

NCGC National Clinical Guideline Centre

# Sedation in children and young people

Sedation for diagnostic and therapeutic procedures  
in children and young people

## Appendices A to C

<b>SEDATION IN CHILDREN AND YOUNG PEOPLE .....</b>	<b>1</b>
<b>1 APPENDIX A - SCOPE .....</b>	<b>4</b>
1.1 GUIDELINE TITLE .....	4
1.2 SHORT TITLE .....	4
1.3 BACKGROUND.....	4
1.4 CLINICAL NEED FOR THE GUIDELINE .....	4
1.5 THE GUIDELINE .....	6
1.6 POPULATION .....	6
1.6.1 <i>Groups that will be covered</i> .....	6
1.6.2 <i>Groups that will not be covered</i> .....	7
1.7 HEALTHCARE SETTING.....	7
1.8 CLINICAL MANAGEMENT.....	7
1.9 TRAINING AND COMPETENCE .....	8
1.10 STATUS.....	8
1.10.1 <i>Scope</i> .....	8
1.10.2 <i>Guideline</i> .....	8
1.11 FURTHER INFORMATION .....	8
1.12 REFERRAL FROM THE DEPARTMENT OF HEALTH.....	8
<b>2 APPENDIX B - DECLARATIONS OF INTERESTS.....</b>	<b>9</b>
2.1 INTRODUCTION.....	9
2.2 DECLARATIONS OF INTERESTS OF THE GDG MEMBERS .....	10
2.2.1 <i>Prof Mike Sury</i> .....	10
2.2.2 <i>Dr Paul Averley</i> .....	11
2.2.3 <i>Dr Peter Crean</i> .....	12
2.2.4 <i>Dr Nick Croft</i> .....	13
2.2.5 <i>Prof Nick Girdler</i> .....	14
2.2.6 <i>Dr Susan King</i> .....	15
2.2.7 <i>Dr Christina Lioffi</i> .....	16
2.2.8 <i>Ms Liz McArthur</i> .....	17
2.2.9 <i>Ms Heather McClelland</i> .....	18
2.2.10 <i>Dr Neil Morton</i> .....	19
2.2.11 <i>Ms Farrah Pradhan</i> .....	20
2.2.12 <i>Dr Daniel Wallis</i> .....	21
2.2.13 <i>Ms Madeleine Wang</i> .....	22
2.3 DECLARATIONS OF INTERESTS OF THE NCGC MEMBERS.....	23
<b>3 APPENDIX C – SEARCH STRATEGIES .....</b>	<b>23</b>
3.1 SEDATION PATIENT FILTERS .....	25
3.1.1 <i>Sedation in children</i> .....	25
3.1.2 <i>Modified patient filter</i> .....	26
3.2 STUDY DESIGN FILTERS .....	28
3.2.1 <i>Randomised controlled trial (RCT) filters</i> .....	28
3.2.2 <i>Systematic Review (SR) filters</i> .....	29
3.2.3 <i>Observational study filters</i> .....	29
3.3 EXCLUSIONS FILTER.....	31
3.4 DRUG EFFICACY .....	32
3.5 OPIOIDS: SPECIFIC DRUGS AND ROUTES OF ADMINISTRATION.....	34
3.6 ADVERSE EFFECTS OF DRUGS .....	35
3.7 ADVERSE EFFECTS OF ENDOSCOPY .....	37
3.8 PSYCHOLOGICAL PREPARATION FOR PATIENTS UNDERGOING SEDATION.....	38
3.9 SEDATION SPARING .....	40
3.10 SEDATION ASSESSMENT TOOLS.....	42
3.11 FASTING BEFORE PAEDIATRIC SEDATION .....	44
3.12 FASTING BEFORE PAEDIATRIC ANAESTHESIA.....	45
3.13 HEALTH ECONOMICS.....	46
<b>4 APPENDIX D - EVIDENCE TABLES.....</b>	<b>48</b>
SEE SEPARATE FILE.....	48

<b>5</b>	<b>APPENDIX E - META-ANALYSES FOREST PLOT .....</b>	<b>48</b>
	SEE SEPARATE FILE.....	48
<b>6</b>	<b>APPENDIX F - COST-EFFECTIVENESS ANALYSIS.....</b>	<b>48</b>
	SEE SEPARATE FILE.....	48
<b>7</b>	<b>APPENDIX G - RECOMMENDATIONS FOR RESEARCH .....</b>	<b>48</b>
	SEE SEPARATE FILE.....	48
<b>8</b>	<b>APPENDIX H - REVIEW PROTOCOL FORM.....</b>	<b>48</b>
	SEE SEPARATE FILE.....	48
<b>9</b>	<b>APPENDIX I - AGREE TOOL .....</b>	<b>48</b>
	SEE SEPARATE FILE.....	48
<b>10</b>	<b>APPENDIX J – LICENSING INDICATIONS .....</b>	<b>48</b>
	SEE SEPARATE FILE.....	48

# 1 Appendix A - SCOPE

## 1.1 Guideline title

Sedation for diagnostic and therapeutic procedures in children and young people

## 1.2 Short title

Sedation in infants, children and young people

## 1.3 Background

- A. The National Institute for Health and Clinical Excellence ('NICE' or 'the Institute') has commissioned the National Collaborating Centre for Nursing and Supportive Care to develop a clinical guideline on sedation for diagnostic and therapeutic procedures in children and young people for use in the NHS in England and Wales. This follows referral of the topic by the Department of Health (see appendix). The guideline will provide recommendations for good practice that are based on the best available evidence of clinical and cost effectiveness.
- B. NICE clinical guidelines support the implementation of National Service Frameworks (NSFs) in those aspects of care where a Framework has been published. The statements in each NSF reflect the evidence that was used at the time the Framework was prepared. The clinical guidelines and technology appraisals published by the Institute after an NSF has been issued have the effect of updating the Framework.
- C. NICE clinical guidelines support the role of healthcare professionals in providing care in partnership with patients, taking account of their individual needs and preferences, and ensuring that patients (and their carers and families, if appropriate) can make informed decisions about their care and treatment.

## 1.4 Clinical need for the guideline

- A. In adults, many procedures can be undertaken with local anaesthesia and reassurance. In children and young people this is often not possible because the procedures are too frightening, too painful and need to be carried out in children who may be ill, or in pain or have behavioural problems. Therefore special consideration is necessary for children and young people undergoing distressing procedures.
- B. It is estimated that more than 2 million children and young people are taken to emergency departments each year following accidental injury. Many of

these children and young people will undergo procedures that require sedation. For example, in 2005–6 there were 866 children aged 14 and younger who required a closed reduction of a dislocated joint. Sedation is also frequently used for invasive diagnostic procedures such as lumbar punctures, bone marrow biopsies and endoscopies. In 2005–6 there were 4700 gastroscopies, 9000 diagnostic spinal punctures and 2100 bone marrow biopsies carried out on children aged 14 and younger. Sedation is also commonly used in dental practice where the use of general anaesthesia is now restricted to the hospital setting.

- C. Sedation is only one of the management options available for children and young people undergoing therapeutic or diagnostic procedures. Non-pharmacological techniques may also be useful in reducing anxiety and managing behaviour, and analgesia may be used to provide pain control. These techniques may be used in combination with sedation or as an alternative to sedation. Another alternative to using sedation for diagnostic or therapeutic procedures is to carry out the procedure under general anaesthesia, in which case the usual standards of care for patients undergoing anaesthesia must be met.
- D. Sedation is a drug-induced depression of consciousness. The aims of sedation during diagnostic or therapeutic procedures may include reducing fear and anxiety, providing pain control and minimising movement. The importance of each of these aims will vary depending on the nature of the procedure and the characteristics of the patient. For example, in younger children sedation may be necessary to ensure that movement is minimised during non-painful procedures such as a magnetic resonance imaging (MRI) scan; in older children sedation may be necessary to minimise the physical and psychological consequences of a painful procedure such as a lumbar puncture.
- E. The effect of sedation drugs on consciousness level is a continuum ranging from the awake state, through progressively deeper levels of sedation to anaesthesia. Anaesthesia is an unresponsive state in which vital airway and breathing reflexes are likely to be suppressed. The American Society of Anaesthesiologists (ASA) has published useful definitions of sedation levels, classifying them as 'minimal', 'moderate' and 'deep'. Minimal sedation equates to anxiolysis and has no appreciable effect on vital reflexes. In a state of moderate sedation the patient is able to breathe adequately without assistance and responds purposefully to verbal stimulus or tactile stimulation. This is often referred to as conscious sedation. During deep sedation, the patient cannot be roused easily but will respond purposefully to repeated or painful stimuli and may require assistance with their airway or breathing. The level of sedation that is appropriate will depend on the nature of the procedure and the needs of the individual. Deeper levels of sedation require more advanced management because the patient's protective reflexes are affected and they have the potential to progress to anaesthesia.
- F. The level of sedation achieved depends on the drug used and the dose at which it is given. When choosing between sedation techniques, healthcare professionals must consider the effectiveness of the drug in achieving the

required level of sedation, the duration of that effect, and the margin of safety between the dose required to achieve sedation and the dose that is likely to cause anaesthesia.

