use of reversing agents as appropriate
- Specific drug side effects (Especially ketamine)

Following the Procedure

- Minimal physical contact or other psychic disturbance. Quiet area with dim lighting if possible
- Advise patient or caretakers not to stimulate patient prematurely
- Continue oxygen saturation and ET CO2 monitoring
- record the patient's vital signs (as defined directly above) every 5 - 10 minutes for a minimum of 30 minutes following the last administered dose of IV sedation
- then if the patient is stable every 15-30 minutes until the patient returns to his/her pre-procedure state
- Discharge criteria should include:
    - patient has stable vital signs and oxygen saturation level
    - patient's swallow, cough and gag reflexes are present
    - patient is alert or appropriate to baseline
    - patient can sit unaided if appropriate to baseline and procedure
    - patient can walk without/with assistance if appropriate to baseline and procedure
    - nausea and dizziness are minimal
    - hydration is adequate
    - Adequate analgesia
    - discharge order and instructions has been written by physician
    - Responsible adult to accompany patient if discharged
    - Appropriate follow up has been arranged

Staff training

The preparation, knowledge, experience, skills and procedure will vary on a case by case basis. Three different levels are suggested for accreditation: it is proposed that clinicians would need to be signed off by an ED consultant for each level separately, before being allowed to practice independently at that level. A record of this would be made and kept in a dedicated folder in the resuscitation room of the ED. For each of the three levels a base level of experience will be required. This will include anaesthetic and ICU experience, successful completion of Advanced Life Support (ALS) course, a sound knowledge of the drugs used and familiarity with working in the ED setting. Part of the credentialing process would involve passing a written competency test and a period of supervised practice. On obtaining the required number of supervised practices the ED consultant will be required to sign off the individual having ensured they have met the other key elements for that level.
A guideline on safe sedation practice will be available in the resuscitation room folder as a reminder to clinicians.

The 3 levels of competency for sedation:

Level 1

Entenox, IV opiates and Midazolam (Up to a maximum of 0.05 mg/kg. Maximum 3 mg)
To achieve level 1 staff are required to be familiar with the agents delivered, to have read relevant departmental policies and to have performed 5 supervised level 1 sedation

Level 2

Ketamine plus level 1
To achieve level 2 competency the practitioner must demonstrate familiarity with the agents and safety equipment, hold ALS and have had 3 months experience in ICU/anaesthetics. In addition they should have performed 5 supervised level 2 sedation episodes

Level 3

The use of sedating agents like Propofol/Etomidate for procedural sedation requires excellent knowledge of the agents and safety equipment plus ALS and

- 6 months ICU/anaesthetics
- and to have performed 5 supervised procedural sedation episodes

Audit and Clinical Governance

Emergency Medicine Physicians aims to introduce a robust system for assessment of the quality and safety standards of all sedations in the Emergency Department. There is a need for the development and recognition of experienced Sedation teams, who would provide more advanced conscious sedation techniques under carefully controlled conditions. It is a requirement of clinical governance and fundamental good practice that all clinicians work to monitor and constantly strive to improve the quality of care they and their teams provide to patients. Those involved in sedation practice should seek to regularly audit their practice. There should be a system of local protocols for the care and management of complications. There should be a positive environment of training for the whole team. Clinical governance and audit procedures should include all patient groups being managed by Emergency Medicine Doctors as well as other specialty doctors, who occasionally provide sedation service. All sedation practices should carry out adverse-event analysis. All facilities that provide conscious sedation should undergo regular independent inspections as part of a quality assurance programme.

The Emergency Department will regularly audit the use of sedation against national standards. Any serious complication ort near misses will be reported through the hospital incident reporting system and discussed at the quarterly Emergency Department clinical governance meetings. It is of paramount importance that **accurate documentation** is maintained and the PSAA proforma filled in by the Sedation Practitioner and kept in the PSAA file.

Conclusion

Procedural sedation and analgesia is an excellent way to perform diagnostic, therapeutic and/or surgical procedures with comfort to the patient. Adequate training, preparation and ultimately experience will allow the physician working in the emergency setting to utilize this valuable tool.

Document ratification and history	
File name	Adult Sedation
Owning Department	Emergency Department
Authors	S. Elkhodair, Peter Jay, Tim Harris
Review date	

Approved by Date approved

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