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Sedation alternatives to GA for Paediatric Maxillofacial Patients in the ED - a

Service Evaluation.

Introduction

Oral and maxillofacial surgery (OMFS) paediatric emergencies can include facial injuries or conditions requiring immediate treatment. For example: dental trauma, foreign bodies, lacerations, fractures and swellings impeding airway.^{1,2}

Treatment of OMFS paediatric emergencies heavily utilises general anaesthesia (GA).³ Current Emergency Department (ED) SIGN sedation guidance encourages sedation for these cases as GA risks significant morbidity, mortality and anxiety; which are increased with multiple GAs, particularly in younger patients (under 2 years).^{1,4} Dental extractions under GA in 0 to 19 year olds costs the NHS £50.5 million annually; this is the leading cause of hospital admission in children age 5 to 9.⁵ Awareness and utilisation of sedation by OMFS teams may improve quality and safety, whilst reducing exposure to GA.²

Sedation is a useful adjunct in paediatrics, saving time and resources whilst improving patient comfort. It should be considered in anxious children able to cooperate for its administration. It enables children with medical histories contra-indicating GA to be treated.^{2,3} An economic evaluation found that ED sedation for a paediatric emergency case costs approximately £171, compared to £785 when under GA. Treating 100 paediatric ED procedures with conscious sedation instead of GA can therefore save £60,000 per year.³

Ketamine, diamorphine, fentanyl and midazolam via intra-nasal and IV routes are available for ED paediatric sedation by trained personnel.^{1,2,6} A decision was made to investigate why sedation was not being utilised by OMFS teams following a two-year-old patient who had complications whilst undergoing a GA for a two centimetre head laceration. The OMFS teams did not request sedation for any paediatric patients at that time.

Aim

To evaluate clinician utilisation of ED sedation for paediatric maxillofacial patients.

Objectives were:

- To evaluate the current sedation and GA practice within the ED department
- To illustrate to staff the indications for sedation and update clinicians on alternative options available

Method

Data were collected prospectively in the OMFS unit at Prince Charles Hospital (PCH), Merthyr Tydfil, South Wales.

Data collection was piloted, then collected for all patients seen by OMFS in the ED over a 7-week period.

Data capture forms were available to all OMFS clinicians. Data collected included free text answers on:

- Patient age
- Reason for ED attendance
- Diagnosis
- Treatment modality and justification

Data were analysed with descriptive statistics using Microsoft Word and Excel (Microsoft® Corporation, Washington, US).

Results

First Evaluation

Data collection occurred in Merthyr between 12/11/20-31/12/20. Of the 31 patients referred to OMFS, 23 were managed without additional pharmacological support. All remaining patients, (100%, n=8), were treated with GA (Table 1). Deep lacerations were the greatest justification for GA (n=4).

Changes introduced

The initial evaluation demonstrated sedation was neglected as an alternative prior to choosing GA. Different clinicians recording data were a potential concern due to varying clinical preference and expertise affecting the management chosen. Barriers voiced by the team included a lack of Dental Core Trainee (DCT) knowledge on sedation options and availability. Findings were presented to the OMFS team. Indications for, and access to ED sedation was taught to the OMFS team through core briefs and presentations. Through worked cases, teaching was delivered on availability and indications of sedation alongside an ED Consultant. Sedation trained ED staff members were also introduced to the team; it was emphasised that only those trained in sedation could provide it, such as sedation trained doctors and nurses, who are not also performing the treatment.^{1,2,6} Governing staff deemed advanced sedation training for the OMFS team was not needed and a repeat evaluation was indicated to identify any change in sedation utilisation.

Second Evaluation

Data collection occurred for seven weeks between 24/1/21-14/3/21. Of the 22 children seen by OMFS, 13 needed additional pharmacological support, of which 7.7% (n=1) utilised sedation to enable the application of glue and steri-strips (Table 1). The greatest justification for GA was for non-compliant patients (n=7).

Overall, across both evaluations, 41% (n=11) of GA were indicated due to a lack of compliance (Table 2). In total, 60% (n=32) of cases required neither GA or sedation, with 94% (n=15) of these patients requiring solely glue or 'steri-strips'. Notably, multiple justifications were often given for a single treatment.

