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Evaluation of intranasal/intravenous sedation service within a Special Care Dental service

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Abstract

Aims

1. To evaluate the outcomes of an intranasal/intravenous (INIV) sedation service for adults with learning disabilities within a Special Care Dental Service (SCDS).

2. To raise awareness of this service pathway as a safe and cost-effective alternative to general anaesthesia (GA) or no treatment, improving access to dental care.

Methods

Data were collected retrospectively using electronic patient records for all patients who attended for an INIV sedation session within SCDS between January 2018 and July 2025 (inclusive).

Results

Dental treatment was completed as planned for 90.5% of patients. Only 4.8% of patients were referred onwards for treatment under GA. Where dental treatment was not completed, the most common reason was poor patient compliance with INIV sedation. In these cases, patients appeared hypersensitive to the sensory stimulation of the dental environment, and cognitive processing issues rendered reassurance from the dental team ineffectual.

Conclusions

This service is successful in providing dental treatment for patients with learning disabilities in primary care, with benefits in both patient safety and financial savings. Outcomes will be improved by reviewing the pre-operative advice process to ensure compliance, and clearer documentation of treatment outcomes and suitability for future treatment with INIV sedation.

KEY POINTS

1. Service evaluation of an intranasal/intravenous sedation service for adults with learning disabilities within a Special Care Dental Service.

2. Effectiveness demonstrated with 90.5% of patients having treatment completed, and only 4.8% requiring onward referral for general anaesthetic.

3. Recommendation for this service to be expanded nationally as a safe alternative to dental treatment under general anaesthetic.

INTRODUCTION

Patients with learning disabilities face many obstacles in accessing routine dental care, which may include regular dental recalls, restorations, non-surgical periodontal treatment, and extractions. Patients can present with behavioural issues, concurrent medical comorbidities and dental anxiety, which all act as barriers to appropriate oral care. [1] Consequently, patients are often unable to accept treatment in general dental practice and require referral to specialist services. They are, therefore, a priority group within Special Care Dental Services (SCDS).

Patients with learning disabilities are at an increased risk of developing oral health conditions such as dental caries and periodontal disease. This cohort of patients may not be able to undertake their own oral hygiene and may be dependent on a care team or family members to support them.[2] Patients may also present with other medical comorbidities for which they require multiple medications. Polypharmacy often contributes to xerostomia which, along with suboptimal oral hygiene, further exacerbates oral disease. Patients with advanced neuromuscular conditions, cognitive impairment and learning disabilities are at a greater risk of suboptimal oral hygiene.

As a result, many patients with learning disabilities present with unmet dental needs. Those with moderate to severe learning disabilities may be uncooperative for clinical examination and routine dental care. These patients are at an increased risk of tooth loss due to poor restorability and, in many cases, complex restorative treatment is not in the best interest of the patient. For patients where a (potential) treatment need is identified, an appropriate treatment modality must be planned.[3]

Conscious sedation is a technique that depresses the central nervous system enabling dental treatment to be carried out, during which verbal contact and protective reflexes are maintained. There should be a wide margin of safety that renders loss of consciousness unlikely.[4] Standard techniques consist of inhalation sedation with nitrous oxide/oxygen, and intravenous/transmucosal/oral midazolam.[4] General anaesthesia (GA) is an alternative treatment modality, however, there are greater safety concerns, particularly for those with multiple medical comorbidities. In addition, GA is expensive for services, and the process can be distressing for service users and those supporting them.[5] Conscious sedation, therefore, has benefits over GA and should increasingly be utilised where possible to facilitate treatment for patients with learning disabilities.[6]

The intranasal/intravenous (INIV) sedation service for adult patients with learning disabilities was set up as a pilot scheme in 2012, funded and commissioned by Sussex Community NHS Foundation Trust (SCFT) SCDS. The funding was accommodated by reducing GA services. The service is led by a Specialist in Special Care Dentistry, acting as the operator, and a consultant anaesthetist, acting as the sedationist. Midazolam is administered intravenously, with prior intranasal midazolam if required to enable intravenous access. The pathway within SCDS was changed and suitable patients unable to tolerate treatment with local anaesthesia or inhalation sedation, who had appropriate treatment requirements, were referred for INIV as the first line management. The aim was to reduce the number of patients with learning disabilities undergoing GA for dental procedures.[7]

Since its inception, there has not been a comprehensive review of the service. This evaluation aims to evaluate the service effectiveness and outcomes.

