Conscious Sedation in Dentistry

Dental Clinical Guidance

Surveillance Review Report

December 2022

Scottish Dental
Clinical Effectiveness Programme

Guidance updating decision

SDCEP has determined that until there is a further update to the IACSD Report, the 3rd edition of Conscious Sedation in Dentistry should remain unchanged. Further review of this guidance may be triggered if any significant developments are identified prior to the next scheduled review in 2027.

1 Background

The 3rd edition of SDCEP's Conscious Sedation in Dentistry guidance was published in 2017.[1] The guidance topic was due for review in 2022 in line with SDCEP's five-year guidance review policy. A surveillance review was carried out to assess whether there were any developments in the area or changes in the evidence base that would impact on the guidance recommendations and inform any updating.

2 Surveillance review methods

The following steps were carried out by SDCEP to assess whether the recommendations in the guidance remain up to date.

- All guidelines used previously as sources were checked for updated versions.
- New guidelines relevant to the topic were sought by checking websites and publications of known guideline providers and relevant professional bodies including:
  - Scottish Intercollegiate Guideline Network (SIGN)
  - National Institute for Health and Care Excellence (NICE)
  - Guidelines International Network (GIN) International Guideline Library
  - ECRI Guidelines Trust
  - American Dental Association (ADA)
  - American Academy of Pediatric Dentistry (AAPD)
  - European Association of Paediatric Dentistry (EAPD)
  - American Society of Anesthesiologists (ASA)
  - European Society of Anaesthesiology (ESA)

  and via PubMed.
- Updated and new guidelines were assessed for any changes or recommendations that might impact on the guidance (see Appendix 1 for details).
- A search of the Cochrane Database of Systematic Reviews and Epistemonikos, from April 2016 to August 2022, for new systematic reviews relevant to dental sedation and meeting the inclusion criteria used previously for the guidance was carried out.
- The conclusions of new systematic reviews were checked to assess the impact on the guidance recommendations (see Appendix 2 for details).
- Information on other developments relevant to the topic was sought from stakeholders.
- Feedback on the 3rd edition of Conscious Sedation in Dentistry was considered.

A summary of the review findings is provided in Section 3, with more details provided in Appendices 1-3.

The sedation Guidance Development Group (GDG) and the SDCEP Steering Group were consulted on proposals for the guidance updating based on an assessment of the review (see Section 4).

3 Surveillance review summary

The key sources informing the recommendations presented in SDCEP's Conscious Sedation in Dentistry guidance were the Intercollegiate Advisory Committee for Sedation in Dentistry (IACSD) report, 'Standards for Conscious Sedation in the Provision of Dental Care', the Academy of Medical Royal Colleges (AoMRC) 'Safe Sedation Practice for Healthcare Procedures: Standards and Guidance' and National Institute for Health and Care Excellence (NICE) guideline, 'Sedation in under 19s: using sedation for diagnostic and therapeutic procedures'.[2-4] All have been updated to some extent since publication of SDCEP's guidance. The European Association of Paediatric Dentistry (EAPD) 'Guidelines on Sedation in Paediatric Dentistry'[5] have also been updated. Key points from these updates are:

- The 2020 edition of the IACSD report now incorporates the FAQs that were published subsequent to the first edition to clarify points within it, with no other significant changes.[6] A full review is not planned to take place before the end of 2022. The SDCEP guidance reflects the recommendations made in the IACSD report and FAQs.
- The AoMRC published a supplementary update to their guidance in 2021,[7] which provides a summary of more explicit recommendations based on the narrative advice in the full 2013 guidance. Some of these recommendations are more stringent than previously (e.g. for fasting, monitoring and number of staff required). However, the AoMRC advise that the IACSD standards should be followed for dental sedation.
- NICE carried out a review of their 2010 guideline and published a surveillance report in 2018.[8] No new evidence that impacted on the recommendations or new research studies in progress were found. A recommendation was slightly amended to advise referring to professional guidance for the appropriate fasting regime, in circumstances when fasting is advised (these circumstances are unchanged). NICE notes that some professional bodies support a reduction of the fasting period for clear liquids from 2 to 1 hour for children.
- The EAPD replaced previous guidelines in 2021 with a new version incorporating data from an updated Cochrane review on sedation of children for dental treatment.[9,10] The recommended sedation drugs are still nitrous oxide/oxygen or midazolam by any route, although there has been an increase in evidence certainty to moderate for oral midazolam.