- G. There may be serious adverse effects if the level of sedation is greater than intended. If breathing is unintentionally depressed and this complication is not recognised and managed appropriately, then this may lead to hypoxic brain injury or death. Sedation drugs may also have other unexpected adverse effects such as prolonged emergence, paradoxical excitement or post-sedation nausea and vomiting.
- H. If sedation is unsuccessful, this can result in a painful and traumatic experience for the child. It may be necessary to complete the procedure under general anaesthesia or the procedure may need to be abandoned and rescheduled. If the child becomes distressed due to a failure to provide adequate sedation, their parent or carer may choose to refuse consent for further procedures. A distressing experience may also have long-term psychological consequences for the patient, especially if they are required to undergo repeated procedures.
- I. There is significant variation in practice across the NHS, with sedation being carried out by a variety of healthcare professionals using a wide range of techniques, within different clinical settings. The Scottish Intercollegiate Guidelines Network (SIGN) published a guideline on this topic in 2004. This covered moderate sedation but not deep sedation, and the evidence base it considered has not been updated since 2002. The aim of this guideline is to provide recommendations to both improve the effectiveness and safety of all types of procedural sedation and to reduce current variations in standards of care.

## 1.5 The guideline

- A. The guideline development process is described in detail in two publications that are available from the NICE website (see 'Further information'). 'The guideline development process: an overview for stakeholders, the public and the NHS' describes how organisations can become involved in the development of a guideline. 'The guidelines manual' provides advice on the technical aspects of guideline development.
- B. This scope defines what this guideline will (and will not) examine, and what the guideline developers will consider. The scope is based on a referral from the Department of Health (see appendix).
- C. The areas that will be addressed by the guideline are described in the following sections. 'Sedation' is used in the following sections to mean a drug-induced depression of consciousness that is not intended to result in anaesthesia.

## 1.6 Population

### 1.6.1 Groups that will be covered

- A. Infants, children and young people (under 19 years) receiving sedation by any technique for painful or non-painful diagnostic or therapeutic procedures.

- B. The GDG will consider whether different recommendations are required for different age groups in the population.

### **1.6.2 Groups that will not be covered**

- A. Patients requiring sedation for purposes other than for diagnostic or therapeutic procedures including:
  - sedation in critically ill patients requiring mechanical ventilation
  - sedation in palliative care
  - sedation in the treatment of mental health conditions
  - sedation given as premedication for general anaesthesia or as postoperative analgesia
  - night sedation.
- B. Patients having diagnostic or therapeutic procedures under general anaesthesia.

## **1.7 Healthcare setting**

- A. Hospital settings, including inpatients, outpatients, radiology and emergency departments.
- B. Primary care, including dental and medical general practice settings.

## **1.8 Clinical management**

- A. Assessment of the patient to determine whether sedation is appropriate.
- B. Clear communication, in a child-friendly manner, of information relating to the preparation required for the procedure or investigation, and related sedation technique. This will include the needs of the patient and their parents or carers, ensuring that implications (sedation safety and efficacy) are clearly understood by both the patient and their parent or carer prior to informed consent.
- C. Preparation required for the procedure or investigation and related sedation technique.
- D. The clinical environment, including the availability of equipment, facilities and staff.
- E. Patient monitoring during and after sedation and criteria for discharge following sedation.
- F. The effectiveness, safety and limitations of sedation techniques. This will include the use of sedation in combination with non-pharmacological techniques and in combination with analgesia. Note that guideline recommendations will normally fall within licensed indications. Where clearly supported by evidence, use outside

a licensed indication may be recommended. The guideline will assume that prescribers will use a drug's summary of product characteristics and the 'British National Formulary for Children' to inform their decisions for individual patients.

- G. The Guideline Development Group will take reasonable steps to identify ineffective interventions and approaches to care. If robust and credible recommendations for re-positioning the intervention for optimal use, or changing the approach to care to make more efficient use of resources, can be made, they will be clearly stated. If the resources released are substantial, consideration will be given to listing such recommendations in the 'Key priorities for implementation' section of the guideline.

## 1.9 Training and competence

- A. Training for practitioners involved in procedural sedation, irrespective of specialty background, that will be relevant to the sedation techniques and the clinical environment.
- B. Training that enables practitioners to be competent in the practical aspects of effective and safe delivery of sedation techniques relevant to the clinical situation, and the management of adverse events (for example, airway management skill in the inadvertently anaesthetised patient).

## 1.10 Status

### 1.10.1 Scope

This is the final scope.

### 1.10.2 Guideline

The development of the guideline recommendations will begin in January 2009.

## 1.11 Further information

The guideline development process is described in:

- 'The guideline development process: an overview for stakeholders, the public and the NHS'
- 'The guidelines manual'.

These are available from the NICE website ([www.nice.org.uk/guidelinesmanual](http://www.nice.org.uk/guidelinesmanual)). Information on the progress of the guideline will also be available from the website.

## 1.12 Referral from the Department of Health

The Department of Health asked NICE to develop a guideline on sedation for diagnostic and therapeutic procedures in infants, children and young people up to the age of 19.

## **2 Appendix B - Declarations of interests**

### **2.1 Introduction**

All members of the GDG and all members of the NCC-AC staff were required to make formal declarations of interest at the outset, and these were updated at every subsequent meeting throughout the development process. No interests were declared that required actions.

## 2.2 Declarations of interests of the GDG members

### 2.2.1 Prof Mike Sury

<b>GDG meeting</b>	<b>Declaration of Interests</b>
<b>Chair recruitment</b>	None
<b>First GDG meeting (26 January 2009)</b>	No change to declarations
<b>Second GDG Meeting (27 January 2009)</b>	No change to declarations
<b>Third GDG Meeting (19 March 2009)</b>	No change to declarations
<b>Fourth GDG Meeting (27 April 2009)</b>	No change to declarations
<b>Fifth GDG Meeting (28 April 2009)</b>	No change to declarations
<b>Sixth GDG Meeting (11 June 2009)</b>	No change to declarations
<b>Seventh GDG Meeting (23 July 2009)</b>	No change to declarations
<b>Eight GDG Meeting (28 September 2009)</b>	No change to declarations
<b>Ninth GDG Meeting (2 November 2009)</b>	No change to declarations
<b>Tenth GDG Meeting (26 November 2009)</b>	No change to declarations
<b>Eleventh GDG Meeting (11 January 2010)</b>	No change to declarations
<b>Twelfth GDG Meeting (12 January 2010)</b>	No change to declarations
<b>Thirteenth GDG Meeting (9 February 2010)</b>	No change to declarations
<b>Fourteenth GDG Meeting (28 July 2010)</b>	No change to declarations

### 2.2.2 Dr Paul Averley

<b>GDG meeting</b>	<b>Declaration of Interests</b>
<b>GDG recruitment</b>	25 June 2008: Personal pecuniary interest: I provide a paediatric sedation NHS service for the provision of dental services in a primary care environment.
<b>First GDG meeting (26 January 2009)</b>	No change to declarations
<b>Second GDG Meeting (27 January 2009)</b>	No change to declarations
<b>Third GDG Meeting (19 March 2009)</b>	No change to declarations
<b>Fourth GDG Meeting (27 April 2009)</b>	No change to declarations
<b>Fifth GDG Meeting (28 April 2009)</b>	No change to declarations
<b>Sixth GDG Meeting (11 June 2009)</b>	No change to declarations
<b>Seventh GDG Meeting (23 July 2009)</b>	No change to declarations
<b>Eight GDG Meeting (28 September 2009)</b>	Personal pecuniary interest: I am the managing partner of Queensway Dental Practice, 170 Queensway, Billingham, Teesside, B2 32NT. This dental practice has a PDS contract to supply NHS sedation services in primary care (dental services).
<b>Ninth GDG Meeting (2 November 2009)</b>	No change to declarations
<b>Tenth GDG Meeting (26 November 2009)</b>	No change to declarations
<b>Eleventh GDG Meeting (11 January 2010)</b>	No change to declarations
<b>Twelfth GDG Meeting (12 January 2010)</b>	No change to declarations
<b>Thirteenth GDG Meeting (9 February 2010)</b>	No change to declarations
<b>Fourteenth GDG Meeting (28 July 2010)</b>	No change to declarations