METHODS

SCFT is the main provider of community NHS care throughout Sussex. Within this, SCDS operates five outpatient clinics in Haywards Heath, Crawley, Brighton, Chichester and Worthing. The INIV sedation service for adult patients with learning disabilities was set up at Haywards Heath Health Centre in 2012.

This service evaluation with registered with the Sussex Community NHS Foundation Trust Quality and Safety Department. As per the NHS Health Research Authority decision tool, this study was not considered research. The data was collected retrospectively and was anonymised. As such, patient consent and ethics approval were not required.

All patients who attended for an INIV sedation session within SCDS between January 2018 and July 2025 (inclusive) were identified retrospectively using the dental practice management software currently used by SCDS, Systems for Dentists (SfD). The relevant data were then collected from the digital patient records. No patients were excluded from data collection. The primary and secondary authors collected the data, each collecting data from alternate years, which were then consolidated onto a singular spreadsheet. Data collection was carried out between July and October 2025.

Data collected included: reason for referral into service, type of consent acquired, treatment outcomes, next steps if treatment was not completed, quality of sedation, operating conditions, recovery, use of flumazenil, adverse events, British Dental Association (BDA) case mix, indicator of sedation need (IOSN).

Descriptive analysis was used to review and evaluate the data. A basic cost analysis of the service was also conducted.

RESULTS

Between January 2018 and July 2025 (inclusive), 59 sessions of INIV sedation were provided for adult patients with learning disabilities within SCFT SCDS. A total of 105 patients were seen for INIV sedation in this period, with 13 sessions where one patient was seen (either as a single, long case, or where a second patient had cancelled), and 46 sessions where two patients were seen.

Within this time frame:

- 12 patients had a single repeat INIV sedation session
- One patient had three INIV sedation sessions
- One patient had four INIV sedation sessions

Reason for referral into service

Patients were referred to the INIV sedation service for: an examination- if this was not possible by other means; behavioural changes indicating pain of suspected dental origin; or a limited number of treatment items- primarily, periodontal treatment (not accepted as the sole reason for referral and only provided if appropriate following other investigation/treatment), restorations, or extractions. 25 patients were referred for more than one type of treatment. Table 1 details reasons for referral into the service.

Table 1
Reason(s) patients were referred to INIV sedation service.

Reason for referral into INIV sedation service	**Number (%)**	
Examination	10 (9.5)	
Behaviour changes indicating suspected dental pain	11 (10.5)	
Treatment (all types)	84 (80.0)	
	Type of treatment requested on referral	Number (% by patients referred for treatment)
	Periodontal treatment	23 (27.4)
	Restoration(s)	51 (60.7)
	Extraction(s)	32 (38.1)
	Other	3 (3.6)

Consent

Mental capacity assessments were completed at the sedation assessment appointments, as per the Mental Capacity Act.[8] 94.3% (99 patients) lacked capacity to consent to their treatment, so a best interest process and ‘consent form 4’ were completed. 5.7% (six patients) had capacity, so ‘consent form 1’ was used.

Five of the patients who had capacity to consent had medical comorbidities in addition to mild learning disabilities, which meant they were treated within the service rather than being referred to primary care IV sedation providers. The other patient did not have a learning disability diagnosis but was referred due to a medical history of a previous stroke and enteral feeding, so was accepted for treatment as an exception.

Treatment outcomes

Table 2 details the outcomes of patients seen in INIV sedation sessions.

Table 2
Outcome of patients attending INIV sedation sessions.

