

PATIENT REPORTED OUTCOME MEASURES (PROMs) ASSESSMENT OF INHALATION SEDATION PATIENTS

A Clinical Audit

Submitted in partial fulfilment of the requirements for the Degree of
Dental Doctorate in Paediatric Dentistry

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1. SUMMARY

Inhalation sedation (IS) is widely used and is an important pharmacological behavioural management tool. Use of a patient related outcomes (PROMS) tool would allow us to understand better how patients feel about this. This audit targeted patients who had dental treatments under IS as a behaviour management technique. Future uptake of health services and patient's overall health status influence the patient's satisfaction outcome. Therefore, this audit measures the patients' satisfaction after dental treatment under Inhalation sedation. A focus group designed the questionnaire in order to assess and evaluate patients' acceptance following dental treatment under inhalation sedation. Previously, 2 audits: general anaesthesia (GA) and intravenous sedation (IV) audits conducted in the department to assess patient reported outcome measures (PROMs). Therefore, this audit was suggested for consistency and completion purposes of assessing the services provided at the paediatric department in Eastman Dental Hospital.

2. BACKGROUND AND LITERATURE REVIEW

2.1. Inhalation Sedation (IS)

Inhalation sedation (IS) is used to relieve fear and anxiety, and can augment pain control in order to improve treatment outcomes. National institute for health and Clinical Excellence (NICE) in Dec 2010 recommend the use of nitrous oxide for dental treatment in children (Sury et al., 2010). So nitrous oxide is a basic sedation technique and it gives minimal sedative effects. It delivers nitrous oxide and oxygen in sub anaesthetic concentrations. Having the properties of sweet odour that is non-irritant, with very soluble properties and high minimal alveolar concentration, nitrous oxide is a useful alternative to general anaesthesia. Inhalation sedation considered to be a very safe sedative technique with rapid elimination, uptake and with no excretion products or Central Nervous System (CNS) depression (Sury et al., 2010).

A dedicated machine is used to deliver the suitable concentrations of both gases through a nasal mask.

By this method, inhalation sedation has rapid onset and recovery. It acts for a short period of time in a titratable and controlled duration. Sedation is therefore controlled

and these machines allow possible titration. Using this sedation technique also doesn't require any special patient arrangements. However, patients must accept using this pharmacological behaviour management tool. This sedative technique can't be used in pre-co-operative children, its success highly depends on the proper patient selection. Also, it may not be profound enough for difficult procedures.

According to the American Academy of Paediatric Dentistry inhalation sedation in conjunction with other behaviour management technique can build patient's confidence and improve cooperation.

Its success rate varies in literature, according to Lyratzopoulos, Blain on 2003 it was quoted to be between 83% and 97% (Lyratzopoulos and Blain, 2003). On the other hand, NICE found the success reported in the evidence to be only 50% but this included not only dental but also medical procedures (Sury et al., 2010). IS can be very useful to facilitate dental extractions in children. British society of paediatric dentistry (BSPD) in 2002 and Shepherd and Hill in 2000 stated that IS is preferred to general anaesthesia (GA) for anxious children undergoing elective orthodontic extractions (Hosey, 2002) (Shepherd and Hill, 2000). Also, Blain and Hill in 1998 successfully treated 221 of 265 children who required extractions, 57% of these were directly referred for treatment under general anaesthesia (Blain and Hill, 1998). Moreover, children who have extractions with IS exhibit less post operative distress compared to children treated under GA (Arch et al., 2001).

Dental anxiety is a significant barrier to dental treatment uptake. And it is generally experienced by most clinicians that anxious patients more often require longer chair time. So, IS can be used as an aid to reduce anxiety. Veerkamp et al in 1993/1995 reported that dental treatment under IS can reduce anxiety that can be long lasting even 2 years post IS treatment (Veerkamp et al., 1994) (Veerkamp et al., 1992). Eid in 2002 showed that 1 to 2 sessions of IS can be significant in minimising anxiety in 8-18 years old patients (Eid, 2003).

2.2. Clinical quality

Measuring factors relating to patients can be used to improve patient experience. Also, measuring health outcomes is widely used and significantly influences treatment results.

In the introduction to the Next Stage Review, Lord Darzi has stated that: 'High quality care should be as safe and effective as possible, with patients treated with compassion, dignity and respect. (Department of Health 2008b) (Coulter, Fitzpatrick,

& Cornwell, July). According to this review, quality is defined to be consisting of the following patient safety, clinical effectiveness, and patients' experience components.

Also the quality will be strengthened and supported using the following procedures:

- Launching a National Quality Board.
- To require trusts measure quality, including 'real-time' feedback in order to monitor patients' experience.
- Incorporating data from patients' experience surveys in the 'vital signs' that include the NHS Operating Framework and National Indicator Set for national and local use.
- National patient surveys' results on the NHS Choices website publication.
- Offering assistance on collecting and operating regular patient feedback.
- Introducing regular use of patient-reported outcome measures (PROMs).
- Creating quality observatories in every NHS region.
- Publishing quality indicators (metrics) in the form of quality accounts.
- Rewarding high quality implementation through Commissioning for Quality and Innovation (CQUIN).

2.3. Patient-Reported Outcome Measures (PROMs)

PROMs are a set of sensibly formulated and validated tools (questions) to measure patients' views and opinions of their health status, their disability, and their well-being. The patients themselves by (PROMs) will allow gathering information on the usefulness of care delivered to them. This will add to the importance of information available on the care delivered to facilitate the improvement on the quality of services.

The English NHS since 1 April 2009 started the PROMs programme to cover four common elective surgical procedures: groin hernia operations, hip replacements, knee replacements and varicose vein operations. Patients have been invited to complete questionnaire before and after their surgeries (Department of Health 2008a).

Usually PROMs are applied before and after a course of treatment to measure any changes due to the treatment and to assess whether the outcome is useful. Also,

patients' experience measures are used with PROMs to gain a better image of patients' opinions on the process and the result of care.