### 2.2.3 Dr Peter Crean

<b>GDG meeting</b>	<b>Declaration of Interests</b>
<b>GDG recruitment</b>	None
<b>First GDG meeting (26 January 2009)</b>	No change to declarations
<b>Second GDG Meeting (27 January 2009)</b>	No change to declarations
<b>Third GDG Meeting (19 March 2009)</b>	No change to declarations
<b>Fourth GDG Meeting (27 April 2009)</b>	No change to declarations
<b>Fifth GDG Meeting (28 April 2009)</b>	No change to declarations
<b>Sixth GDG Meeting (11 June 2009)</b>	No change to declarations
<b>Seventh GDG Meeting (23 July 2009)</b>	No change to declarations
<b>Eight GDG Meeting (28 September 2009)</b>	No change to declarations
<b>Ninth GDG Meeting (2 November 2009)</b>	No change to declarations
<b>Tenth GDG Meeting (26 November 2009)</b>	No change to declarations
<b>Eleventh GDG Meeting (11 January 2010)</b>	No change to declarations
<b>Twelfth GDG Meeting (12 January 2010)</b>	No change to declarations
<b>Thirteenth GDG Meeting (9 February 2010)</b>	No change to declarations
<b>Fourteenth GDG Meeting (28 July 2010)</b>	No change to declarations

### 2.2.4 Dr Nick Croft

<b>GDG meeting</b>	<b>Declaration of Interests</b>
<b>GDG recruitment</b>	<p>2 September 2008:Non-personal pecuniary interest  None relevant to sedation or endoscopy  Schering Plough have funded an IBD nurse specialist for one year (2007-2008) in my department at Barts and the London NHS Trust.  Part of the income (for my time) from the below go to my Investigator Fund administered by Barts and the London NHS Trust R&amp;D Department.  Chief Investigator and local investigator of a clinical trial in the UK funded by Abbott.  Consultancy (one off, 2008) Alizyme Therapeutics, Cambridge.</p>
<b>First GDG meeting (26 January 2009)</b>	No change to declarations
<b>Second GDG Meeting (27 January 2009)</b>	No change to declarations
<b>Third GDG Meeting (19 March 2009)</b>	No change to declarations
<b>Fourth GDG Meeting (27 April 2009)</b>	No change to declarations
<b>Fifth GDG Meeting (28 April 2009)</b>	No change to declarations
<b>Sixth GDG Meeting (11 June 2009)</b>	No change to declarations
<b>Seventh GDG Meeting (23 July 2009)</b>	No change to declarations
<b>Eight GDG Meeting (28 September 2009)</b>	No change to declarations
<b>Ninth GDG Meeting (2 November 2009)</b>	No change to declarations
<b>Tenth GDG Meeting (26 November 2009)</b>	No change to declarations
<b>Eleventh GDG Meeting (11 January 2010)</b>	No change to declarations
<b>Twelfth GDG Meeting (12 January 2010)</b>	No change to declarations
<b>Thirteenth GDG Meeting (9 February 2010)</b>	No change to declarations
<b>Fourteenth GDG Meeting (28 July 2010)</b>	No change to declarations

## 2.2.5 Prof Nick Girdler

<b>GDG meeting</b>	<b>Declaration of Interests</b>
<b>GDG recruitment</b>	9 July 2008: Personal non-pecuniary interest: Interest in the topic under consideration: Authorship of published research projects (2002-2007) on paediatric sedation techniques which state conclusions about the safety and effectiveness of oral midazolam sedation, intravenous midazolam (+sevoflurane) sedation, buccal midazolam sedation and nitrous oxide sedation in children. Also, published studies on effectiveness of midazolam, propofol and flumazenil in adults. Published opinions and surveys on dental sedation education, competency in sedation and safe sedation practice endorsing the use of nitrous oxide sedation in children and midazolam in adults (1998-02).
<b>First GDG meeting (26 January 2009)</b>	No change to declarations
<b>Second GDG Meeting (27 January 2009)</b>	No change to declarations
<b>Third GDG Meeting (19 March 2009)</b>	No change to declarations
<b>Fourth GDG Meeting (27 April 2009)</b>	No change to declarations
<b>Fifth GDG Meeting (28 April 2009)</b>	No change to declarations
<b>Sixth GDG Meeting (11 June 2009)</b>	No change to declarations
<b>Seventh GDG Meeting (23 July 2009)</b>	No change to declarations
<b>Eight GDG Meeting (28 September 2009)</b>	No change to declarations
<b>Ninth GDG Meeting (2 November 2009)</b>	No change to declarations
<b>Tenth GDG Meeting (26 November 2009)</b>	No change to declarations
<b>Eleventh GDG Meeting (11 January 2010)</b>	No change to declarations
<b>Twelfth GDG Meeting (12 January 2010)</b>	No change to declarations
<b>Thirteenth GDG Meeting (9 February 2010)</b>	No change to declarations
<b>Fourteenth GDG Meeting (28 July 2010)</b>	No change to declarations

### 2.2.6 Dr Susan King

<b>GDG meeting</b>	<b>Declaration of Interests</b>
<b>GDG recruitment</b>	None
<b>First GDG meeting (26 January 2009)</b>	No change to declarations
<b>Second GDG Meeting (27 January 2009)</b>	No change to declarations
<b>Third GDG Meeting (19 March 2009)</b>	No change to declarations
<b>Fourth GDG Meeting (27 April 2009)</b>	No change to declarations
<b>Fifth GDG Meeting (28 April 2009)</b>	No change to declarations
<b>Sixth GDG Meeting (11 June 2009)</b>	No change to declarations
<b>Seventh GDG Meeting (23 July 2009)</b>	No change to declarations
<b>Eight GDG Meeting (28 September 2009)</b>	No change to declarations
<b>Ninth GDG Meeting (2 November 2009)</b>	No change to declarations
<b>Tenth GDG Meeting (26 November 2009)</b>	No change to declarations
<b>Eleventh GDG Meeting (11 January 2010)</b>	No change to declarations
<b>Twelfth GDG Meeting (12 January 2010)</b>	No change to declarations
<b>Thirteenth GDG Meeting (9 February 2010)</b>	No change to declarations
<b>Fourteenth GDG Meeting (28 July 2010)</b>	No change to declarations

### 2.2.7 Dr Christina Liossi

<b>GDG meeting</b>	<b>Declaration of Interests</b>
<b>GDG recruitment</b>	None
<b>First GDG meeting (26 January 2009)</b>	No change to declarations
<b>Second GDG Meeting (27 January 2009)</b>	No change to declarations
<b>Third GDG Meeting (19 March 2009)</b>	No change to declarations
<b>Fourth GDG Meeting (27 April 2009)</b>	No change to declarations
<b>Fifth GDG Meeting (28 April 2009)</b>	No change to declarations
<b>Sixth GDG Meeting (11 June 2009)</b>	No change to declarations
<b>Seventh GDG Meeting (23 July 2009)</b>	No change to declarations
<b>Eight GDG Meeting (28 September 2009)</b>	No change to declarations
<b>Ninth GDG Meeting (2 November 2009)</b>	No change to declarations
<b>Tenth GDG Meeting (26 November 2009)</b>	No change to declarations
<b>Eleventh GDG Meeting (11 January 2010)</b>	No change to declarations
<b>Twelfth GDG Meeting (12 January 2010)</b>	No change to declarations
<b>Thirteenth GDG Meeting (9 February 2010)</b>	No change to declarations
<b>Fourteenth GDG Meeting (28 July 2010)</b>	No change to declarations

**2.2.8 Ms Liz McArthur**

<b>GDG meeting</b>	<b>Declaration of Interests</b>
<b>GDG recruitment</b>	None
<b>First GDG meeting (26 January 2009)</b>	No change to declarations
<b>Second GDG Meeting (27 January 2009)</b>	No change to declarations
<b>Third GDG Meeting (19 March 2009)</b>	No change to declarations
<b>Fourth GDG Meeting (27 April 2009)</b>	No change to declarations
<b>Fifth GDG Meeting (28 April 2009)</b>	No change to declarations
<b>Sixth GDG Meeting (11 June 2009)</b>	No change to declarations
<b>Seventh GDG Meeting (23 July 2009)</b>	No change to declarations
<b>Eight GDG Meeting (28 September 2009)</b>	No change to declarations
<b>Ninth GDG Meeting (2 November 2009)</b>	No change to declarations
<b>Tenth GDG Meeting (26 November 2009)</b>	No change to declarations
<b>Eleventh GDG Meeting (11 January 2010)</b>	No change to declarations
<b>Twelfth GDG Meeting (12 January 2010)</b>	No change to declarations
<b>Thirteenth GDG Meeting (9 February 2010)</b>	No change to declarations
<b>Fourteenth GDG Meeting (28 July 2010)</b>	No change to declarations