Outcome of INIV sedation sessions	Number (%)	
Treatment completed as planned	95 (90.5%)	
Declined INIV sedation	1 (1.0%)	
Treatment not completed as planned	9 (8.6%)	
	Reason treatment not completed	Number (% by patients for whom treatment was not completed)
	Pre-operative guidance not followed- INIV sedation not provided	1 (11.1)
	Not compliant with INIV sedation	5 (55.6)
	INIV sedation insufficient to proceed with treatment	2 (22.2)
	Unexpected clinical findings requiring additional planning	1 (11.1)

INIV sedation was declined for a single patient at the start of the session, and they were able to accept the planned treatment with non-pharmacological behaviour management.

For the nine patients who did not have treatment completed as planned, five were referred onwards for treatment under GA. The INIV sedation session was rescheduled for the patient for whom pre-operative guidance was not followed; acclimatisation was arranged for another patient; a best interests meeting to plan further management was arranged for another; and for the final patient it was determined that treatment/intervention was not required.

Evaluation of sedation

As above, INIV sedation was declined for one patient, and it was also not provided during the session for another two. Pre-operative guidance had not been followed for one of these patients, thereby rendering it unsafe to proceed with the sedation on that occasion, and the other could not cooperate with the intranasal midazolam administration.

For all patients who underwent INIV sedation, a total of 102 patients, the following were recorded: quality of sedation (scored from 0–5, zero being worst and five being best), operating conditions, and recovery. Table 3 demonstrates these results.

Table 3
Quality of sedation, operating conditions, and recovery for patients who received INIV sedation.

Evaluation of sedation		
Quality of sedation	Score	Number (%)
	0	1 (1.0)
	1	2 (2.0)
	2	1 (1.0)
	3	14 (13.7)
	4	14 (13.7)
	5	63 (61.8)
	Not recorded/not available	7 (6.9)
Operating conditions		Number (%)
	Good	49 (48.0)
	Fair	29 (28.4)
	Poor	22 (21.6)
	Impossible	2 (2.0)
Recovery		Number (%)
	Normal	83 (81.4)
	Rapid	5 (4.9)
	Prolonged	14 (13.7)

Flumazenil is a reversal agent for benzodiazepines. In this service, it has only been used on an elective basis. As above, INIV sedation was not provided for three patients, and the relevant paperwork was unavailable for another two. For the remaining 100 patients, flumazenil was used in 48.0% (48 patients) and was not used in 52.0% (52 patients). In two cases, ‘flumazenil use’ was ticked on the paperwork, but it was not written on the drug chart, so it was assumed that it had not been administered.

Adverse events

Only one adverse event was recorded for the 102 patients for whom INIV sedation was provided. In this case, a member of the dental team sustained an injury due to an uncontrollable limb movement by the patient. Treatment was abandoned and the patient safely recovered.

BDA case mix

BDA case mix is a tool used to assess the complexity of patients with regards to their ability to accept oral care. There are six criteria for which patients are given a score: ability to communicate, ability to cooperate, medical status, oral risk factors, access to oral care, and legal and ethical barriers to care. The four available scores are 0, A, B, and C, which represent increasing levels of complexity in relation to each criterion. Each score is weighted and totalled to give an overall score, which is then allocated to a band.[9] Fig. 1 details the case mix of patients seen in INIV sedation sessions, for whom a case mix score was recorded/available (81 patients, 77.1%).

The two criteria which had the largest proportion of patients ranked 'C', i.e. the highest level of complexity, were 'ability to communicate' and 'ability to cooperate'.

Indicator of Sedation Need (IOSN)

The IOSN is a tool to determine the degree to which patients have a need for conscious sedation to facilitate dental treatment. A total score is derived from three individual sections- the Modified Dental Anxiety Scale score (patient-performed questionnaire in which their anxiety towards dental treatment is quantified), a medical and behavioural indicator score, and a treatment complexity score. The rank that the score falls into determines the sedation need.[10]

In the INIV sedation service, an IOSN score was recorded for 40.0% (42) of patients. For the other 60.0% (63) patients, the score was not recorded/available. Figure 2 demonstrates the sedation need of those for whom a score was recorded/available.