This will provide a consistent measure of the clinical quality of care as seen by patients themselves. Also the department of Health has extended the PROMs programmes to include other conditions, such as long-term conditions, and to relate this to financial issues to encourage suppliers to develop the quality of care. (Coulter, Fitzpatrick, & Cornwell, 2009)

An opinion directly perceived from patients is a successful method for evaluating patient's experience. In order to reliably collect the feedback, all staff should help and be involved in encouraging the patients to provide the proper feedback. Several ways are available to collect data. For example, using mail, telephone, interviews, online surveys, and patient panels.

Patients' feedback can be greatly beneficial for various reasons:

- Understanding the current care of the delivered service.
- Services redesigning and improvement.
- Monitoring the influence of any services modifications.
- Aid the professional to reflect the change on themselves and their team's practice.
- Comparing organisations comparison in order to assess their performance. (Coulter, Fitzpatrick, & Cornwell, 2009).

2.4. Examples of PROMs use in United Kingdom (U.K)

- ✓ Knee replacement, Hernia repair, Hip replacement and Varicose vein surgery in April 2009.
- ✓ BUPA also has a routine PROMs collection system for elective surgery in the U.K

2.5. Questionnaire evolution

Data gathering can be enabled using a collection tool such as a questionnaire (De Vaus, 1996). However, the best design of questionnaire has not yet been widely accepted, this may reflect that the medical professionals do not have the proper skills to design a questionnaire (Stone, 1993).

Self-completion and interview questionnaire are two forms of questionnaire. Both are with advantages and disadvantages. The main advantages of self-completion questionnaire are its affordability, simplicity to obtain a large sample, and its familiarity. It can be completed either at home or in the research setting (Williams, 2003). Disadvantages of self-completion questionnaire is that the patient's compliance and the low response rate especially if the questionnaire is posted to participants (Black et al, 1998).

Several factors should be considered in constructing a questionnaire. This will eventually affect the response rate and maximise its benefits (Edwards et al, 2002). Appropriate length of questionnaire is important; thus, short and simple questionnaire will result in better response rate (Leung, 2001). Obviously, the questions should address the research topic in order to collect the relevant data. They should be easy and simple to answer and follow. Proper instruction on the ideal and the best way of completing the questionnaire is essential. Confidentiality is a very critical issue and should be guaranteed (Black et al, 1998).

Moreover, other factors should also be considered; for example, the layout of the questionnaire. This can help the patient in answering the questions properly and also facilitate the analysis process. It is significant that the questions are short, simple, and specific. Paying attention to all these details will develop a questionnaire with superior response rate (Walonick, 2004).

2.5.1. Psychometric characteristics of questionnaires

It is uncertain if the same tools used to measure the quality and sustainability in quantitative evidence can be applied in qualitative investigations. Usually the debate is concerned mainly about the concepts of validity and reliability.

Validity

A questionnaire is considered valid if it measures what it designed to measure. To evaluate the validity of a questionnaire it is important to understand that there are different aspects of validity, the external and internal validity (Black et al, 1998).

Reliability

To assess the reproducibility of a research, reliability can be used to evaluate the consistency of an instrument. Two parts need to be examined; the internal consistency and the test-retest reliability (Williams, 2003). In the first aspect the questions should be asked in more than one way, but in the second aspect the participants are asked to answer the questions in two different occasions then compare the different response. However, reliability is not very recommended and in qualitative research it is inappropriate (Holstein Gubrium, 1997).

Readability

Having a questionnaire that is easily read, understood and completed by the public is essential issue to be considered. Therefore, readability is a feature in designing a successful questionnaire. In a pilot study this can be obtained by asking the participants directly about their opinion on the questionnaire and assess it. On the other hand, different indices are available like the Flesch Reading Ease Score (Flesch, 1948) and the Flesch –Kincaid Grade level (Kincaid et al, 1975).

Acceptability

During the pilot stage of a study, acceptability can be looked at to assess the questionnaire. For instant, the time needed to complete the questionnaire, the participants' opinions and understanding of the words used in the questions are all aspects to be considered in acceptability (Williams, 2003).

3. AIMS AND STANDARDS

3.1. Audit aim and objectives

The aim of this audit to determine the patient reported outcome measures (PROMs) of patients attending for dental procedures under inhalation sedation.

Objectives are:

1. Assess patients/parents perceptions of the way they were treated on the day of the inhalation sedation (IS).
2. Determine how patients/parents reported quality of life had changed after treatment when compared to before.

3.2. Standards

1. 100% of patients/carers should be satisfied with the way they were treated on the day of having the inhalation sedation (IS).
2. 100% of patients should show improvement in quality of life after the dental treatment under inhalation sedation (IS).

4. METHODS AND MATERIALS

4.1. Patient selection

Inclusion criteria

- ⇒ Children on dental day case under inhalation sedation (IS) having elective treatment

Exclusion criteria

- ⇒ Patients with severe mental and or physical impairment.
- ⇒ Patients requiring interpreters.

4.2. Sample size of the audit

- ⇒ Feedback must be from a representative group of patients.
- ⇒ 61 patients were included

4.3. Development of the questionnaire

The questionnaire was formulated after discussion with the consultants, patients, parents, and the standard NHS form. It is designed to be simple and easy to follow and answer. Different colours presenting traffic lights colours used to encourage the simplicity of completing it. Unbiased terminology used such as (Often, Sometimes, Never) instead of (Yes/No) answers. This questionnaire was also used previously in the GA and IV PROMs audits done at the department. However, certain modifications was done to allow its use for IS assessment.

4.4. Data collection plan

Data on the dental IS sedation experience collected on the day (after patient recovered enough to be discharged).

Data on quality of life collected via questionnaire:

- Pre-operative (on the day)
- Post-operative:

- On the day after full recovery
- After 1 day
- After 10 days

A convenience sample of patients, undergoing dental treatment under IS sedation were asked to participate in the audit. Patients were asked to fill a questionnaire preoperatively on the same day. However, postoperative questionnaires were filled in three different time points; on the same day after full recovery, after 1 day of the treatment, and after 10 days.