### 2.2.9 Ms Heather McClelland

<b>GDG meeting</b>	<b>Declaration of Interests</b>
<b>GDG recruitment</b>	None
<b>First GDG meeting (26 January 2009)</b>	No change to declarations
<b>Second GDG Meeting (27 January 2009)</b>	No change to declarations
<b>Third GDG Meeting (19 March 2009)</b>	No change to declarations
<b>Fourth GDG Meeting (27 April 2009)</b>	No change to declarations
<b>Fifth GDG Meeting (28 April 2009)</b>	No change to declarations
<b>Sixth GDG Meeting (11 June 2009)</b>	No change to declarations
<b>Seventh GDG Meeting (23 July 2009)</b>	No change to declarations
<b>Eight GDG Meeting (28 September 2009)</b>	No change to declarations
<b>Ninth GDG Meeting (2 November 2009)</b>	No change to declarations
<b>Tenth GDG Meeting (26 November 2009)</b>	No change to declarations
<b>Eleventh GDG Meeting (11 January 2010)</b>	No change to declarations
<b>Twelfth GDG Meeting (12 January 2010)</b>	No change to declarations
<b>Thirteenth GDG Meeting (9 February 2010)</b>	No change to declarations
<b>Fourteenth GDG Meeting (28 July 2010)</b>	No change to declarations

**2.2.10 Dr Neil Morton**

<b>GDG meeting</b>	<b>Declaration of Interests</b>
<b>GDG recruitment</b>	None
<b>First GDG meeting (26 January 2009)</b>	No change to declarations
<b>Second GDG Meeting (27 January 2009)</b>	No change to declarations
<b>Third GDG Meeting (19 March 2009)</b>	No change to declarations
<b>Fourth GDG Meeting (27 April 2009)</b>	No change to declarations
<b>Fifth GDG Meeting (28 April 2009)</b>	No change to declarations
<b>Sixth GDG Meeting (11 June 2009)</b>	No change to declarations
<b>Seventh GDG Meeting (23 July 2009)</b>	No change to declarations
<b>Eight GDG Meeting (28 September 2009)</b>	No change to declarations
<b>Ninth GDG Meeting (2 November 2009)</b>	Personal non-pecuniary interest: Chairman SIGN guideline 58 working group
<b>Tenth GDG Meeting (26 November 2009)</b>	No change to declarations
<b>Eleventh GDG Meeting (11 January 2010)</b>	No change to declarations
<b>Twelfth GDG Meeting (12 January 2010)</b>	No change to declarations
<b>Thirteenth GDG Meeting (9 February 2010)</b>	No change to declarations
<b>Fourteenth GDG Meeting (28 July 2010)</b>	No change to declarations

### 2.2.11 Ms Farrah Pradhan

<b>GDG meeting</b>	<b>Declaration of Interests</b>
<b>GDG recruitment</b>	None
<b>First GDG meeting (26 January 2009)</b>	No change to declarations
<b>Second GDG Meeting (27 January 2009)</b>	No change to declarations
<b>Third GDG Meeting (19 March 2009)</b>	No change to declarations
<b>Fourth GDG Meeting (27 April 2009)</b>	No change to declarations
<b>Fifth GDG Meeting (28 April 2009)</b>	No change to declarations
<b>Sixth GDG Meeting (11 June 2009)</b>	No change to declarations
<b>Seventh GDG Meeting (23 July 2009)</b>	No change to declarations
<b>Eight GDG Meeting (28 September 2009)</b>	No change to declarations
<b>Ninth GDG Meeting (2 November 2009)</b>	No change to declarations
<b>Tenth GDG Meeting (26 November 2009)</b>	No change to declarations
<b>Eleventh GDG Meeting (11 January 2010)</b>	No change to declarations
<b>Twelfth GDG Meeting (12 January 2010)</b>	No change to declarations
<b>Thirteenth GDG Meeting (9 February 2010)</b>	No change to declarations
<b>Fourteenth GDG Meeting (28 July 2010)</b>	No change to declarations

**2.2.12 Dr Daniel Wallis**

<b>GDG meeting</b>	<b>Declaration of Interests</b>
<b>GDG recruitment</b>	27 June 2008: Personal non-pecuniary interest I have been invited to speak at meeting(s) where I have been specifically asked to argue a case in a database, in particular that the drug ketamine may be safely used by non-anaesthetists for paediatric sedation. I have given other presentations where I have suggested that subject to important safeguards it may be reasonable practice for specialists in emergency medicine to use this drug for paediatric sedation in appropriate cases.
<b>First GDG meeting (26 January 2009)</b>	No change to declarations
<b>Second GDG Meeting (27 January 2009)</b>	No change to declarations
<b>Third GDG Meeting (19 March 2009)</b>	No change to declarations
<b>Fourth GDG Meeting (27 April 2009)</b>	No change to declarations
<b>Fifth GDG Meeting (28 April 2009)</b>	No change to declarations
<b>Sixth GDG Meeting (11 June 2009)</b>	No change to declarations
<b>Seventh GDG Meeting (23 July 2009)</b>	No change to declarations
<b>Eight GDG Meeting (28 September 2009)</b>	No change to declarations
<b>Ninth GDG Meeting (2 November 2009)</b>	No change to declarations
<b>Tenth GDG Meeting (26 November 2009)</b>	No change to declarations
<b>Eleventh GDG Meeting (11 January 2010)</b>	No change to declarations
<b>Twelfth GDG Meeting (12 January 2010)</b>	No change to declarations
<b>Thirteenth GDG Meeting (9 February 2010)</b>	No change to declarations
<b>Fourteenth GDG Meeting (28 July 2010)</b>	No change to declarations

### 2.2.13 Ms Madeleine Wang

<b>GDG meeting</b>	<b>Declaration of Interests</b>
<b>GDG recruitment</b>	28 June 2008: Personal non-pecuniary interest Lay member Northern and Yorkshire REC Lay member NCEPOD Steering Group Lay member/patient representative DH information for cohesion work stream board Commission for Human Medicines Patient Information Expert Advisory Group Lay member NICE General and Acute topic selection panel
<b>First GDG meeting (26 January 2009)</b>	No change to declarations
<b>Second GDG Meeting (27 January 2009)</b>	No change to declarations
<b>Third GDG Meeting (19 March 2009)</b>	No change to declarations
<b>Fourth GDG Meeting (27 April 2009)</b>	No change to declarations
<b>Fifth GDG Meeting (28 April 2009)</b>	No change to declarations
<b>Sixth GDG Meeting (11 June 2009)</b>	No change to declarations
<b>Seventh GDG Meeting (23 July 2009)</b>	No change to declarations
<b>Eight GDG Meeting (28 September 2009)</b>	No change to declarations
<b>Ninth GDG Meeting (2 November 2009)</b>	No change to declarations
<b>Tenth GDG Meeting (26 November 2009)</b>	No change to declarations
<b>Eleventh GDG Meeting (11 January 2010)</b>	No change to declarations
<b>Twelfth GDG Meeting (12 January 2010)</b>	No change to declarations
<b>Thirteenth GDG Meeting (9 February 2010)</b>	No change to declarations
<b>Fourteenth GDG Meeting (28 July 2010)</b>	No change to declarations

### 2.3 Declarations of interests of the NCGC members

<b>GDG meeting</b>	<b>Declaration of Interests of NCGC members</b>
<b>First GDG meeting (26 January 2009)</b>	None
<b>Second GDG Meeting (27 January 2009)</b>	None
<b>Third GDG Meeting (19 March 2009)</b>	None
<b>Fourth GDG Meeting (27 April 2009)</b>	None
<b>Fifth GDG Meeting (28 April 2009)</b>	None
<b>Sixth GDG Meeting (11 June 2009)</b>	None
<b>Seventh GDG Meeting (23 July 2009)</b>	None
<b>Eight GDG Meeting (28 September 2009)</b>	None
<b>Ninth GDG Meeting (2 November 2009)</b>	None
<b>Tenth GDG Meeting (26 November 2009)</b>	None
<b>Eleventh GDG Meeting (11 January 2010)</b>	None
<b>Twelfth GDG Meeting (12 January 2010)</b>	None
<b>Thirteenth GDG Meeting (9 February 2010)</b>	None
<b>Fourteenth GDG Meeting (28 July 2010)</b>	None

## 3 Appendix C – Search Strategies

This appendix details the search strategies used in the identification of relevant studies for the guideline on sedation in infants, children and young people.

All searches were conducted on the following databases with no date restrictions unless otherwise noted below:

<b>Database</b>	<b>Interface</b>	<b>Date searched from</b>
Medline	OVID	1950

Embase	OVID	1980
Cinahl	EBSCO	1982
The Cochrane Library (to 2009 Issue 4)	www.thecochranelibrary.com	All dates searched: 1996 for Cochrane Reviews 1995 for DARE 1898 for CENTRAL 1904 for Methods Studies 1995 for HTA and NHSEED

Search filters were applied where appropriate, including filters for randomised controlled trials (RCT) and systematic reviews (SR). The RCT filter used was based on that recommended by Cochrane (Higgins, 2005). An exclusions filter was designed to remove irrelevant results such as letters and editorials.

The search strategies for each review are reproduced below. Note that the searches make use of controlled vocabulary which varies between databases and between search interfaces. Amendments were made where necessary in order to take these variations into account.