DISCUSSION

Findings

This service evaluation demonstrates that the INIV sedation service is a valuable alternate treatment modality for patients with learning disabilities. A mean of 14 patients were seen per year, with only a small cohort of patients requiring repeat INIV sedation within the time period, as preventive interventions were also implemented at routine recalls.

Patients with mild learning disabilities may be able to cooperate for an examination, even if cursory, however, they may not be able to accept treatment without pharmacological intervention. In such cases, conscious sedation or GA can be planned, depending on the treatment needs identified.

For patients with moderate-severe learning disabilities, dental examination may not be possible due to suboptimal patient compliance. If behaviour changes indicating dental pain are reported by the care teams or next of kin, they can be referred to the service for an examination and investigation under INIV sedation; this was the case for 10.5% of patients. Depending on the treatment needs identified, this can

be completed in the same session, a best interests meeting to plan care can be arranged, or they can be referred onwards for treatment under GA.

The most common reason for referral into the service was for items of treatment (80.0%). The highest proportion of patients were referred for restorations, followed by extractions. Periodontal treatment was not routinely accepted as the sole reason for referral but could be completed as an adjunct to other treatment.

Although not the primary reason for the sedation, in some instances blood samples were also taken during the session from patients who were unable to cooperate for medical investigation, when this has been pre-arranged with their GP and appropriate consent has been gained. GPs provided the blood sample bottles and care teams then transported them back to the GP surgery for testing.

Treatment was successfully completed as planned for the majority of patients (90.5%), demonstrating the thoroughness and effectiveness of the sedation assessment and planning process in ensuring appropriate patient selection and adequate preparation in advance of the appointment.

The most common reason for incomplete treatment (55.6% of patients for whom treatment was not completed) was patients not being compliant with the INIV sedation. Even under conscious sedation, dental treatment generates significant sensory stimulation, and patients' reaction to this can render operating conditions unsafe. Unfortunately, cognitive processing issues often mean that explanation or reassurance from the dental team is ineffectual. This increased risk alongside medical comorbidities justifies employing a consultant anaesthetist to act as sedationist and having a separate dental operator.

Where sedation was insufficient to proceed with treatment (22.2% of patients for whom treatment was not completed), the level of sedation may have been inadequate, especially for patients taking benzodiazepines regularly, or the window of sedation may not have allowed for completion of all planned treatment, particularly for those requiring multiple items or complex treatment.

The patient who had unexpected clinical findings requiring additional planning was referred to the service due to suspected pain of dental origin, suggesting they were unable to comply with clinical examination prior to the INIV sedation session. Therefore, the clinical findings could not have been predicted in advance.

For one patient, pre-operative fasting advice was not followed, therefore, the appointment was rescheduled. In this service, general fasting guidance is provided (no food for six hours prior, no drinks for two hours prior) but is sometimes reviewed on an individual basis with the consultant anaesthetist, as patients often present with medical comorbidities that may affect advice. Patients would also be rescheduled if appropriate escorts were not present.

The quality of sedation was rated as '5' (highest score available) for 61.8% of patients. However, it is important to note that in some cases patients can be well-sedated clinically but may not be compliant when stimulated by dental treatment, resulting in poor operating conditions.

The operating conditions were rated ‘good’ or ‘fair’ for 76.4% of patients. This was determined based on whether the patient was able to accept treatment during the session and whether there were any interruptions, such as muscular spasm or coughing.

Recovery was normal for most patients (81.4%). Where it was prolonged, patients had increased drowsiness, but there were no occasions of airway concerns.

Flumazenil was used as a reversal agent on a purely elective basis- there were no instances where emergency reversal was required. Elective flumazenil aided recovery in patients for whom it was prolonged, and assisted the care team on the journey home. Patients and their care teams were warned of the risk of re-sedation after the effects of the flumazenil wore off. The split between patients who received flumazenil electively (48.0%) and those who didn’t (52.0%) mainly appeared to be due to the individual anaesthetist’s preference.