Questions were set for the inhalation sedation (IS) experience as follow:

1. Treated with respect and dignity?
2. Given sufficient information regarding the treatment?
3. Given sufficient information regarding sedation and after care?
4. Given the chance to ask questions?
5. Seen in a clean and safe area?
6. Seen in a child friendly environment?
7. Were you seen on time?
8. Recovery status?
9. Similarity to expectations and information given in the leaflet?
10. How helpful the IS?

Questions have been set for the quality of life, the pre-operative questionnaire as follows:

1. Given the choice of deciding the treatment way?
2. Is your child in dental pain?
3. Is your child's diet affected?
4. Is your child's sleep disturbed?
5. Is your child's attendance at school OR schoolwork affected?
6. How is your child's overall health?
7. Is it the child first IS experience?

Questions have been set for the quality of life, the post-operative questionnaire as follows:

1. Any postoperative problems?

2. Is your child in dental pain?
3. Is your child's diet affected?
4. Is your child's sleep disturbed?
5. Is your child's attendance at school OR schoolwork affected?
6. Any further medication?
7. Any emergency treatment needed?
8. How is your child's overall health?

The pre-operative and post-operative questionnaires collecting data on the same day were handed to the patient upon arrival and collected perhaps on an envelope after completion for confidentiality issues. Data collected from postoperative questionnaire were either obtained by phone or in person if the second IS appointment was after 10 days.

5. Results

Considering the questionnaires collected, the patients were categorized into 3 different groups according to the dental treatment performed under IS. Of the 61 patients included in the audit; 17 had restorative dental treatment under IS, 21 had dental extraction, and 23 patients had both procedures done under IS. (Figure 5.1) The age of all the patients ranged between 4 and 16 years old.

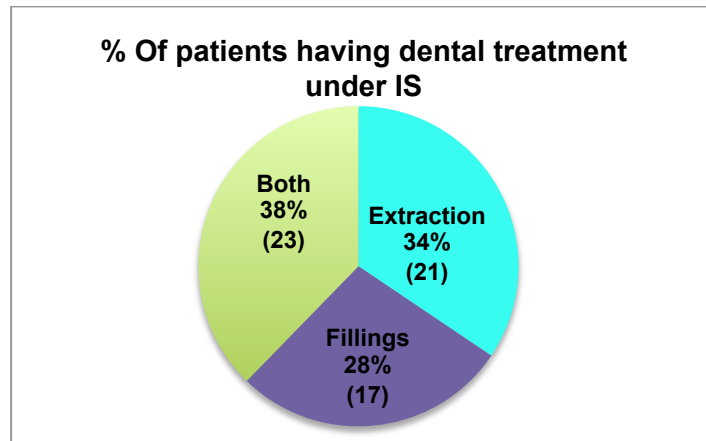


Figure 5.1: Patients' distribution

5.1. Pre-operative

This section provides the patients pre-operative opinion and quality of life disturbances they experienced before having the IS treatment.

Figure 5.2 shows that 8% of the overall total of patients reported that they have not had the chance to choose how to have the treatment done pre-operatively.

Given the choice of how to have dental treatment	Yes	No
	56 (92%)	5 (8%)

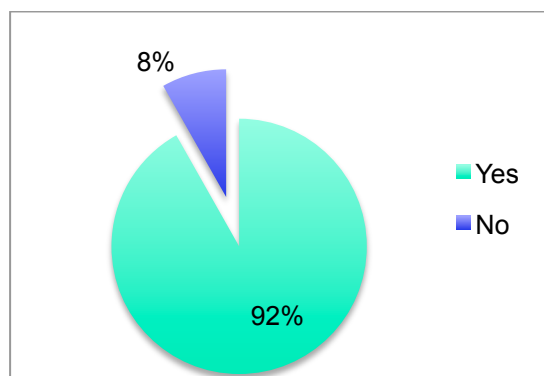


Figure 5.2: Patients' opinion preoperatively

Reporting the preoperative quality of life disturbances, a range of 3%, 5%, and 8% of the patients had sleeping disturbances, were in pain, and their diet was affected respectively. Also, 10% of the patient reported that school attendance was affected. All of these patients had dental extractions under IS subsequently.

In addition 26% of the patients were already anxious pre-operatively. 12 (75%) of these patient were scheduled to have dental extractions under IS. (Table 5.1)

Figure (5.3) shows the actual number of the patients with quality of life disturbed pre-operatively.

	Never	Sometimes	Often / Always
In pain	36%	59%	5%
Diet affected	54%	38%	8%
Sleeping disturbed	70%	26%	3%
School attendance and work affected	64%	26%	10%
Anxious	28%	46%	26%

Table 5.1: % of patients with quality of life disturbances pre-operatively

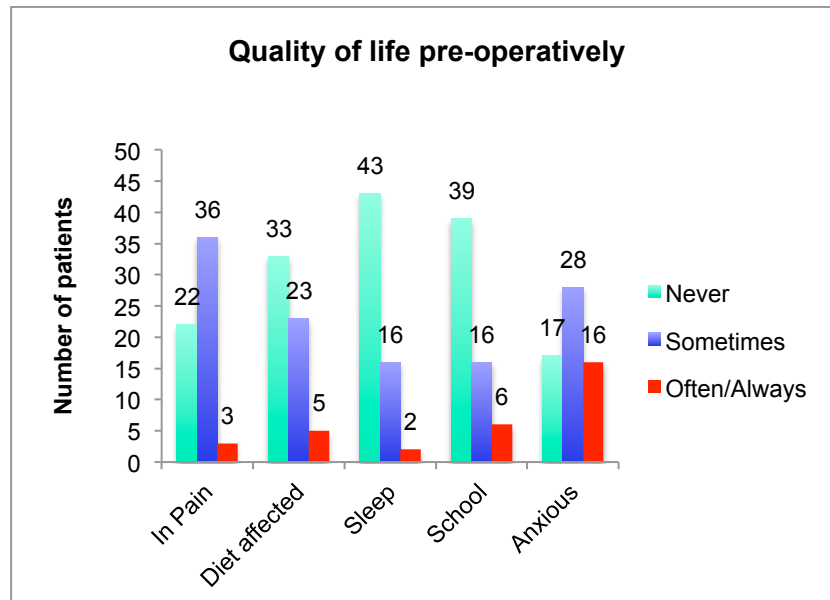


Figure 5.3: number of patients with quality of life disturbances pre-operatively

Pre-operatively, patients were asked to report their opinion about having the treatment without IS. As seen in figure 5.4, 66% said that they would have had a worse feeling to have any dental treatment without IS. On the other hand, 23% said they would have had no difference but 11% reported that they would have felt better if they had the treatment without IS.