Where possible, searches were restricted to articles written in English. All searches were updated on January 18<sup>th</sup> 2010.

Hand searching was not undertaken following NICE advice that exhaustive searching on every guideline review topic is not practical. Reference lists of articles were checked for further articles of potential relevance.

### 3.1 Sedation patient filters

The following patient filters were developed in consultation with the GDG chair. Section 1.1.1 shows the filter used for retrieving studies relating to sedation in children. A modified filter (section 1.1.2) was used when it was necessary to retrieve studies relating to either sedation or anaesthesia.

#### 3.1.1 Sedation in children

##### *Medline*

No.	Search terms
1	conscious sedation/
2	deep sedation/
3	sedat\$.ti,ab.
4	dental anxiety/
5	((minimal or light) adj (anesthesia or anaesthesia)).tw.
6	or/1-5
7	exp child/
8	child\$.tw.
9	exp infant/
10	infan\$.tw.
11	(baby or babies).tw.
12	"adolescent"/
13	(pediatric\$1 or paediatric\$1).tw.
14	or/7-14
15	6 and 14

##### *Embase*

No.	Search terms
1	conscious sedation/
2	sedation/
3	sedat\$.ti,ab.
4	dental anxiety/
5	((minimal or light) adj (anesthesia or anaesthesia)).tw.
6	or/1-5
7	exp child/
8	child\$.tw.
9	childhood/
10	infancy/
11	infan\$.tw.
12	(baby or babies).tw.
13	exp adolescent/
14	(pediatric\$1 or paediatric\$1).tw.
15	or/7-14
16	6 and 15

##### *Cinahl*

No.	Search terms
S15	S14 and S7
S14	S13 or S12 or S11 or S10 or S9 or S8
S13	TX pediatric or TX pediatrics or TX paediatrics or TX paediatrics

S12	TX baby or TX babies
S11	TX infan*
S10	TX child*
S9	(MH "Adolescence+")
S8	(MH "Child+")
S7	S6 or S5 or S4 or S3 or S2 or S1
S6	TI light N1 anesthesia or AB light N1 anesthesia or TI light N1 anaesthesia or AB light N1 anaesthesia
S5	TI minimal N1 anesthesia or AB minimal N1 anesthesia or TI minimal N1 anaesthesia or AB minimal N1 anaesthesia
S4	sedat*
S3	(MH "Dental Anxiety")
S2	(MH "Sedation")
S1	(MH "Conscious Sedation")

### **The Cochrane Library**

<b>No.</b>	<b>Search terms</b>
#1	sedat*:ti,ab,kw
#2	MeSH descriptor Conscious Sedation, this term only
#3	MeSH descriptor Deep Sedation, this term only
#4	MeSH descriptor Dental Anxiety, this term only
#5	((dental or dentist) near/2 (anxiety or anxious or nervous* or fear or panic)):ti,ab,kw
#6	((minimal or light) next (anesthesia or anaesthesia)):ti,ab,kw
#7	(#1 OR #2 OR #3 OR #4 OR #5 OR #6)
#8	child*:ti,ab,kw
#9	infan*:ti,ab,kw
#10	(baby or babies):ti,ab,kw
#11	adolescen*:ti,ab,kw
#12	(pediatric? or paediatric?):ti,ab,kw
#13	(#8 OR #9 OR #10 OR #11 OR #12)
#14	(#7 AND #13)

### **3.1.2 Modified patient filter**

#### **Medline**

<b>No.</b>	<b>Search terms</b>
1	Conscious Sedation/
2	Deep Sedation/
3	sedat\$.ti,ab,hw.
4	(anesthesia or anaesthesia).ti,ab.
5	exp Anesthesia/
6	or/1-5
7	exp child/
8	child\$.tw.
9	exp infant/
10	infan\$.tw.
11	(baby or babies).tw.
12	"Adolescent"/
13	(pediatric\$1 or paediatric\$1).tw.
14	or/7-13

**Embase**

No.	Search terms
1	Conscious Sedation/
2	Sedation/
3	sedat\$.ti,ab,hw.
4	(anesthesia or anaesthesia).ti,ab.
5	exp Anesthesia/
6	or/1-5
7	exp child/
8	child\$.tw.
9	childhood/
10	infancy/
11	infan\$.tw.
12	(baby or babies).tw.
13	exp adolescent/
14	(pediatric\$1 or paediatric\$1).tw.
15	or/7-14

**Cinahl**

No.	Search terms
S15	S7 and S14
S14	(S13 or S12 or S11 or S10 or S9 or S8)
S13	TX pediatric or TX pediatrics or TX paediatrics or TX paediatrics
S12	TX baby or TX babies
S11	TX infan*
S10	TX child*
S9	(MH "Adolescence+")
S8	(MH "Child+")
S7	(S1 or S2 or S3 or S4 or S5 or S6)
S6	(MH "Anesthesia, General+")
S5	(MH "Anesthesia+")
S4	anesthesia or anaesthesia
S3	sedat*
S2	(MH "Sedation")
S1	(MH "Conscious Sedation")

**The Cochrane Library**

No.	Search terms
#1	sedat*:ti,ab,kw
#2	MeSH descriptor Conscious Sedation, this term only
#3	MeSH descriptor Deep Sedation, this term only
#4	(anesthesia or anaesthesia):ti,ab,kw
#5	(#1 OR #2 OR #3 OR #4)
#6	child*:ti,ab,kw
#7	infan*:ti,ab,kw
#8	(baby or babies):ti,ab,kw
#9	adolescen*:ti,ab,kw
#10	(pediatric? or paediatric?):ti,ab,kw
#11	(#6 OR #7 OR #8 OR #9 OR #10)
#12	(#5 AND #11)

## 3.2 Study design filters

### 3.2.1 Randomised controlled trial (RCT) filters

#### Medline

No.	Search terms
1	randomized controlled trial\$.pt,sh.
2	clinical trial\$.pt,sh.
3	random allocation/
4	double blind method/
5	single blind method/
6	((clin\$ or control\$) adj5 trial\$).ti,ab.
7	((singl\$ or doubl\$ or trebl\$ or tripl\$) adj25 (blind\$ or mask\$)).ti,ab.
8	placebos/
9	placebo\$.ti,ab.
10	random\$.ti,ab.
11	(volunteer\$ or "control group" or controls or prospective\$).ti,ab.
12	research design/
13	or/1-12
14	animals/ not humans/
15	13 not 14

#### Embase

No.	Search terms
1	exp randomized controlled trial/
2	(random\$ or placebo\$).ti,ab.
3	((singl\$ or doubl\$ or trebl\$ or tripl\$) adj25 (blind\$ or mask\$)).ti,ab.
4	(clin\$ adj25 trial\$).ti,ab.
5	exp comparative study/
6	exp evaluation/
7	exp follow up/
8	exp prospective study/
9	(control\$ or prospective\$ or volunteer\$).ti,ab.
10	or/1-9
11	exp human/
12	10 and 11

#### Cinahl

No.	Search terms
S11	(s10 or s9 or s8 or s7 or s6 or s5 or s4 or s3 or s2 or s1)
S10	control* or prospective* or volunteer*
S9	(mh "quantitative studies")
S8	(mh "placebos")
S7	(mh "random assignment")
S6	random* or placebo*
S5	(singl* n25 mask*) or (doubl* n25 mask*) or (trebl* n25 mask*) or (tripl* n25 mask*)
S4	(singl* n25 blind*) or (doubl* n25 blind*) or (trebl* n25 blind*) or (tripl* n25 blind*)
S3	(clin* n25 trial*)
S2	pt clinical trial

S1 (mh "clinical trials+")

### 3.2.2 Systematic Review (SR) filters

#### *Medline / Embase*

No.	Search terms
1	review.pt. or review.ti. or "review"/
2	(systematic\$ or evidence\$ or methodol\$ or quantitativ\$ or analys\$ or assessment\$).ti,sh,ab.
3	1 and 2
4	meta-analysis.pt.
5	meta-analysis/
6	meta-analysis as topic/
7	"systematic review"/
8	(meta-analy\$ or metanaly\$ or metaanaly\$ or meta analy\$).ti,ab.
9	((systematic\$ or evidence\$ or methodol\$ or quantitativ\$) adj5 (review\$ or survey\$ or overview\$)).ti,ab,sh.
10	((pool\$ or combined or combining) adj2 (data or trials or studies or results)).ti,ab.
11	or/3-10

#### *Cinahl*

No.	Search terms
S13	S12 or S11 or S10 or S9 or S8 or S7 or S6
S12	(pool* N2 data) or (combined N2 data) or (combining N2 data) or (pool* N2 trials) or (combined N2 trials) or (combining N2 trials) or (pool* N2 studies) or (combined N2 studies) or (combining N2 studies) or (pool* N2 results) or (combined N2 results) or (combining N2 results)
S11	(systematic* N5 overview*) or (evidence* N5 overview*) or (methodol* N5 overview*) or (quantitativ* N5 overview*)
S10	(systematic* N5 survey*) or (evidence* N5 survey*) or (methodol* N5 survey*) or (quantitativ* N5 survey*)
S9	(systematic* N5 review*) or (evidence* N5 review*) or (methodol* N5 review*) or (quantitativ* N5 review*)
S8	(meta-analy* or metanaly* or metaanaly* or meta analy*)
S7	(MH "Meta Analysis")
S6	S4 and S5
S5	S3 or S2 or S1
S4	(systematic* or evidence* or methodol* or quantitativ* or analys* or assessment*)
S3	TI review
S2	(MH "Systematic Review")
S1	PT review

### 3.2.3 Observational study filters

#### *Medline*

No.	Search terms
1	exp Clinical Trial/
2	exp Clinical Trials as Topic/
3	exp Evaluation Studies/ or follow-up studies/ or prospective studies/
4	exp epidemiological studies/
5	cohort stud\$.ti,ab.
6	case control stud\$.ti,ab.