As sedation uptake was lower than expected, a survey was created for local OMFS DCT and senior team. A 50% response rate, consisting of mostly DCTs, found:

- 80% were unaware sedation was available before cycle one and only 10% had utilised ED sedation
- 50% had attended the teaching sessions
- 80% would like more teaching

Discussion

This evaluation identified the minimal use of paediatric sedation by Merthyr's ED team. Survey feedback highlighted the lack of clinician confidence from a lack of education, particularly of DCTs, thereby limiting sedation utilisation. Other potential limitations include the clinician's range of experience and confidence with sedation. Emergency departments will therefore have different sedation use. A similar evaluation highlighted many children eligible for sedation do not receive it, potentially due to a busy ED and lack of available staff.³

Advocacy for sedation, when indicated, is needed to encourage its uptake. A lack of education was identified as the main barrier, with teaching providing some improvement in sedation utilisation on repeat evaluation. Consequently, managers and senior ED staff have incorporated sedation training into future ED staff education. Local DCT inductions lacked similar training, which was addressed through teaching on sedation uses, indications and access for DCTs and staff (ED and OMFS).

A previous evaluation on ED sedation by Boyle *et al* (2010) noted sedation utilisation could successfully reduce emotional burden and financial costs, to families and Trusts, compared with a GA and that avoiding GA reduces morbidity and mortality risks.^{3,5} However, it is important to note that sedation is not always indicated nor appropriate for children, for such reasons as: medical conditions worsened by sedation and where sedation alone would be inadequate in very young children or long or invasive procedures.^{1,2,6} Therefore, a standard of all children being offered sedation should not be implemented. The ages treated and justifications from our evaluation complied with guidance for sedation.^{1,2,3,6}

Following delivery of sedation teaching, one child who might have had a GA was treated with sedation. Despite this small number, this evaluation highlights the potential use of this modality in the ED to reducing GA incidence. Following this evaluation, the OMFS team at Merthyr more readily offers sedation. Repeat evaluations have been successfully performed in greater proportion at local health boards which further supports sedations utilisation. For GA reduction to take place, OMFS teams' awareness is essential. It is hoped that in the future more children will receive sedation to reduce GA experience and associated risks.

Interestingly, no cases of dental trauma were identified over this winter evaluation. Repeat evaluation during summer may show increased incidence of dental trauma, where sedation may be utilised in acute management.

Short periods between data collection and the relatively small volume of data limit evaluation of the effects from implemented changes. Future evaluation is required to appraise this impact on the proportion of children receiving sedation and the subsequent reduction in utilisation of GA. Formal evaluation of staff training and confidence could also be completed.

Action Plan:

- Teaching added to Welsh DCT induction days
- Results presented to both health boards and nationally
- Long term, development of a joint ED and OMFS sedation clinic
- Repeat evaluation in both units is planned for summer 2022

Conclusion

Sedation is a viable alternative to general anaesthetic for many children but is often under-utilised. With increased awareness through teaching, the ED utilisation of sedation can be improved. The clinician awareness and training raised through this service evaluation can therefore aid the reduction of children's exposures to GA, improving children's health and resource usage.

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Table 1 – Proportion of patients treated with GA and sedation in each evaluation

	Total number of paediatric OMFS patients	Proportion of patients requiring additional <u>pharmacological support (PS)</u>	Proportion of patients treated with <u>GA</u> :		Proportion of patients treated with <u>sedation</u> :	
			Total	PS	Total	PS
Evaluation 1	31	26% (n=8)	26% (n=8)	100% (n=8)	0% (n=0)	0% (n=0)
Evaluation 2	22	59% (n=13)	56% (n=12)	92% (n=12)	4.5% (n=1)	7.7% (n=1)

Table 2: Justifications recorded for cases (as a proportion of all those receiving that treatment modality)

	Sedation	GA
Non-compliant for treatment without GA		11 (41%)
Glue +/- steri-strips only	1 (100%)	
Dental extraction for facial swelling		9 (33%)
Deep wound		4 (15%)
Dog bite		1 (4%)
Fractured bone		2 (7%)
<u>Total</u>	1	27