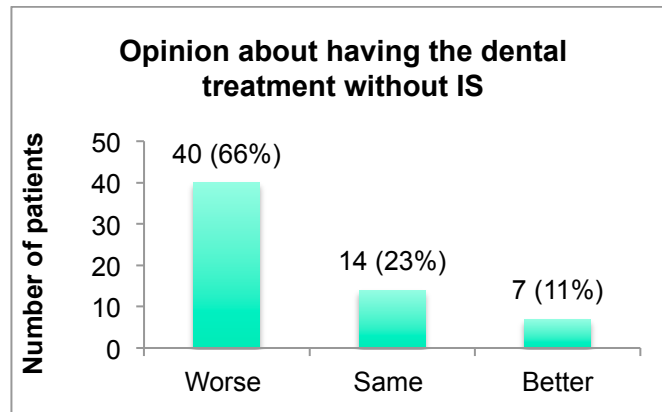


Figure 5.4: Patients' opinion of having the treatment without IS

Patients participated in the audit were asked to report if it was their first experience and almost 52% of them reported the appointment being their first experience. (Table 5.3)

In addition, painkillers pre-operatively can be advised to patients if required. Hence, they were advised for patients having dental extractions under IS (Paracetamol and/or Brufen) and only in 5 patients (Table 5.2)

	Yes	No
First experience	32 (52%)	29 (48%)
Pain killer pre operatively advised	5	56
IS procedure explained in pre-assessment appointment	52 (85%)	9 (15%)

Table 5.2: Patients' pre-operative experience

Also, patients scheduled to have treatment under IS are usually advised to have a light meal pre-operatively. However, 3 (5%) patients did not eat before the appointment. But, 58 (95%) patients last time ate was on average 1.5 hours before the appointment.

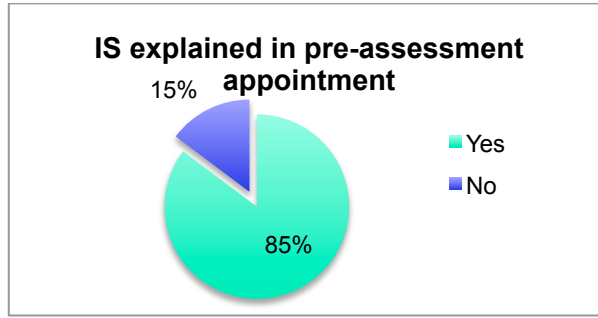


Figure 5.5: % of patients who had IS explained pre-operatively

Also, 15% of the patients did not have the IS procedure explained at the pre-assessment appointment. Figure 5.5

5.2. Post-operative on the day

Table 5.3 explains the post-operative IS experience reported by the patients after the IS experience on the day.

	Never	Sometimes	Often/Always
Treated with respect and dignity	0	0	61
Seen in clean safe area			
Seen in a child friendly environment			
Have sufficient information regarding sedation and after care			
Have sufficient information regarding the treatment		3	58
Have the chance to ask questions			60
Have sufficient information regarding pain control	1	1	59
Seen in reasonable time	0	3	58

Table 5.3: Patients' post-operative experience

61 patients always reported that they were treated with respect, seen in clean safe area, seen in a child friendly environment, and have sufficient information regarding the sedation and after care. However, 3 patients stated that sometimes they haven't received the sufficient information regarding the treatment itself and were not seen in reasonable time. Also, 1 patient indicated that sometimes he had the chance to ask questions or had sufficient information regarding pain control. In addition 1 patient indicated that he/she had never enough information regarding the pain management post-operatively.

Figure 5.6 demonstrates the patients indication regarding reporting any delay in the IS appointment.

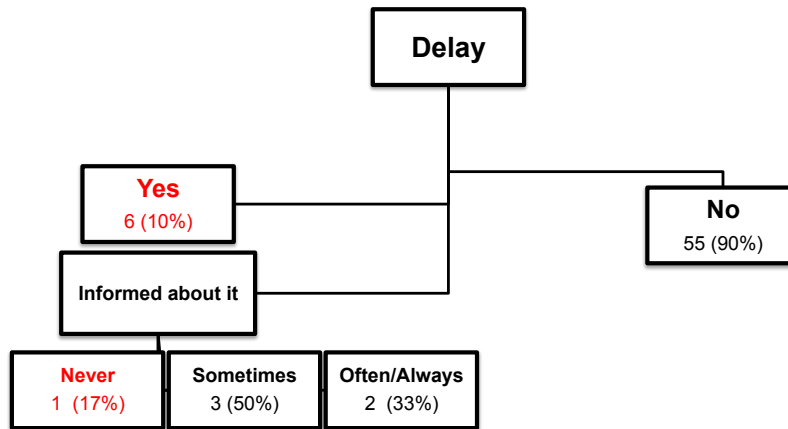


Figure 5.6: Delay reported by patients

Referring to figure 5.6, Only 10% reported a delay in their appointment. 33% of those patients were informed about the delay, 50% were sometimes informed and 17% were never informed of any expected delays.

5.3. Post-operative after 1 day

Post-operatively after 1 day of having the dental treatment under IS, 7 patients experienced problems after the treatment. 4 (57%) of those patients had dental extractions. Also, only 1 patient required an emergency appointment.

Patients with problems post-operatively reported the following problems:

- 1st patient had his cemented crown came off and required an emergency appointment to re-cement the crown
- 2nd patient experienced mild pain and paracetamol was taken subsequently
- 3rd had more intense pain and Ibuprofen was required
- 4th patients felt numbness and headache all day
- 5th patient felt sleepy and tired
- 6th had surgical extraction and therefore had pain all day and required pain killer such as Ibuprofen
- 7th patient had Stainless steel crown (SSC) cemented and experienced some slight discomfort and pain postoperatively

In addition, 5 patients felt nausea or dizziness for a range of 1 – 5 hours. The dental treatment done ranged as: Either root canal treatment, restorations, and dental extractions.