- 
- 7 ((crossover or cross-over or cross over) adj2 (design\$ or stud\$ or procedure\$ or trial\$)).ti,ab.  
8 or/1-7
- 

**Embase**

---

No.	Search terms
1	controlled study/
2	clinical study/ or major clinical study/ or clinical trial/ or phase 1 clinical trial/ or phase 2 clinical trial/ or phase 3 clinical trial/ or phase 4 clinical trial/
3	exp Longitudinal Study/
4	exp Cohort Analysis/
5	cohort studies.ti,ab.
6	(cross adj2 over adj2 (study or design)).ti,ab.
7	crossover procedure/
8	or/1-7

---

### 3.3 Exclusions Filter

The following filter was designed to remove irrelevant results from searches. If used it was combined into search strategies using the NOT operator.

#### *Medline / Embase*

No.	Search terms
1	letter.pt.
2	letter/
3	letter\$/
4	editorial.pt.
5	historical article.pt.
6	anecdote.pt.
7	commentary.pt.
8	note.pt.
9	case report/
10	case report\$.pt.
11	case study/
12	case study.pt.
13	exp animal/ not human/
14	nonhuman/
15	exp animal studies/
16	animals, laboratory/
17	exp experimental animal/
18	exp animal experiment/
19	exp animal model/
20	exp rodentia/
21	exp rodents/
22	exp rodent/
23	or/1-22

### 3.4 Drug efficacy

The following searches were combined with the sedation patient filter to identify studies on drug efficacy. The medline and embase results were combined with study design filters for RCTs and SRs. The exclusions filter was also used on these two databases.

#### Clinical question:

- Which sedation technique is the most appropriate (multifactorial)?

#### Medline

No.	Search terms
1	ketamine/
2	propofol/
3	midazolam/
4	diazepam/
5	morphine/
6	heroin/
7	fentanyl/
8	alfentanil/
9	meperidine/
10	nitrous oxide/
11	sevoflurane.mp.
12	triclofos.mp.
13	(remifentanyl or remifentanil).mp.
14	or/1-13
15	exp "Hypnotics and Sedatives"/
16	exp Anti-Anxiety Agents/
17	exp Analgesics, Opioid/
18	exp Anesthetics, Inhalation/
19	exp anesthetics/
20	exp analgesics/
21	or/15-20
22	14 or 21

#### Embase

No.	Search terms
1	ketamine/
2	propofol/
3	midazolam/
4	diazepam/
5	morphine/
6	diamorphine/
7	fentanyl/
8	alfentanil/
9	pethidine/
10	nitrous oxide/
11	sevoflurane/
12	triclofos/
13	remifentanil/
14	or/1-13
15	exp hypnotic sedative agent/

- 16 exp anxiolytic agent/  
 17 exp narcotic analgesic agent/  
 18 exp inhalation anesthetic agent/  
 19 exp anesthetic agent/  
 20 exp analgesic agent/  
 21 or/15-20  
 22 14 or 21

### **Cinahl**

<b>No.</b>	<b>Search terms</b>
S7	S6 or S5 or S4 or S3 or S2 or S1
S6	TX triclofos or TX remifentanyl or TX remifentanil
S5	(MH "Ketamine") or (MH "Propofol") or (MH "Midazolam") or (MH "Diazepam") or (MH "Morphine") or (MH "Heroin") or (MH "Fentanyl") or (MH "Alfentanil") or (MH "Meperidine") or (MH "Nitrous Oxide") or (MH "Sevoflurane")
S4	(MH "Anesthetics+")
S3	(MH "Analgesics+")
S2	(MH "Antianxiety Agents+")
S1	(MH "Hypnotics and Sedatives+")

### **The Cochrane Library**

<b>No.</b>	<b>Search terms</b>
#1	(ketamine or propofol or midazolam or diazepam or sevoflurane or morphine or diamorphine or heroin or fentanyl or alfentanil or alfentanyl or remifentanil or remifentanyl or meperidine or pethidine or triclofos or nitrous oxide):kw,ti,ab
#2	MeSH descriptor Analgesics explode all trees
#3	MeSH descriptor Anesthetics explode all trees
#4	MeSH descriptor Hypnotics and Sedatives explode all trees
#5	MeSH descriptor Anti-Anxiety Agents explode all trees
#6	(#1 OR #2 OR #3 OR #4 OR #5)

### 3.5 Opioids: specific drugs and routes of administration

Further searches were carried out to identify studies of the efficacy of opioids. These were limited by the GDG to specific drugs via specific routes of administration. The searches were combined with the sedation patient filter.

#### Clinical question:

- Which sedation technique is the most appropriate (multifactorial)?

#### Medline

No.	Search terms
1	fentanyl/
2	morphine/
3	heroin/
4	intravenous.hw.
5	1 or 2
6	4 and 5
7	intranasal.hw.
8	3 and 7
9	6 or 8

#### Embase

No.	Search terms
1	fentanyl/iv
2	morphine/iv
3	diamorphine/na
4	or/1-3

#### Cinahl

No.	Search terms
S1	(MH "Morphine") or (MH "Heroin") or (MH "Fentanyl")

#### The Cochrane Library

No.	Search terms
#1	(intravenous near/2 fentanyl):kw,ti,ab
#2	(intravenous near/2 morphine):kw,ti,ab
#3	(intranasal near/2 heroin):kw,ti,ab
#4	(intranasal near/2 diamorphine):kw,ti,ab
#5	(#1 OR #2 OR #3 OR #4)

### 3.6 Adverse effects of drugs

The sedation patient filter was combined with the following searches to retrieve papers on the adverse effects of drugs used for sedation.

#### Clinical question:

- Which sedation technique is the most appropriate (multifactorial)?

#### Medline

No.	Search terms
1	midazolam/ae, to
2	nitrous oxide/ae, to
3	ketamine/ae, to
4	temazepam/ae, to
5	propofol/ae, to
6	Chloral Hydrate/ae, to
7	triclofos.ti,ab,hw. and (ae or to).fs.
8	isoflurane/ae, to
9	sevoflurane.ti,ab,hw. and (ae or to).fs.
10	exp Analgesics, Opioid/ae, to
11	or/1-10

#### Embase

No.	Search terms
1	midazolam/ae, to
2	nitrous oxide/ae, to
3	ketamine/ae, to
4	temazepam/ae, to
5	propofol/ae, to
6	triclofos/ae, to
7	Chloral Hydrate/ae, to
8	Isoflurane/ae, to
9	sevoflurane/ae, to
10	exp narcotic analgesic agent/ae, to
11	or/1-10

#### Cinahl

No.	Search terms
S7	S1 or S2 or S3 or S4 or S5 or S6
S6	MW "adverse effects"
S5	complication* or tolerability
S4	drug* n2 safe*
S3	toxic*
S2	side effect*
S1	adverse* and (effect* OR reaction* OR event*)

**The Cochrane Library**

No.	Search terms
#1	(ketamine or propofol or midazolam or diazepam or sevoflurane or morphine or diamorphine or heroin or fentanyl or alfentanil or alfentanil or remifentanil or remifentanyl or meperidine or pethidine or triclofos or nitrous oxide or chloral hydrate or isoflurane or temazepam):kw,ti,ab
#2	MeSH descriptor Analgesics explode all trees
#3	MeSH descriptor Anesthetics explode all trees
#4	MeSH descriptor Hypnotics and Sedatives explode all trees
#5	MeSH descriptor Anti-Anxiety Agents explode all trees
#6	(#1 OR #2 OR #3 OR #4 OR #5)
#7	Any MeSH descriptor with qualifiers: AE,TO
#8	((adverse*) near/2 (effect* OR reaction* OR event*)):ti,ab,kw
#9	side effect*:tw,ab,ti
#10	toxic*:ti,ab,kw
#11	drug* near/2 safe*:ti,ab,kw
#12	(complication* or tolerability):ti,ab,kw
#13	(#7 OR #8 OR #9 OR #10 OR #11 OR #12)
#14	(#6 AND #13)

### 3.7 Adverse effects of endoscopy

The following searches were combined with the modified patient filter.