The extremely low number of adverse events reported demonstrates the safety of the service. In the singular instance, a member of the dental team was injured by a patient inadvertently. A note was made in the patient’s clinical records that they would not be suitable for INIV sedation in the future.

When considering the BDA case mix, all patients seen in the service were in the ‘moderate’, ‘severe’ or ‘extreme’ complexity bands, with the greatest proportion deemed to have ‘severe’ or ‘extreme’ complexity (86.4% of patients for whom a case mix score was recorded/available). This highlights the complexity of patients seen within the service, and the key challenges of communication and cooperation for dental treatment. These patients require both increased time and resources to provide dental care, evidencing the need for this specialist service. The BDA case mix was not completed for all incoming referrals, but over the period examined there was a notable improvement in use of the toolkit.

An IOSN score for patients formed part of the referral to the service, however, it was only recorded/available for 40.0% of patients. One element of the total is the Modified Dental Anxiety Scale score, where patients rate how anxious they would feel in different scenarios relating to dental treatment. Patients with learning disabilities, particularly if severe, may process emotional challenges differently and/or lack the cognitive ability to complete this questionnaire, which likely explains the low rates of completion. There is a paucity of evidence relating to the validity and reliability of self-report measures for this group of patients, and whether it can be used for dental treatment planning. This would be a valuable area of further research.

Implications

Patients with learning disabilities may lack the capacity to decide how their dental care should be managed, as evidenced by the findings that 94.3% of patients in this service lacked capacity. Principle six of the Mental Capacity Act states that when making best interests decisions, it should be considered how the outcome can be achieved in the least restrictive way.[8] Treatment under conscious sedation has a better safety profile, faster recovery, and is less restrictive compared to GA.[3,6,7] Furthermore, it may be

easier and less distressing for patients and care teams to access this service in a primary care setting, as opposed to attending a hospital for GA.

In addition, INIV sedation carries a substantial cost saving compared to GA. In 2025, the average cost for 1 patient to be treated under GA at a district general hospital was approximately £2,250, whilst the cost for a patient to be treated with INIV sedation in an outreach clinic was approximately £900. This price included equipment and staff costs. This is an approximately 60% reduction in costing between treatment in INIV sedation sessions compared with GA sessions. Consequently, since the establishment of this service, SCFT SCDS has made a significant saving in the provision of dental care to patients with learning disabilities.

Future directions

Within SCFT SCDS, recent changes to the service include standardising incoming referrals using a digital custom referral screen and working towards the complete digitisation of documentation. Dentists have received training on appropriate patient selection, the acceptance criteria, and use of the custom referral screen.

To further improve outcomes, the pre-operative advice process will be reviewed to ensure compliance. Also, both treatment outcomes and suitability for future treatment with INIV sedation will be documented clearly in a short summary at the end of each patient's clinical records for the session.

CONCLUSIONS

This service evaluation demonstrates the success of this INIV sedation service for patients with learning disabilities and other medical comorbidities in a primary care setting. The findings have highlighted that it is both safe and effective for this cohort of special care patients, with the planned treatment being completed for 90.5% of patients, and only one reported adverse event.

There is scope to further develop this service nationally in other Community Dental Services where patients with learning disabilities may face difficulties with accessing dental treatment in secondary/tertiary care units. Expansion of this service nationally would have benefits in terms of patient safety and reduced cost for certain dental treatments that would otherwise need to be provided under GA.

Declarations

COMPETING INTERESTS

The authors declare no competing interests.

AUTHOR CONTRIBUTIONS

AK identified the need for the service evaluation and conceived of the study. All authors designed the study. BOB and BR collected and analysed the data, which AK reviewed. BOB and BR drafted the manuscript. All authors reviewed and approved the final manuscript.

DATA AVAILABILITY

The data supporting the findings of this study are available within the paper. The full data can be accessed by contacting the corresponding author on reasonable request.