Evidence from nine systematic reviews supported the recommendations made in the SDCEP guidance, particularly those relating to sedation techniques. Twenty-four new systematic reviews, published since 2016, were identified through the surveillance review searches.

- Thirteen systematic reviews, including the updated Cochrane review above, relate to the effectiveness of various sedation drugs for dental treatment, individually or in

combination, for adults and/or children.[9,11-22] None have conclusions that would directly impact on the recommendations included in the guidance.

- Two of the systematic reviews relate to capnography and report evidence, for non-dental procedures, supporting its use.[23,24] The advice in the SDCEP guidance is aligned with the most recent IACSD report, which does not recommend capnography for routine monitoring of ASA grade I and II patients.
- One systematic review concluded that bispectral index (BIS) might be a useful indicator of sedation level.[25] BIS is not included in the IACSD report or AoMRC guidance and is unlikely to be widely available in dental practice.
- Eight of the systematic reviews assessed sedative agents (chloral hydrate,[26] dexmedetomidine[27-32] and remimazolam[33]) that are not currently routinely used in UK dental practice and are not included in the IACSD report. Remimazolam is a newer, ultra-short acting benzodiazepine which may be increasingly used for dental sedation in future.

Other developments:

- Anecdotally, there may be increased use of advanced sedation techniques, including drug combinations, in Scotland for complex or lengthy procedures.
- The term 'Conscious sedation' is no longer used by some professional bodies, including the AoMRC, the European Society of Anaesthesiology and the American Society of Anesthesiologists, who use the term procedural sedation and analgesia (PSA).
- Recommendations for sedation in updated European and American anaesthesiology society guidelines,[34,35] like the AoMRC update, are more stringent than those currently used in dentistry in the UK.
- There is increasing awareness and information about the environmental impact of anaesthetic gases, including those used in dental sedation, such as nitrous oxide.

4 Assessment

Much of the SDCEP guidance is concerned with advising on the appropriate environment, staff and training, rather than clinical details of sedation, therefore few of the recommendations are evidence based and are instead based on expert opinion and other guidelines. Most of the research evidence about dental sedation relates to effectiveness of various sedation drugs and none of the new evidence about this identified through the surveillance review of the topic directly impacts on the key recommendations. Although there are new systematic reviews reporting evidence on the use of capnography, the single dental study included did not find a significant reduction in hypoxaemia incidence. The advice on capnography in the SDCEP guidance aligns with that currently provided by IACSD.

The four UK CDOs and the GDC are listed as corresponding members of the committee for the 2020 IACSD report and the AoMRC advise that these standards are followed for sedation in dental settings. Consequently, the IACSD report is considered an authoritative source. The 2017 SDCEP

guidance essentially comprises implementation advice for the IACSD standards and remains consistent with the current version of the IACSD report.

Based on the findings of the surveillance review, it was proposed that the SDCEP Conscious Sedation in Dentistry guidance remains unchanged until the IACSD standards are reviewed and updated. This avoids the risk of inconsistent recommendations between the two documents and confusion for the profession. The majority of GDG members, who responded to a questionnaire, and the SDCEP Steering Group agreed with the proposal.

It is anticipated that IACSD will need to decide whether to align with UK and international anaesthesiology guidelines regarding developments such as capnography, ECG, supplemental oxygen and staff required. Changes to the requirements for these are likely to have significant implications for dental sedation providers and it will be important to consult with this stakeholder group about proposed updates. The inclusion of the benzodiazepine remimazolam could also be considered.

GDG members also supported a further proposal to provide supplementary sedation-related environmental sustainability advice. SDCEP will consider how to take this forward.

Regarding advice on fasting regimes, it was judged best at this time not to include a note advising that some professional bodies support a reduction to 1 hour of the fasting period for clear fluids for children. Although noted by NICE, this reduction is not currently accepted by all professional bodies and would not change the SDCEP guidance key recommendation on fasting. This decision will be reviewed when the IACSD report has been updated.