#### Clinical question:

- Do the specific complications of endoscopy (perforation/bleed) differ in frequency (or severity - probably much more difficult to measure) when using general anaesthetic versus sedation techniques in children (<18)?

#### Medline

No.	Search terms
1	exp endoscopy/
2	perforation.hw.
3	Gastrointestinal Hemorrhage/ (bleed* or hematochezia or haematochezia or hemorrhage or haemorrhage or
4	perforat*).ti,ab.
5	or/2-4
6	1 and 5

#### Embase

No.	Search terms
1	exp endoscopy/
2	perforation.hw.
3	exp bleeding/ (bleed* or hematochezia or haematochezia or hemorrhage or haemorrhage or
4	perforat*).ti,ab.
5	or/2-4
6	1 and 5

#### Cinahl

No.	Search terms
S6	S1 and S5
S5	(S2 or S3 or S4)
S4	bleed* or hematochezia or haematochezia or hemorrhage or haemorrhage or perforat*
S3	(MH "Gastrointestinal Hemorrhage")
S2	MW perforation
S1	(MH "Endoscopy+")

#### The Cochrane Library

No.	Search terms
#1	MeSH descriptor Endoscopy explode all trees
#2	*scopy:ti,ab,kw
#3	(#1 OR #2)
#4	(bleed* or hematochezia or haematochezia or hemorrhage or haemorrhage or perforat*):ti,ab,kw
#5	(#3 AND #4)

### 3.8 Psychological preparation for patients undergoing sedation

These searches were combined with the modified patient filter.

#### Clinical questions:

- What standard psychological preparation should be used for patients who are going to receive sedation?
- What coping skills should be discussed with patients and their families?

#### Medline

No.	Search terms
1	exp parents/
2	1 or <b>child filter</b>
3	psychological preparation.ti,ab.
4	stress, psychological/pc
5	anxiety/pc
6	dental anxiety/pc
7	play therapy/
8	adaptation, psychological/
9	patient education as topic/
10	or/3-9
11	2 and 10

#### Embase

No.	Search terms
1	exp parent/
2	1 or <b>child filter</b>
3	psychological preparation.ti,ab.
4	anxiety/
5	dental anxiety/
6	play therapy/
7	coping behavior/
8	patient education/
9	or/3-8
10	2 and 9

#### Cinahl

No.	Search terms
S13	S3 and S12
S12	S4 or S5 or S6 or S7 or S8 or S9 or S10 or S11
S11	(MH "Patient Education")
S10	(MH "Adaptation, Psychological")
S9	(MH "Coping")
S8	(MH "Play Therapy")
S7	(MH "Dental Anxiety/PC")
S6	(MH "Anxiety/PC")
S5	(MH "Stress, Psychological/PC")
S4	psychological preparation

S3 S1 or S2 or *child filter*  
S2 parent\*  
S1 (MH "Parents+")

---

### ***The Cochrane Library***

---

<b>No.</b>	<b>Search terms</b>
#1	parent*:kw,ab,ti
#2	(#1 OR <i>child filter</i> )
#3	(psychological preparation or play therapy or adaptation or coping or patient prepar* or patient education or patient inform*):ti,ab,kw
#4	((anxiety or stress) near/2 prevent*):ti,ab,kw
#5	(#3 OR #4)
#6	(#2 AND #5)

---

### 3.9 Sedation sparing

The following searches were combined with the sedation patient filter.

#### Clinical question:

- Does a combination of psychological techniques and sedation drugs lead to sedation sparing?

#### Medline

No.	Search terms
1	exp Hypnosis/
2	breathing exercises/
3	exp parents/ed, px
4	virtual reality.ab,ti.
5	play therapy/
6	music.hw.
7	relaxation/ or relaxation therapy/
8	(psycholog* adj (technique* or strateg* or intervention*).ti,ab.
9	"Imagery (Psychotherapy)"/
10	distract*.ti,ab.
11	cognitive therapy/
12	memory/
13	or/1-12

#### Embase

No.	Search terms
1	hypnosis/
2	breathing exercise/
3	virtual reality/
4	play therapy/
5	music.hw.
6	relaxation training/
7	(psycholog* adj (technique* or strateg* or intervention*).ti,ab.
8	exp psychotherapy/
9	distract*.ti,ab.
10	memory/
11	exp parent/
12	or/1-11

#### Cinahl

No.	Search terms
S15	S1 or S2 or S3 or S4 or S5 or S6 or S7 or S8 or S9 or S10 or S11 or S12 or S13 or S14
S14	psycholog* and (technique* or strateg* or intervention*)
S13	(MH "Behavior Therapy")
S12	(MH "Cognitive Therapy")
S11	(MH "memory")
S10	(MH "Guided Imagery")
S9	(MH "Distraction")
S8	(MH "Relaxation Techniques")
S7	(MH "Music Therapy")

- S6 (MH "Play Therapy")  
 S5 (MH "Virtual Reality")  
 S4 (MH "Parenting Education")  
 S3 (MH "Parents+ /ED/PF")  
 S2 (MH "Breathing Exercises")  
 S1 (MH "Hypnosis")
- 

### ***The Cochrane Library***

<b>No.</b>	<b>Search terms</b>
#1	(hypnosis or hypnotis* or parent* or breathing exercise* or virtual reality or play therapy or relaxation or music or imagery or distract* or memory):ti,ab,kw
#2	psychotherapy:ti,ab,kw
#3	(psycholog* near (technique or strateg* or intervention*)):ti,ab,kw
#4	((cognitive or behaviour or behavior) near/2 therapy) or CBT:ti,ab,kw
#5	(#1 or #2 or #3 or #4)

### 3.10 Sedation Assessment Tools

The following searches were combined with the sedation patient filter. The medline and embase results were combined with study design filters for RCTs, SRs and observational studies. The exclusions filter was also used on these two databases.

#### Clinical question:

- What validated tools should be used to support assessment?

#### Medline

No.	Search terms
1	(risk adj2 (engine\$ or equation\$ or calculation\$ or table\$ scor\$)).ti,ab.
2	scor\$ system\$.ti,ab.
3	risk model\$.ti,ab.
4	Disease severity grad\$.ti,ab.
5	(assess\$ adj2 (indice\$ or tool\$)).ti,ab.
6	*Questionnaires/
7	(sedation adj3 questionnaire\$).ti,ab.
8	Predictive value of tests/
9	Severity of illness Index/
10	valid\$ tool\$.ti,ab.
11	algorithms/
12	algorithm\$.ti,ab.
13	*Risk Assessment/
14	*Factor Analysis, Statistical/
15	*Regression Analysis/
16	*Logistic Models/
17	*Analysis Of Variance/
18	*multivariate analysis/
19	or/68-85

#### Embase

No.	Search terms
1	(risk adj2 (engine\$ or equation\$ or calculation\$ or table\$ scor\$)).ti,ab.
2	scor\$ system\$.ti,ab.
3	risk model\$.ti,ab.
4	Disease severity grad\$.ti,ab.
5	(assess\$ adj2 (indice\$ or tool\$)).ti,ab.
6	Clinical Assessment Tool/
7	*Questionnaire/
8	(sedation adj3 questionnaire\$).ti,ab.
9	"prediction and forecasting"/
10	valid\$ tool\$.ti,ab.
11	exp algorithm/
12	algorithm\$.ti,ab.
13	*Risk Assessment/
14	*Factor Analysis, Statistical/
15	*Regression Analysis/
16	*Logistic Models/
17	*Analysis Of Variance/
18	*multivariate analysis/

- 19 \*scoring system/  
20 or/1-19

### **Cinahl**

<b>No.</b>	<b>Search terms</b>
S1	assess* n3 tool* or assess* n3 indice* or sedation n3 questionnaire* or risk n3 assess* or scor* n1 system* or risk n2 engine* or risk n2 calculat* or risk n2 table* or risk n2 scor* or risk n2 model* or algorithim* or valid* n3 tool*

### **The Cochrane Library**

<b>No.</b>	<b>Search terms</b>
#1	MeSH descriptor Predictive Value of Tests explode all trees
#2	MeSH descriptor Severity of Illness Index explode all trees
#3	(assess* near (indice* or tool*)):ti,ab,kw
#4	(Disease severity grad*):ti,ab,kw
#5	(risk near2 (engine* or calculat* or equation* or table* or scor* or model*)):ti,ab,kw
#6	(scor* next system*):ti,ab
#7	(valid* tool*):ti,ab,kw
#8	MeSH descriptor Algorithms explode all trees
#9	(algorithm*):ti,ab,kw
#10	(#1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9)

### 3.11 Fasting before paediatric sedation

The following searches were combined with the sedation patient filter. The medline and embase results were combined with study design filters for RCTs and observational studies.

