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The Indicator of Sedation Need (IOSN)

Abstract: Conscious sedation in dentistry is usually indicated because a patient's anxiety can prohibit the necessary dental treatment being undertaken. It may also be indicated because of unpleasant or lengthy treatment or to prevent exacerbation of a patient's medical or behavioural condition by anxiety. The indicator of sedation need (IOSN) tool has been developed to help support dentists in their clinical decision-making and uses information about a patient's anxiety, medical and behavioural status and treatment complexity. The IOSN has been used to measure sedation need and has shown that 5.1% of patients attending general dental practices have a high need of conscious sedation. IOSN has also been used to investigate the need for conscious sedation in the general population among dental practice attenders and those who don't attend. The proportion was found to be 6.7%.

Clinical Relevance: Some patients require conscious sedation in order to access dental care. The indicator of sedation need (IOSN) tool helps in the decision-making process.

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Patient anxiety remains a significant barrier to accessing dental care and the prevalence of dental anxiety in the UK has not changed in the last 30 years. It is not surprising that the most common indication for a patient to need conscious sedation for dental treatment is anxiety. However, there are other reasons too. An unpleasant or lengthy treatment, or a patient's medical or behavioural condition that may be exacerbated by anxiety and prohibit dental care, should also be considered.¹

The indicator of sedation need (IOSN) tool has been developed to help support dentists in their clinical decision-making and uses information about a patient's anxiety, medical and behavioural status and treatment complexity.² This may challenge

those dentists who rarely consider the use of, or refer patients for, conscious sedation. It similarly may challenge those who use conscious sedation based on 'demand' rather than 'need'. In the UK, we are fortunate that inhalation sedation, intravenous sedation and general anaesthesia services are available, although some patients never get access to the services that they need because they are not offered. The IOSN tool will hopefully make access to services more equitable for patients.

Anxiety

Some patients are more anxious than others about life events in general, including attending for dental treatment. This is described as trait anxiety.³ State anxiety is the heightened anxiety for a particular event and, if high in the case of dentistry, is usually the consequence of a previous poor experience. Management of anxiety is important to our patients and can usually be improved. It is also known that patients with higher levels of dental anxiety experience more pain during and after dental treatment than those with lower levels of anxiety.⁴ Managing a patient's

anxiety also reduces the stress for the dentist.

Most mildly anxious dental patients are adequately managed by a dentist's behavioural management skills. These might include using, when feasible, a planned approach to treatment, starting with the most readily accepted and leading up to the most invasive to desensitize the patient gradually. Other techniques, such as the 'tell, show, do' technique may be used. Having a caring attitude and showing empathy are obviously core qualities to being a healthcare professional. When these behavioural management strategies are insufficient, then conscious sedation may need to be considered.

How does the dentist recognize anxiety? Patient behaviour, such as being uncommunicative or over talkative, looking distracted, being unco-operative, or displaying uncontrolled movements, may indicate anxiety. Experienced dentists may consider that they are expert in determining which of their patients are unduly anxious, but is there a more objective way to measure this? Actually, asking the patient is the best measure! Anxiety is a personal experience to the patient and so the best measure is patient self-reporting.

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The Modified Dental Anxiety Scale (MDAS) is a short questionnaire that may be completed in a few minutes by the patient whilst in the waiting area (Table 1). It consists of five questions and gives a total summed score between 5 and 25 that is then translated by the dentist or dental nurse to a rank score of 1–4 that can be entered into the IOSN (Table 2). The range for each item is from 'not anxious' to 'extremely anxious' in response to the prospect of a dental visit, when in the waiting room, and if about to have a tooth drilled, have a scaling and a local anaesthetic injection.⁵

Medical and behavioural indicators

Some systemic medical disorders may compromise the patient if exacerbated by the stress of the dentistry and these may indicate a need for conscious sedation.^{6,7} These indications include mild angina, controlled hypertension, and anxiety-induced asthma. However, a recent myocardial infarction or *uncontrolled hypertension* may contra-indicate the use of conscious sedation. So, a judgement is required as to disease severity and the use of the ASA Classification of Physical Status can be helpful for this (Table 3). Systemic disorders that are not of severity to exclude sedation but that may be exacerbated by the stress of dental treatment are ranked 2, 3 or 4 (Table 4).