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Figures

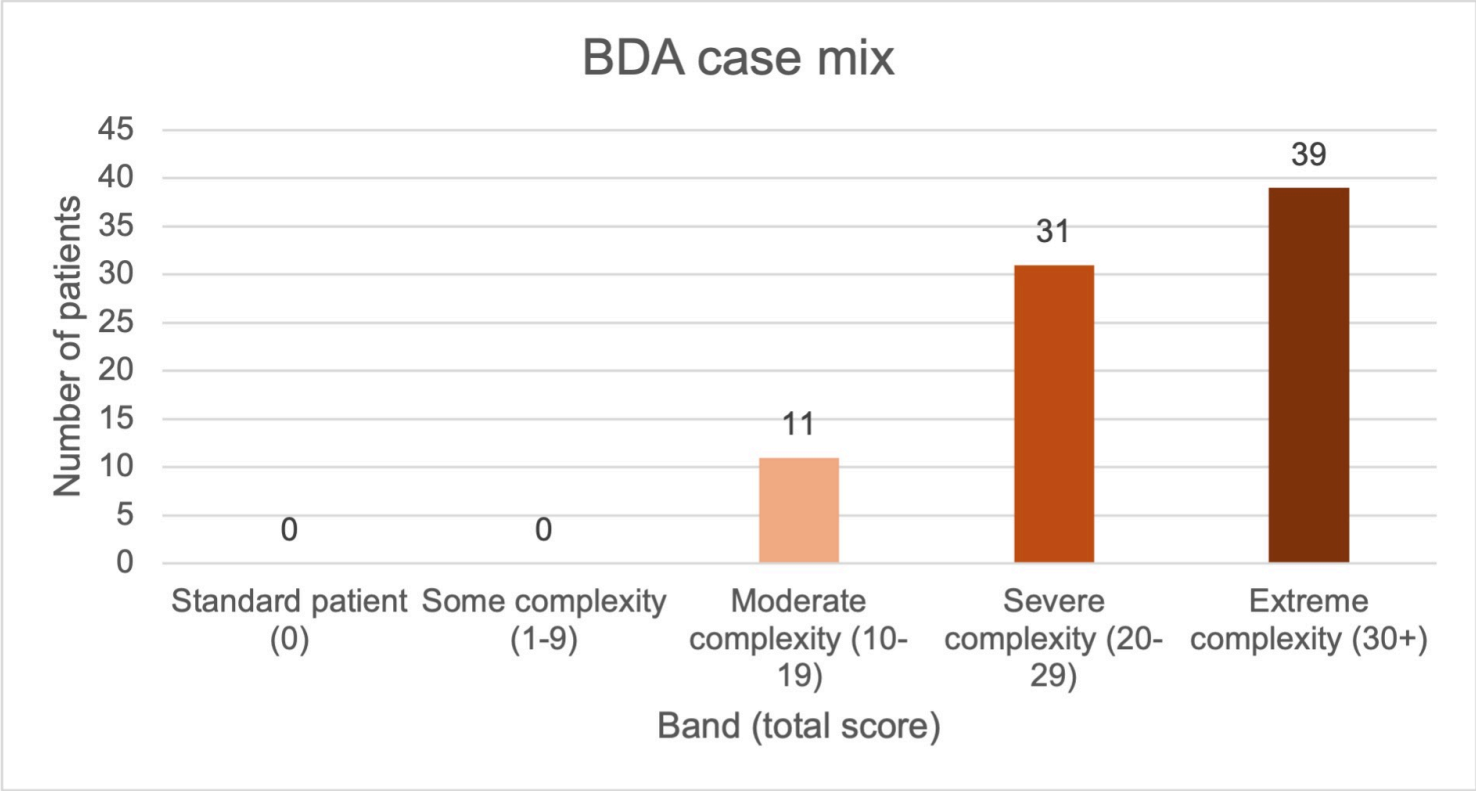


Figure 1

Case mix of patients seen in INIV sedation sessions.