Post-operatively after 1 day, patients were asked to report their anxiety of having any dental treatment again under IS. Figure 5.7 demonstrates the number and percentages of patients who were less anxious, more anxious, and have a similar experience of pain to have any dental treatment again under IS again.

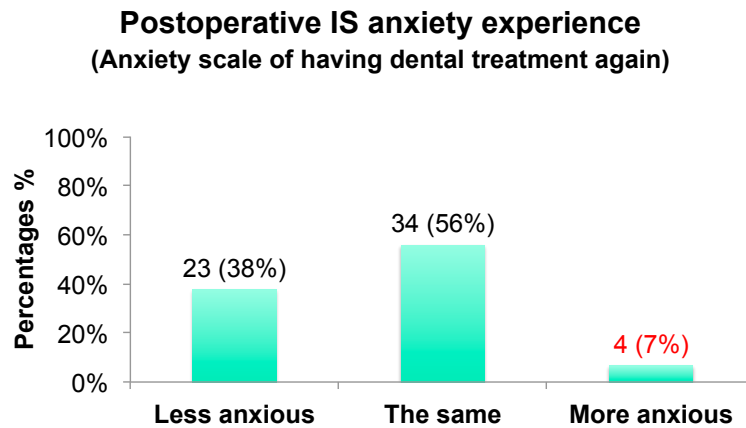


Figure 5.7: Post-operative IS experience

The majority of the patients (56%) reported that they have similar feeling to have any dental treatment under IS again. But, 7% reported that they are more anxious. 3 out of the 4 patients who were more anxious post-operatively had dental extractions. On the other hand, only 38% stated that they are less anxious.

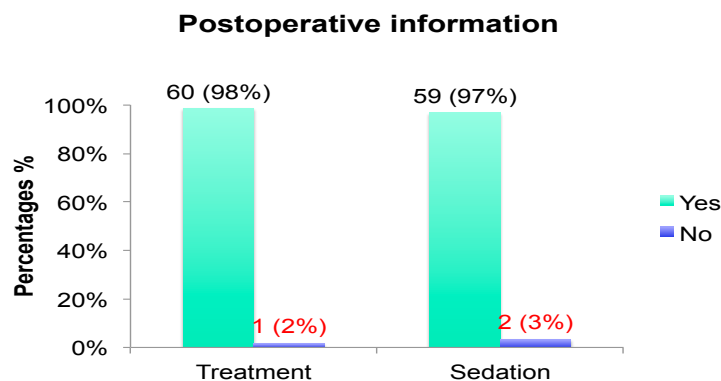


Figure 5.8: Post-operative information

Post-operatively, patients were asked to report if they were provided with post-operative instruction information regarding the IS care, and the dental treatment performed. (Figure 5.8)

Majority of the patients were instructed properly post-operatively. However, only 2% and 3% reported that they were not provided with post-operative information about the treatment and sedation respectively.

After 1 day of having the dental treatment under IS, patients' experienced was assessed. Patients were asked to report if IS helped their anxiety relief on the day of treatment. Also, they were asked to state if their experience was similar to the information provided in the leaflet. (Figure 5.9)

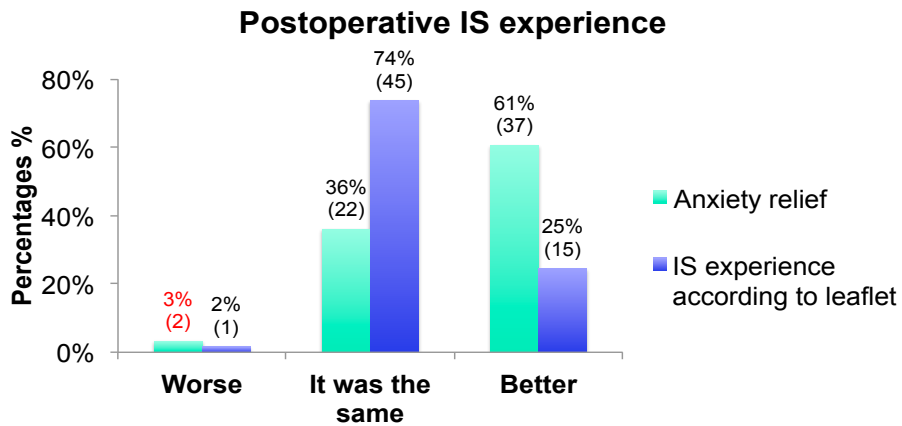


Figure 5.9: Post-operative IS experience

61% patients indicated that IS helped their anxiety relief, 36% stated it was similar, and 3% reported it was worse. The 3% patients who had worse post-operative IS anxiety relief had dental extractions under IS.

Figure 5.10, explains the recovery status patient reported after 1 day of the IS experience.

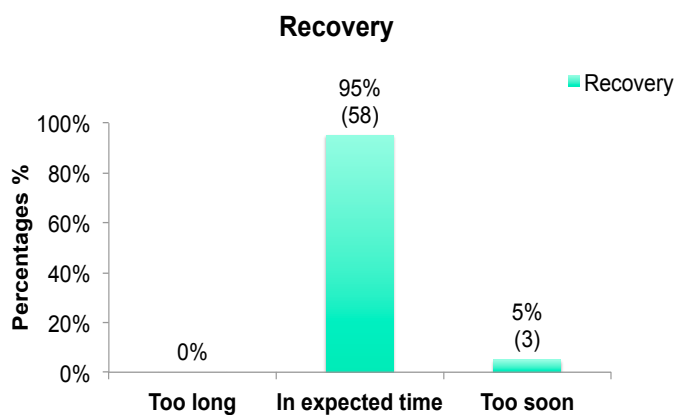


Figure 5.10: Post-operative recovery

Majority of the patients (95%) recovered in expected time but only 5% reported an early recovery and considered it a very soon recovery.