Appendix 1 Details of updated and additional guidelines

The details of the updates to the source guidelines that informed the 2017 edition of Conscious Sedation in Dentistry, and of two newer anaesthesiology guidelines, are described below.

AoMRC Safe Sedation Practice for Healthcare Procedures. Standards and Guidance

The AoMRC published an update to their 2013 'Safe Sedation Practice for Healthcare Procedures Standards and Guidance' in 2021.[3,7] The update does not replace the 2013 publication but provides a summary of more explicitly stated recommendations based on the narrative advice provided previously. The update no longer uses the term 'conscious sedation'.

Several of the recommendations represent a more stringent interpretation of the content of the 2013 version that they cite. For example, previously AoMRC included extracts from NICE guidance on sedation of children, which advises that fasting is not necessary for 'moderate sedation during which the child or young person will maintain verbal contact with the healthcare professional'. The 2021 AoMRC update states that 'Fasting before sedation is recommended for patients undergoing moderate or deep sedation', citing their 2013 document and the NICE guidance.

Similarly, the update recommends that there should be at least 3 members of the procedural team except for 'brief procedures, such as dental extractions performed under minimal sedation' whereas the 2013 AoMRC guidance previously advised that 2 members of the team are sufficient for brief, simple procedures carried out under 'Moderate Sedation/Analgesia ('Conscious Sedation')'.

The update also recommends that in addition to pulse oximetry, capnography, electrocardiography (ECG) and automated non-invasive blood pressure should all be used for monitoring patients undergoing any sedation deeper than minimal, whereas previously ECG monitoring was non-essential for conscious sedation and capnography was considered a 'developmental standard'. The use of supplemental oxygen for fit patients undergoing brief, simple procedures, also previously a developmental standard, is now recommended for sedation deeper than minimal sedation for any patient.

Although links to the 2013 AoMRC guidance and other sources are included, no other details of the methodology used to develop the recommendations in the update are provided. No new evidence is discussed.

However, notably, the update states that:
'These recommendations are primarily intended for the use of hospitals and clinics in which sedation for non-dental procedures is given. Dental sedationists practising in primary or secondary care settings should ensure that standards of practice are in accordance with those detailed in guidance published by the Intercollegiate Advisory Committee for Sedation in Dentistry (IACSD)', making reference to the 2020 version of the IACSD report.

IACSD Standards for Conscious Sedation in the Provision of Dental Care

The IACSD published an updated version of the 'Standards for Conscious Sedation in the Provision of Dental Care' in 2020.[6] Since no new clinical evidence or safety issues were identified in their review of the topic, no substantial changes were made to the report.

The updated report does incorporate the IACSD Standards for Conscious Sedation frequently asked questions published on the Royal College of Surgeons of England, Faculty of Dental Surgery website but these were considered during the development of SDCEP's Conscious Sedation in Dentistry guidance.

IACSD note that a detailed review and update of the Standards should be considered by the end of 2022. If IACSD adopt the more stringent AoMRC recommendations when updating, this is likely to have significant implications for the provision of conscious sedation in dentistry.

NICE Sedation in under 19s: using sedation for diagnostic and therapeutic procedures

NICE carried out a review of their 2010 guideline and published a surveillance report in 2018.[8] Three newer systematic reviews, and a number of studies identified in their 2012 evidence update,[36] were considered. However, this evidence did not impact on the recommendations and no new ongoing research studies were found. The outcome of the surveillance review and stakeholder consultation was that an update was not necessary.

Although no new edition of the guidance was published, one of the recommendations about fasting was slightly amended to reflect a change in the fasting regime for general anaesthesia adopted by other professional bodies such as the Association of Paediatric Anaesthetists of Great Britain and Ireland.[37]

Previously the NICE guideline recommendations stated:

'1.2.2 Fasting is not needed for: minimal sedation, sedation with nitrous oxide (in oxygen), moderate sedation during which the child or young person will maintain verbal contact with the healthcare professional.

1.2.3 Apply the 2-4-6 fasting rule for elective procedures using any sedation technique other than those in recommendation 1.2.2 (that is, apply the 2-4-6 fasting rule for deep sedation and moderate sedation during which the child or young person might not maintain verbal contact with the healthcare professional).'