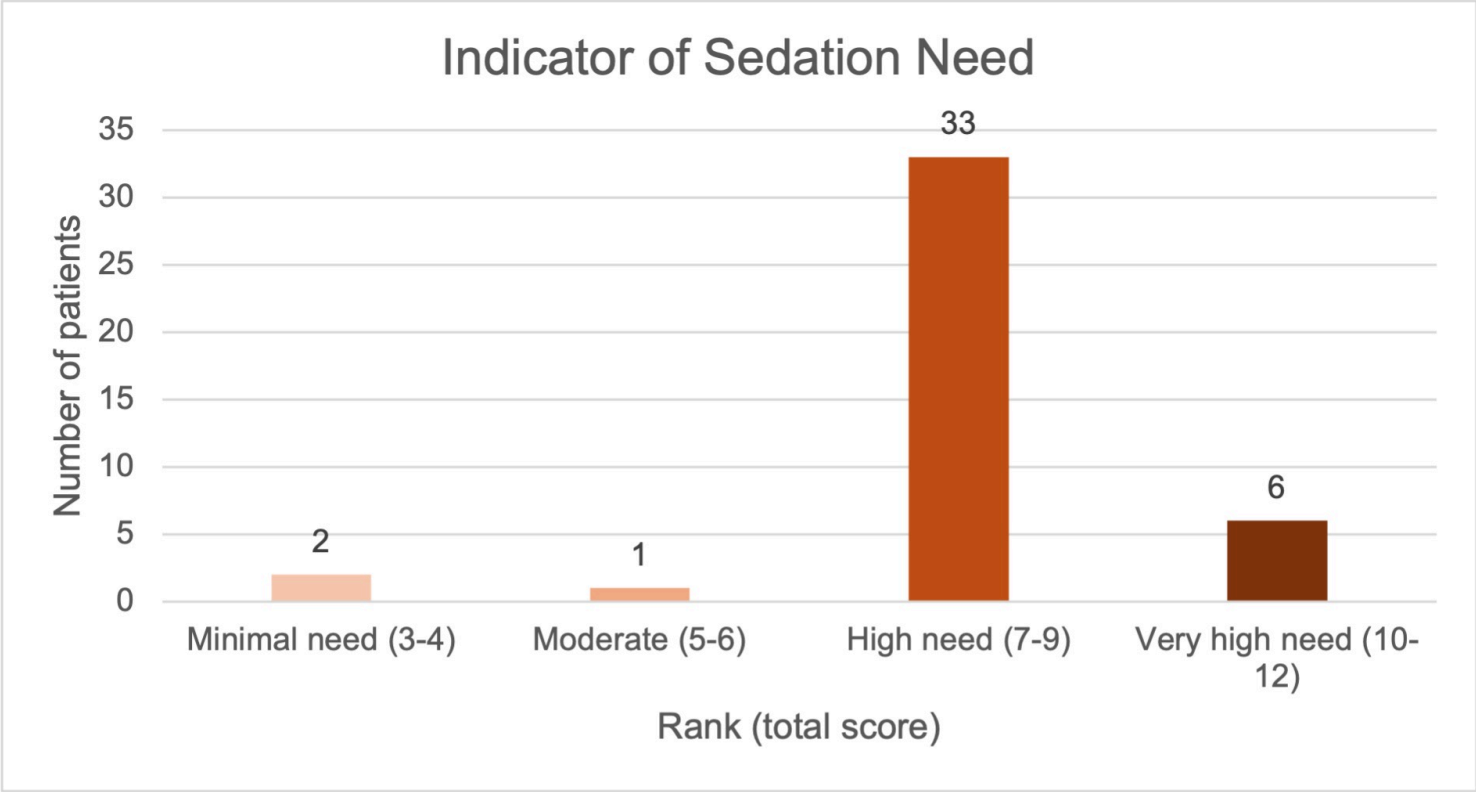


Figure 2

Indicator of Sedation Need ranks of patients seen in INIV sedation sessions.