Patients were asked to state their overall experience of IS after 1 day.

Approximately 89% were satisfied and reported that their experience was positive and that IS helped them to have the treatment they needed. (Figure 5.11)

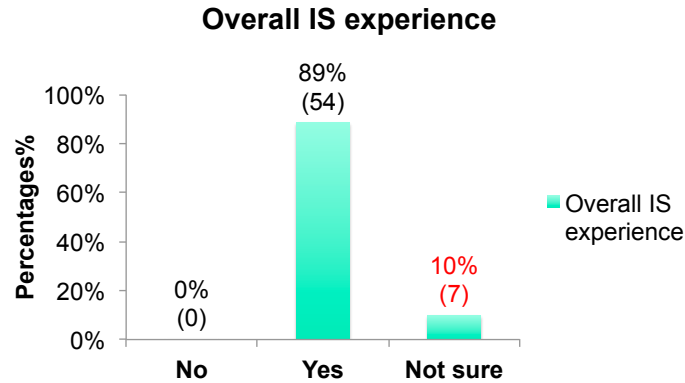


Figure 5.11: Patients' over all IS experience

On the other hand, 10% of the patients (7 patients) were not sure if the IS helped in having the dental treatment they required. 4 of the 7 patients had dental extraction done under IS.

Moreover, 95% (58) patients prefer IS sedation as a treatment option instead of general anaesthesia or any other sedation type. In addition they recommend it to a family member or a friend in this hospital. 0 patients prefer or recommend other types of sedation (IV). But, 2 patients (3%) who had both extractions and fillings under IS, prefer and recommend GA instead of IS. Also, 1 patient (2%) who had restorative treatment under IS prefers and recommends to have the treatment under local anaesthesia without IS.

5.4. Post-operative after 10 days

Patients experience after 10 days is reported in figure 5.11.

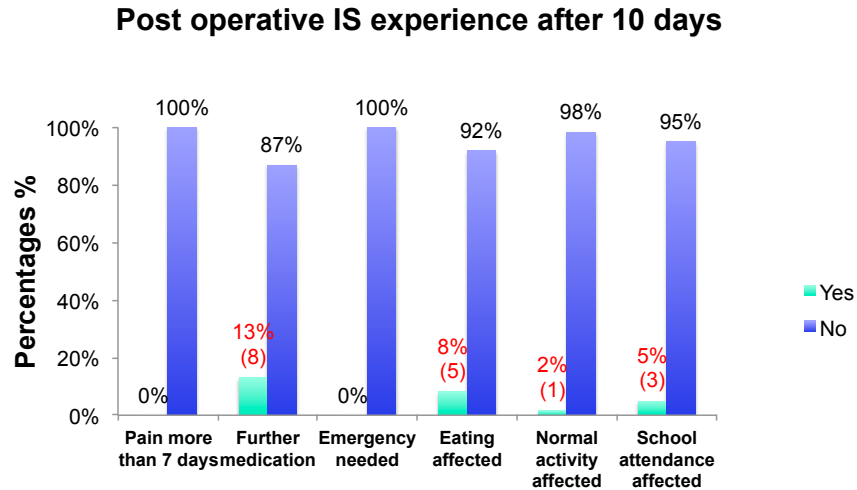


Figure 5.12: Post-operative IS experience (after 11 days)

According to figure 5.12, 100% (61) patients had no pain longer than 7 days, or needed any emergency treatment. Almost, 98% (60) patients and 95% (58) patients their normal activities and school attendance were unaffected. Also, 92% (56) patients stated that their eating habits were unaffected. In addition, 87% (53) patients did not require any further medications post-operatively after 10 days.

However, 8 (13%) patients required further medications (analgesics). Of these patients; 5 patients had extractions, 2 patients had fillings, and 1 patient had both treatments under IS.

5 (8%) patients reported that their eating habits was affected for approximately 1-2 days. 3 of these patients had dental extractions and 2 had stainless steel crown cemented under IS.

3 (5%) patients stated that their school attendance was affected for couple of days. All these patients had dental extractions. Also, the patients who had surgical extraction under IS reported that his/her normal activity was affected for 1 full day post-operatively within the 10 days period.

5.5. Results summary

- 8% of the patients were not given the choice of how to have the dental treatment
- 26% were preoperatively anxious
- 52% of the patients was their first IS experience
- 15% reported that they did not have the IS procedure explained at the pre-assessment appointment
- Pain killers pre-operatively were only advised to patients who were scheduled to have dental extractions under IS
- Few patients reported that insufficient information regarding pain control management postoperatively was provided
- 10% of the patients experienced delays and 33% of them were informed about it
- Patients who had dental extractions or dental extraction and fillings experienced more problems post-operatively after 1 day and 10 days.
- Patients who had dental extractions were more anxious post-operatively after 1 day
- Most of the patients recovered in an expected time
- Majority of the patients prefer IS and also recommend IS at this hospital to a friend or a family member
- The type of dental treatment performed highly influence the patients' response

6. Discussion

Quality is defined to be consisting of: patient safety, clinical effectiveness, and patients' experience components. (Department of Health 2008b) (Coulter, Fitzpatrick, & Cornwell, July). So, PROMS will add to the importance of information available on the care delivered to facilitate the improvement on the quality of services. Therefore, patients' opinion of the treatment provided for them is important. It can improve the service, address any problem, and monitor the excellence of the provided treatment.

In addition, Inhalation sedation is widely used in the department and assessing the patients' opinion of the service provided is essential. Also, similar audits were performed previously to assess the PROMS of patients who had dental treatment under Intravenous Sedation (IV) and General Anaesthesia (GA). Moreover, the

British society of paediatric dentistry (BSPD) in 2002 and Shepherd and Hill in 2000 stated that IS is preferred to general anaesthesia (GA) for anxious children undergoing elective orthodontic extractions (Hosey, 2002) (Shepherd and Hill, 2000).

Also, assessing patients' quality of life disturbances pre-operatively is valuable. It can assess the level of discomfort and uneasiness the patient is experiencing. So, eventually any service provided should help in minimising any complications and solves the discomfort caused by the dental problem. In addition, it can be useful to compare it with the quality of life reported post-operatively and hence evaluate and assess the service provided.