Recommendation 1.2.2 is unchanged.

Recommendation 1.2.3 was revised to state:

'1.2.3 Refer to professional guidance for fasting for elective procedures using any sedation technique other than those in recommendation 1.2.2 (that is, for deep sedation and moderate sedation during which the child or young person might not maintain verbal contact with the healthcare professional).'

With the footnote:

'Note that in 2018 a change to the 2-4-6 fasting rule (fasting times should be as for general anaesthesia: 2 hours for clear fluids; 4 hours for breast milk; 6 hours for solids) was endorsed by

the relevant professional bodies (see for example the Association of Paediatric Anaesthetists of Great Britain and Ireland consensus statement on clear fluids fasting for elective pediatric general anesthesia), supporting a reduction to 1 hour of the fasting period for clear fluids.'

The SDCEP guidance makes reference to the 2-4-6 fasting rule for some circumstances, as does the IACSD report.

EAPD Guidelines on Sedation in Paediatric Dentistry

The EAPD 'Guidelines on Sedation in Paediatric Dentistry' were replaced in 2021 by the 'Best clinical practice guidance for conscious sedation of children undergoing dental treatment: an EAPD policy document'.[10]

The main change to this guideline is the inclusion of a section supporting evidence-based recommendations about the different sedative agents. This section incorporates results from an updated Cochrane review (Ashley et al., 2018),[9] supplemented with updated searches, and follows a high-quality methodology, using the GRADE approach to rate the evidence certainty and assign a strength to each of the recommendations. For the sedation of children needing dental treatment the guideline recommends the use of nitrous oxide/oxygen (weak recommendation based on very low certainty evidence), oral midazolam (strong recommendation based on moderate certainty evidence) or midazolam delivered by IV or transmucosal routes (weak recommendation based on very low certainty evidence). Chloral hydrate, meperidine and diazepam are not recommended as sedation agents.

These recommendations are consistent with the SDCEP guidance advice to use inhalation sedation with nitrous oxide/oxygen as the preferred technique for children (under 12 years of age), and inhalation sedation with nitrous oxide/oxygen or intravenous, oral or transmucosal midazolam for young people (12-16 years old), noting that these are all considered standard techniques for the age groups specified.

The 2021 EAPD guideline also includes a change in the fasting advice to now align with the advice in the SDCEP guidance to base this on assessment of the individual circumstances. Other minor updates include the addition of further contraindications to the use of sedative agents; these details were not included in the scope of the SDCEP guidance so do not impact on the guidance. Advice on clinical signs, pulse oximetry and blood pressure monitoring have been slightly amended but are consistent with those included in the SDCEP guidance.

AAPD Guideline on Use of Nitrous Oxide for Pediatric Dental Patients

The American Academy of Pediatric Dentistry (AAPD) 'Guideline on Use of Nitrous Oxide for Pediatric Dental Patients' was revised in 2018.[38] Although the update includes some additional advice and information points derived from other sources, none of these impact on the SDCEP guidance recommendations. Furthermore, the methodology used for the AAPD guideline update was low quality as for the 2016 version, such that it does not form a strong basis for informing changes to the recommendations.

ADA Guidelines

Although the American Dental Association (ADA) 'Guidelines for Teaching Pain Control and Sedation to Dentists and Dental Students' and 'Guidelines for the Use of Sedation and General Anaesthesia by Dentists' were updated in 2016[39,40] after the original searches were conducted for the SDCEP guidance, these updates were considered during the guidance development and are documented in the SDCEP guidance methodology document.

AAP/AAPD Guidelines for Monitoring and Management of Pediatric Patients Before, During, and After Sedation for Diagnostic and Therapeutic Procedures

The American Academies of Pediatrics and of Pediatric Dentistry (AAP & AAPD) 'Guidelines for Monitoring and Management of Pediatric Patients Before, During, and After Sedation for Diagnostic and Therapeutic Procedures' were revised in 2018.[41] However, the update was limited to revisions to the information on personnel for deep sedation/general anaesthesia, which is not included in the scope of the SDCEP guidance.

Additional guidelines

Additional anaesthesiology guidelines, not specific to dental sedation, were also identified and were assessed for relevant recommendations.