Patients with chronic nasal obstruction or an upper respiratory tract infection will not be suitable for inhalation sedation as they are required to be able to breath through their nose. Patients with chronic obstructive airways disease (COAD), such as emphysema or chronic bronchitis, may have diminished respiratory drive and the drive for respiration may have become a low O₂ rather than hypercapnia because of chronically elevated CO₂ levels. There is therefore the potential risk of depressing respiration if such patients are given supplemental oxygen, as is routine with inhalation sedation when 30% O₂ or more is administered.⁸ Most of these rare dental patients are ASA III or IV.

Similarly, patients with significant liver and kidney disease may have problems with reduced metabolism and excretion of midazolam used for intravenous sedation, but this is only when

ANXIETY QUESTIONNAIRE TO BE COMPLETED BY THE PATIENT

**Can you tell us how anxious you get, if at all, with your dental visit?
Please indicate by putting a 'X' in the appropriate box**

1. If you went to your Dentist for TREATMENT TOMORROW, how would you feel?

Not Anxious Slightly Anxious Fairly Anxious Very Anxious Extremely Anxious

2. If you were sitting in the WAITING ROOM (waiting for treatment), how would you feel?

Not Anxious Slightly Anxious Fairly Anxious Very Anxious Extremely Anxious

3. If you were about to have a TOOTH DRILLED, how would you feel?

Not Anxious Slightly Anxious Fairly Anxious Very Anxious Extremely Anxious

4. If you were about to have your TEETH SCALED AND POLISHED, how would you feel?

Not Anxious Slightly Anxious Fairly Anxious Very Anxious Extremely Anxious

5. If you were about to have a LOCAL ANAESTHETIC INJECTION in your gum, above an upper back tooth, how would you feel?

Not Anxious Slightly Anxious Fairly Anxious Very Anxious Extremely Anxious

Dentist to score Anxiety Questionnaire

Each of the five answers is scored as follows:	
Not anxious	= 1
Slightly anxious	= 2
Fairly anxious	= 3
Very anxious	= 4
Extremely anxious	= 5

So the total Questionnaire Score is a sum of all five items (range 5 to 25)

Table 1. Modified Dental Anxiety Scale (MDAS) and scoring.⁵

severe and probably the patient is ASA IV. These patients are unlikely to be having local anaesthetic injections or surgery if there is a coagulation problem and would be investigated with liver function or coagulation tests.

Behavioural indications for the need for conscious sedation may be as diverse as learning difficulties or a strong gag reflex. Patients who have Multiple Sclerosis or Parkinsonism may be eager to co-operate but physically unable to

**Indicator of Sedation Need (IOSN)
MATRIX TO BE COMPLETED BY THE DENTIST**

1. Anxiety Questionnaire (MDAS) Score		Please circle one
Questionnaire Score is converted to Rank Score		
MDAS	5–9 (minimal anxiety)	1
MDAS	10–12 (moderate anxiety)	2
MDAS	13–17 (high anxiety)	3
MDAS	18–25 (very high anxiety)	4

Table 2. IOSN rank scoring for MDAS.²

Class I	No organic or psychiatric disturbance
Class II	Mild to moderate systemic disturbance
Class III	Severe systemic disturbance
Class IV	Life-threatening severe systemic disturbance
Class V	Moribund patient unlikely to survive 24 hours

Table 3. The American Society of Anaesthesiologists (ASA) Classification of Physical Status.

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MATRIX TO BE COMPLETED BY THE DENTIST**

2. Medical & Behavioural Indicator Score	Please circle one
No medical or behavioural indicators	1
<i>Systemic disorders (not of severity to exclude sedation) that may be exacerbated by treatment</i> Fainting attacks/hypertension/angina/asthma/epilepsy /other (please state)	2, 3 or 4
<i>Systemic disorders that compromise ability to co-operate</i> Arthritis/Parkinsonism/Multiple Sclerosis/other (please state)	
<i>As a rule of thumb ASA II would generally be 2 or 3 and an ASA III would result in a grade of 4</i> Gag reflex	

These indicators are not designed to replace your usual full medical history.

Table 4. IOSN rank scoring for Medical and Behavioural Indicators.²

co-operate for dental treatment, and sedation with a benzodiazepine may be useful because of its muscle relaxation properties.

Pregnancy

It is obviously best to avoid all drugs during the first trimester of pregnancy. However, drugs may be

administered during the second trimester, if essential, but always with caution. Midazolam for intravenous sedation should be avoided for the whole of the pregnancy.⁹ Nitrous oxide, used for inhalation sedation, inactivates vitamin B₁₂ and, whilst elective use during the first trimester is contra-indicated, it may be safely used during late pregnancy. Inhalation sedation (HIS) is considered the safest of all of the conscious

sedation techniques to use during pregnancy.