Patients' opinion in several occasions is valuable in different aspects. For example, it can verify the initial opinion of the patient, report any subsequent problems that might be missed initially, and also it can give the chance to monitor the patients for a longer period.

It is sensible to categorize the patients into the type of dental treatment performed under IS and therefore assess their opinion. This can aid in correlating the type of the dental treatment performed under IS to the patients' opinion. As a result, a better understanding to the impact of the dental treatment or the actual opinion of the service provided to the patient can be obtained.

It was stated in 2001 that children who have extractions with IS exhibit less post-operative pain compared to children treated under GA (Arch et al., 2001). And in literature it was reported that dental treatment under IS can decrease anxiety that can be long lasting even 2 years post IS treatment (Veerkamp et al., 1994). Moreover, studies showed that 1 to 2 appointments of IS can be effective in minimising anxiety in 8 -18 years old patients (Eid, 2003).

In general the results of this audit showed very high level of satisfaction. Therefore the overall impression is that the service provided is considered high in quality. This conclusion is based on the IS questionnaires results from the IS experience and the quality of life pre-operative and the outcomes of the patients post-operatively. In addition, this audit emphasised that the outcomes measures from the patient's opinion is essential view in case of assessing dental treatment and the service provided.

Usually, any clinical audit is conducted to ensure that the current services meet the standards. And this audit aimed also to address this point. Patients and/or parents opinion and satisfaction were collected via questionnaire in multiple occasions. However, one of the major difficulties found with collecting the information is that

usually patients and or career were unable to fill the questionnaire pre-operatively. For example, if a patient or career had high concerns or were anxious about the procedure pre-operatively, filling the questionnaire was difficult and time restricted. In addition, collecting the questionnaire was also affected by the status of the clinic on that occasion. Thus, some clinicians were busy arranging multiple required and essential paper work pre to the IS procedure. So, adding more task in filling the IS questionnaire was demanding and difficult in certain busy clinic situations.

Also, post-operatively on the day the method of collecting the data was challenging. For example, in most of the occasions parents or careers were busy with their children especially if the patient had a complex treatment under IS.

Another major problem is the ability to reach the patients again in another 2 occasions. For instance, 1 day after the appointment, some of the patients were unable to answer or respond to the phone. Again, after 10 days it was even more challenging as usually patients or careers were unable to recall their opinion or satisfaction accurately. However, most of the patients were satisfied and were happy with the service provided.

Large effort was made in contacting patients to take part in the study, such as calling the parents on different time during the day. The aim of this is to encourage the majority of the patients to participate in this audit. Also they were all informed about the benefit of understanding and improving the quality of service provided. In order to motivate the parents to help providing better service to them in the future.

Moreover, parents usually were asked to fill or respond to the questionnaire on behalf of their children. Therefore, to a certain limits this can be biased by the career or parent opinion. Though, it was always encouraged that both the career and the child together answer the questions in order to have a more precise child opinion in the situation that requires his or her individual satisfaction.

An attempt was to have the patients or careers opinion in a second IS appointment instead of obtaining it after 10 days. But most of the patients had their second IS appointment in a very large time gap form the previous one. So, it was decided to obtain the opinion after 10 days from all the included patients in order to achieve more consistency in the results.

With regards to the questionnaire used in this audit, it was previously used twice in similar audits done in the department. But, some modifications of the questionnaire

was required in order to fit into its use in assessing IS outcomes. So, the validity and reliability of this questionnaire might be acceptable.

The reason of having this treatment was highlighted by the result of the pre-operative quality of life disturbances obtained from the questionnaire. For example, 26% of the patients were anxious pre-operatively. Also, 10%, 8%, 5%, and 3% reported disruptions that necessitate dental treatment. In fact, 75% of the anxious patients were scheduled to have dental extraction under IS. Therefore, using the IS as a behaviour management tool to reduce anxiety was a sensible idea.

Ideally, all patients should have the choice on how to have the treatment done. Also, the procedure and explanations of the IS option must always be discussed with the patient or the career in the pre-assessment appointment. However, only 8% of the patients reported that they were not given the choice on how to have the treatment done. Also, only 15% of the patients reported that the procedure was not explained to them pre-operatively. Thus, it can be generally acceptable to consider that the majority of the patients were satisfied pre-operatively.

It is advisable to always give the patients the choice on how to have the dental treatment done. Several treatment options can be offered to the patient. But a partial guidance should be offered to the patient without any enforcement or neglecting to the patient's rights in choosing the way they need to the treatment to be done. However, not overlooking the clinical situations and the treatment requirements.

With regards to painkillers advise pre-operatively, minority of the patients were informed to take any necessary analgesics. This can be explained because, Eastman is considered a training hospital and therefore different opinions and schools can be appreciated. Therefore, in literature there is no enough evidence to encourage any painkillers pre-operatively. However, some of the patients were encouraged to take some medications if they required.

Post-operatively on the day, most of the patients were satisfied and responded positively. But, some patients reported that they did not have the enough post-operatives information regarding the treatment or the information regarding the pain control. This might be confused sometimes with the multiple instructions that are usually provided to the patients. Therefore, parents or career might some time confuse the instruction and consider it as missing information. Though it might be confusion or misunderstanding.

This can be even more accredited as the majority of the questionnaires were filled from patients who were treated by postgraduate dentists. In fact, most of the

postgraduate clinicians are international students and English is not their first language. As a result, language barrier and misunderstanding can explain to a certain limits some lack in the post-operative information provided.

With regards to the delay, majority of the patients were seen on time, but 10% experienced some delays. 50% of them reported that they were sometimes informed about it. A possible reason is that the paediatric department has a busy clinic and it can be challenging to inform the patients with any expected delays. Also, usually the clinician and the nurse used to be busy with the previous patient and unable to let the following patient be aware of any delay. But this was never achieved only in 17% (1 patient) of the total number of the patients.