The European Society of Anaesthesiology (ESA) and European Board of Anaesthesiology published 'guidelines for procedural sedation and analgesia in adults' in 2018.[34] This guideline provides evidence-based recommendations, although evidence relating to dental surgery was excluded.

While acknowledging a lack of evidence about the effectiveness of pre-procedural fasting to reduce adverse outcomes, the ESA guideline provides a weak recommendation for a single protocol as used for pre-operative fasting prior to surgery to avoid confusion and mistakes. The guideline also makes strong recommendations for monitoring using capnography and ECG for all patients undergoing procedural sedation.

The American Society of Anesthesiologists (ASA) 'Practice Guidelines for Moderate Procedural Sedation and Analgesia 2018' report also provides evidence-based recommendations for various aspects of sedation provision.[35] Like the AoMRC Standards, ASA recommend the use of capnography monitoring, supplemental oxygen and pre-procedural fasting for all patients undergoing moderate sedation, referring to their 2017 practice guidelines for preoperative fasting, which advise 2 hours for clear liquids, 4 hours for breast milk and 6 hours for light meals.[42] There was a public consultation in 2022 on an update to the ASA fasting guidelines which proposes recommending that carbohydrate containing liquids can be taken up to 2 hours preoperatively but does not support reducing the liquid fasting time for children to 1 hour. The ASA guidelines for procedural sedation also advise that the individual designated to monitor the patient may also assist with minor interruptible tasks.

Appendix 2 Details of new systematic reviews

Twenty-four systematic reviews relating to dental sedation and published since the searches for the 2017 edition of the SDCEP guidance were identified via the surveillance review searches. Eight of these primarily reported on outcomes for sedative agents chloral hydrate, dexmedetomidine or the newer benzodiazepine, remimazolam.[26-33] Since these drugs are not currently widely used for dental sedation in the UK and are not included in the IACSD standards, these were not considered further here.

Thirteen of the reviews relate to the effectiveness of various sedation drugs for dental treatment, individually or in combination, for adults and/or children.[9,11-22] While some of the reviews only made general statements about the effectiveness of conscious sedation or lack of evidence, others concluded that the specific sedation techniques assessed were effective. The sedation techniques included nitrous oxide/oxygen, midazolam (intravenous, oral or transmucosal), nitrous oxide with midazolam, and ketamine (alone or in combination). Direct comparisons between different drugs/techniques were limited to comparisons between different routes of midazolam delivery. Overall, since the SDCEP guidance already includes all of these as standard or advanced techniques, none of these conclusions would be likely to have an impact on the guidance advice.

One of the reviews[9] was an update of the 2012 Cochrane systematic review 'Sedation of children undergoing dental treatment'[43] which informed the SDCEP guidance. While the review still concludes that oral midazolam is more effective than placebo for dental sedation in children, the evidence is now rated as moderate certainty (previously low). Although not affecting the clinical advice, this could be amended when the guidance is next updated.

Three of the systematic reviews assessed techniques for monitoring, including capnography and bispectral index (BIS).[23-25] The reviews on capnography concluded that monitoring this way may reduce the risk of hypoxaemia and increase detection of adverse respiratory events. However, the only dental study included did not find a significant difference in levels of hypoxaemia when capnography was used during conscious sedation with midazolam in ASA I and II patients not routinely administered supplemental oxygen.[44] Furthermore, this is unlikely to impact SDCEP guidance recommendations at this time since the capnography advice is aligned with the most recent IACSD report, which does not currently recommend capnography for routine monitoring of ASA grade I and II patients. The review on BIS monitoring did not make any strong conclusions about its use and this form of sedation monitoring is not included in the IACSD report or the AoMRC Standards.

Appendix 3 Sustainability considerations

Reducing the environmental impact of anaesthetic gases is a priority for NHS Scotland and NHS England.[45,46] Nitrous oxide and sevoflurane are used in dental sedation, and both have global warming potentials far greater than carbon dioxide.

Information on the environmental impact of dental anaesthetic gases could be communicated to guidance users and advice provided to encourage more efficient or reduced use without compromising provision of the most appropriate care for individual patients. The impact of other aspects of providing dental care with sedation could also be highlighted e.g. staff and patient travel.

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