#### Clinical question:

- Should patients be fasted before sedation?

#### Medline

No.	Search terms
1	fasting/ (meal or meals or solids or drink* or eat* or food* or feed* or fasting* or fasted* or
2	starv* or "nil by mouth" or NPO or "nulla per os" or "nothing by mouth").ti,ab.
3	or/1-2

#### Embase

No.	Search terms
1	exp diet restriction/ (meal or meals or solids or drink* or eat* or food* or feed* or fasting* or fasted* or
2	starv* or "nil by mouth" or NPO or "nulla per os" or "nothing by mouth").ti,ab.
3	1 or 2

#### Cinahl

No.	Search terms
S3	S1 or S2 (meal or meals or solids or drink* or eat* or food* or feed* or fasting* or fasted* or
S2	starv* or "nil by mouth" or NPO or "nulla per os" or "nothing by mouth")
S1	(MH "Fasting") or (MH "Preprocedural Fasting")

#### The Cochrane Library

No.	Search terms
#1	MeSH descriptor Fasting explode all trees (meal or meals or solids or drink* or eat* or food* or feed* or fasting* or fasted* or
#2	starv* or "nil by mouth" or NPO or "nulla per os" or "nothing by mouth").ti,ab,kw
#3	(#1 OR #2)

### 3.12 Fasting before paediatric anaesthesia

The following searches were performed to update the Royal College of Nursing (RCN) guidance on perioperative fasting in adults and children. These searches were restricted by date to retrieve studies published since 2004, the date of the last search in the RCN guideline. The medline and embase results were combined with study design filters for RCTs and observational studies. The paediatric age group filters (from the sedation patient filters, section 1.1.1 above) were applied to all of the following searches.

#### Medline

No.	Search terms
1	exp anesthesia/
2	(anesthe\$ or anaesthe\$).ti,ab.
3	or/1-2
4	fasting/
5	(meal or meals or solids or drink* or eat* or food* or feed* or fasting* or fasted* or starv* or "nil by mouth" or NPO or "nulla per os" or "nothing by mouth").ti,ab.
6	or/4-5
7	3 and 6

#### Embase

No.	Search terms
1	exp anesthesia/
2	(anesthe* or anaesthe*).ti,ab.
3	or/1-2
4	exp diet restriction/
5	(meal or meals or solids or drink* or eat* or food* or feed* or fasting* or fasted* or starv* or "nil by mouth" or NPO or "nulla per os" or "nothing by mouth").ti,ab.
6	or/4-5
7	3 and 6

#### Cinahl

No.	Search terms
S7	S3 and S6
S6	S4 or S5
S5	(meal or meals or solids or drink* or eat* or food* or feed* or fasting* or fasted* or starv* or "nil by mouth" or NPO or "nulla per os" or "nothing by mouth")
S4	(MH "Fasting") or (MH "Preprocedural Fasting")
S3	S1 or S2
S2	anesthe* or anaesthe*
S1	(MH "Anesthesia+")

#### The Cochrane Library

No.	Search terms
#1	MeSH descriptor Anesthesia explode all trees
#2	(anesthe* or anaesthe*):ti,ab,kw
#3	(#1 OR #2)
#4	MeSH descriptor Fasting explode all trees
#5	(meal or meals or solids or drink* or eat* or food* or feed* or fasting* or fasted* or starv* or "nil by mouth" or NPO or "nulla per os" or "nothing by mouth"):ti,ab,kw
#6	(#4 OR #5)
#7	(#3 AND #6)

### 3.13 Health Economics

The sedation in children patient filter was combined with the following filters for health economics and quality of life studies. Searches for health economics were performed on Medline, Embase, the Health Technology Appraisals (HTA) database and the NHS Economic Evaluations Database (NHSEED) in accordance with the NICE Guidelines Manual. The latter two databases were searched via the Cochrane Library with no study design filters applied. Health economics searches were restricted by date on medline and embase to studies published since 2006.

#### Medline

No.	Search terms
1	exp "costs and cost analysis"/
2	economics/
3	exp economics, hospital/
4	exp economics, medical/
5	exp economics, nursing/
6	exp economics, pharmaceutical/
7	exp "fees and charges"/
8	exp budgets/
9	ec.fs.
10	(economic\$ or pharmacoeconomic\$ or price\$ or pricing\$ or cost\$ or budget\$).ti,ab.
11	(value adj2 (money or monetary)).ti,ab.
12	(expenditure not energy).ti,ab.
13	or/1-12
14	((metabolic or energy or oxygen) adj1 cost\$).ti,ab.
15	13 not 14
16	exp quality-adjusted life years/
17	quality adjusted life.tw.
18	exp "quality of life"/
19	value of life/
20	(qaly\$ or qald\$ or qale\$ or qtime\$).tw.
21	disability adjusted life.tw.
22	daly\$.tw.
23	health status indicators/
24	(sf36 or sf 36 or short form 36 or shortform 36 or sf thirtysix or sf thirty six or shortform thirtysix or shortform thirty six or short form thirtysix or short form thirty six).tw.
25	(sf6 or sf 6 or short form 6 or shortform 6 or sf six or sfsix or shortform six or short form six).tw.
26	(sf12 or sf 12 or short form 12 or shortform 12 or sf twelve or sftwelve or shortform twelve or short form twelve).tw.
27	(sf16 or sf 16 or short form 16 or shortform 16 or sf sixteen or sfsixteen or shortform sixteen or short form sixteen).tw.
28	(sf20 or sf 20 or short form 20 or shortform 20 or sf twenty or sftwenty or shortform twenty or short form twenty).tw.
29	(euroqol or euro qol or eq5d or eq 5d).tw.
30	(hql or hqol or h qol or hrqol or hr qol).tw.
31	(hye or hyes).tw.
32	health\$ year\$ equivalent\$.tw.
33	health utilit\$.tw.
34	(hui or hui1 or hui2 or hui3).tw.
35	disutili\$.tw.
36	rosser.tw.
37	quality of well?being.tw.
38	qwb.tw.

- 39 willingness to pay.tw.  
 40 standard gamble\$.tw.  
 41 time trade off.tw.  
 42 time tradeoff.tw.  
 43 tto.tw.  
 44 or/16-43  
 45 15 or 44

**Embase**

No.	Search terms
1	health economics/
2	exp economic evaluation/
3	exp health care cost/
4	exp pharmacoeconomics/
5	exp fee/
6	budget/
7	(economic\$ or pharmacoeconomic\$ or cost\$ or price\$ or pricing\$ or budget\$.ti,ab.
8	(value adj2 (money or monetary\$)).ti,ab.
9	(expenditure not energy).ti,ab.
10	or/1-9
11	((metabolic or energy or oxygen) adj1 cost\$.ti,ab.
12	10 not 11
13	quality adjusted life year/
14	quality of life/
15	(qaly\$ or qald\$ or qale\$ or qtime\$.tw.
16	daly\$.tw.
17	quality adjusted life.tw.
18	disability adjusted life.tw.
19	(sf36 or sf 36 or short form 36 or shortform 36 or sf thirtysix or sf thirty six or shortform thirtysix or shortform thirty six or short form thirtysix or short form thirty six).tw.
20	(sf6 or sf 6 or short form 6 or shortform 6 or sf six or sfsix or shortform six or short form six).tw.
21	(sf12 or sf 12 or short form 12 or shortform 12 or sf twelve or sftwelve or shortform twelve or short form twelve).tw.
22	(sf16 or sf 16 or short form 16 or shortform 16 or sf sixteen or sfsixteen or shortform sixteen or short form sixteen).tw.
23	(sf20 or sf 20 or short form 20 or shortform 20 or sf twenty or sftwenty or shortform twenty or short form twenty).tw.
24	(euroqol or euro qol or eq5d or eq 5d).tw.
25	(hql or hqol or h qol or hrqol or hr qol).tw.
26	(hye or hyes).tw.
27	health\$ year\$ equivalent\$.tw.
28	health utilit\$.tw.
29	(hui or hui1 or hui2 or hui3).tw.
30	disutili\$.tw.
31	rosser.tw.
32	quality of well?being.tw.
33	qwb.tw.
34	willingness to pay.tw.
35	standard gamble\$.tw.
36	time trade off.tw.
37	time tradeoff.tw.
38	tto.tw.
39	or/13-38
40	12 or 39

## **4 Appendix D - Evidence tables**

See separate file.

## **5 Appendix E- Meta-analyses forest plot**

See separate file.

## **6 Appendix F - Cost-effectiveness analysis**

See separate file.

## **7 Appendix G - Recommendations for research**

See separate file.

## **8 Appendix H-Review protocol form**

See separate file.

## **9 Appendix I - AGREE Tool**

See separate file

## **10 Appendix J – Licensing indications**

See separate file.