Treatment complexity indications

Conscious sedation may also be needed when unpleasant or prolonged procedures are required by a patient. General anaesthesia is also, of course, needed by some patients who require particularly invasive dentistry, such as surgery, and this should be kept in mind when considering the need for sedation. It is not always appropriate to substitute conscious sedation for general anaesthesia.

Defining treatment complexity is not straightforward and different dentists have different opinions about what they consider complex. The IOSN provides a brief guide to help and dentists are asked to default to a higher band of complexity rather than a lower band, if in doubt (Table 5). Patients are given a score by their dentist of 1–4 for treatment complexity that is entered into the IOSN. Strict definitions of complexity have not been given as many factors may contribute and professional judgement can take all of these into account.

Using the IOSN tool

The patient completes the MDAS and the dentist or dental nurse then converts the sum into a rank score as shown on the IOSN form. The dentist then completes the rank score for the Medical & Behavioural Indicator section and for the Treatment Complexity section. The total of these three domains gives a total rank score between 3 and 12 that indicates the level of need for conscious sedation (Table 6). Clinical decision-making with IOSN should never override a clinician's treatment recommendation for an individual patient.

A score of 3 or 4 suggests that there is a minimal need for sedation. A score of 5 or 6 suggests moderate sedation need and a high need for sedation would be identified in individuals who score 7 to 9. A score of 10 to 12 suggests very high need for sedation and the dentist should even consider whether general anaesthesia might be indicated.

Where there is a medical history finding such as, for example, an

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3. Treatment Complexity Score	Please circle one
<i>This guidance is not exhaustive – if in doubt about score then please score higher value</i>	
ROUTINE – Scale, single-rooted extraction of 1 or 2 teeth, small soft tissue biopsy, single quadrant restorations, crown preparations or anterior endodontic treatment	1
INTERMEDIATE – Scale and root planing, multi-rooted tooth extraction, surgical extraction without bone removal, apicectomy anterior tooth, 2 quadrant restorative, posterior endodontic treatment	2
COMPLEX – Periodontal surgery, surgical extraction with bone removal, apicectomy posterior tooth, multiple quadrant restorative, multiple posterior endodontics	3
HIGHLY COMPLEX – Any treatment considered more complex than above or are multiples of the above	4

Table 5. IOSN rank scoring for Treatment Complexity Indicators.²

**Indicator of Sedation Need (IOSN)
MATRIX TO BE COMPLETED BY THE DENTIST**

SEDATION NEED domain 1 + 2 + 3 scores		
Total Rank Score	Source Descriptor	Sedation Need
3–4	Minimal need	No
5–6	Moderate	No
7–9	High need	Yes
10–12	Very high need	Yes

Table 6. IOSN rank totalling for sedation need.²

adult with severe learning difficulties, that compromises a person’s ability to co-operate for even simple procedures under local anaesthesia, or a highly complex clinical procedure is planned, a rank of 4 in that component would be recorded.

If a patient scores a single rank of 4 in medical history or clinical complexity then the overall score will be at least 6, so it would be unnecessary for the patient to complete the MDAS questionnaire. Therefore, if a patient has, for example, severe learning difficulties, then the IOSN might be used without the MDAS, which makes it versatile for use for dentists working in special care settings. Similarly, oral surgeons may score a rank of 4 in treatment complexity and negate the need for the MDAS to be completed.

IOSN to measure sedation need in dental practices

IOSN has been used in dental practices to ascertain the proportion of attending patients that needed sedation in those practices.¹⁰ It was found that 5.1% had a high need of conscious sedation, with females 6.7 times more likely to need sedation and 4.7 times more likely to be anxious in relation to dental treatment. Interestingly, there was no association found between the need for sedation and deprivation. Similarly, there was no association with age.

IOSN to measure sedation need in the general population

IOSN has also been used to

investigate the need for conscious sedation in the general population in relation to dental practice attenders and those who do not attend. A Gallup Poll survey was conducted to establish the proportion of the general population that did not attend the dentist because of anxiety¹¹ and this was used, together with the data from the attending patients in need of sedation, to calculate the number in the general population that might be expected to have a high need of sedation.¹² The proportion was found to be 6.7%.

Summary

Patient access to conscious sedation for dental treatment is variable throughout the UK. The IOSN has been developed to encourage fair access. The tool can be used by dentists to help decision-making and by commissioners of dental conscious sedation services to establish the need in a particular population. The IOSN uses information about a patient’s anxiety, medical and behavioural status and treatment complexity.

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