Problems post-operatively after 1 day and 10 days were usually seen in patients who had complicated or more complex treatments under IS. For example, 57% of the patients who reported post-operative problems had dental extractions. Also, patients who reported that they are more anxious to have any dental treatment under IS had dental extractions. Thus, almost 75% of the patients who were more anxious post-operatively had dental extraction. Therefore, it might be a better idea to question the patients exactly if they were concerned or more anxious about the sedation or the dental treatment done under the IS.

Generally, 61% of the patients believed that IS helped them to have the dental treatment done under IS by relieving the anxiety. But on the same time 36% of the patients felt that it did not cause a significant effect. Possibly, those patients were already in a very high level of anxiety and therefore might not notice the effect of this sedation as a behaviour management tool.

As it is previously explained, IS considered safe and a light form of sedation. As a result, 95% of patients recovered in expected time. Overall, majority of the patients stated that they are happy with the IS experience. But only 10% (7 patients) reported that they were unsure of their experience. 4 of the 7 had dental extraction under IS. Therefore, a possible reason for this (unsure experience) can be reasoned to the dental treatment done under IS experience and not the IS experience itself.

In addition, majority of patients prefer IS as a behaviour management technique. It is was noticed that patient prefer IS instead of IV and GA. This can be explained that other forms of sedation are considered to be more complicated than IS. Generally, IS doesn't require complicated pre-operative patient's preparation. But, in one situation GA was preferred instead of IS. In this situation, extraction under IS was performed. Therefore, the dental treatment done might considerably affect the patients opinion

about the IS. But mostly, patients were satisfied and recommends the IS to a family member or friend.

After 10 days, only patients who had dental extraction under IS reported quality of life disturbances. Most of them required further medications (13%). However, all patients reported positive response and opinion.

Complete re-auditing of this survey will not significantly show any different results to the current obtained outcomes. Therefore, it was agreed that maybe partial re-auditing of certain parts of the audit would add to the overall outcomes. For instance, auditing the post-operative instructions or the delay time might be considered. Also, considering categorization of exact dental treatment done under IS and investigates if this highly correlates to the patients' opinion. So, this can show better and more precise results in the future.

Finally, 89% of the patients and their carers are satisfied with the IS treatment. Therefore the following sections highlights the recommendations that can be implemented to achieve the 100% standards of patient satisfaction.

7. Conclusions and recommendations

This audit was able to identify the areas that can be improved. Generally, most of the patients were satisfied. Service can be considered of high quality. Also, patients satisfaction and response is highly affected by the dental treatment done under IS.

Several recommendations can be provided as follow:

- Give the patients the choice on how to have the dental treatment done.
- Make sure to explain the IS procedure at the pre-assessment appointment.
- If needed advise the patient to use painkiller pre-operatively to minimise pain post-operatively.
- Make sure to advise patients to have light meal before IS appointment.
- Address the patients' complains and act to minimise any signs of quality of life disturbances.
- Remember to inform patients about any delays if expected.
- Inform patients about the possibility of experiencing nausea and dizziness post-operatively following dental treatment under IS
- Understand patient's anxiety by incorporating non-pharmacological behaviour management techniques

- Recommend the use of post-operative analgesics if needed especially following dental extractions under IS
- Inform the patients about the quality of disturbances (e.g: eating effects, school attending, normal activities, etc..) following dental extractions under IS.

To conclude, this audit addressed its aim to report patients' outcomes and opinion about dental treatment under IS. Patients were satisfied, and IS can be considered a successful behaviour management tool in terms of the analysis done in this survey. Also, the service provided is generally considered high in quality and patients were happy of the treatment and care they received.

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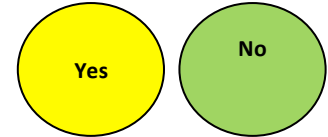
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9. Appendices

Inhalation Sedation (pre-op on the day):

**delete as appropriate*

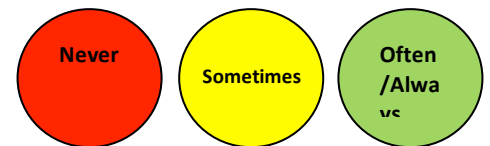
- Were you given a choice of how to have your / or your child's* dental treatment?



- Are you / or is your child* in dental pain?



- Is your / or is your child's* eating affected?



- Is your / or is your child's* sleep disturbed?



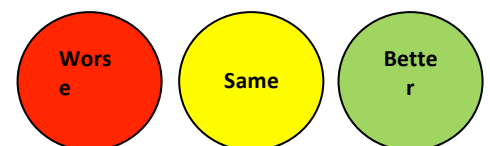
- Is your / or is your child's* attendance at school or school work affected?



- Are you / or is your child* anxious or scared about the dental treatment?



- How would you / your child feel about having this treatment without any sedation?



- **Is it your/ or your child's first IS experience?**

Yes No

- **Were you advised to take/ or give your child any pain killer before treatment?**

Yes No

- **Please state the medication:**
.....

- **Please state the dose:**
.....

- **Did you have the inhalation sedation procedure explained in the pre-assessment appointment?**

Yes No

- **When did you/ or your child last eat before this visit?**.....
.....
.....

Inhalation Sedation (IS Happy air) Experience (post-op on the day):

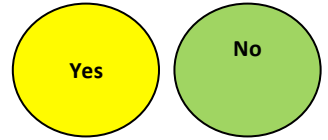
- **Were you treated with respect and dignity?** Never Sometimes Often /Alwa vc
- **Did you have sufficient information regarding the treatment?** Never Sometimes Often /Alwa vc
- **Did you have sufficient information regarding sedation and after care?** Never Sometimes Often /Alwa vc
- **Did you have sufficient information regarding pain control (if this was required)?** Never Sometimes Often /Alwa vc
- **Did you have the chance to ask questions?** Never Sometimes Often /Alwa vc
- **Were you seen in a clean and safe area?** Never Sometimes Often /Alwa vc
- **Were you seen in a child friendly environment?** Never Sometimes Often /Alwa vc
- **Were you seen in reasonable time?** Never Sometimes Often /Alwa vc
- **Do you experience any delay today?** Yes No
- **If there were delays, were you informed of the delay?** Never Sometimes Often /Alwa

Post-operative Questions after 1 day:

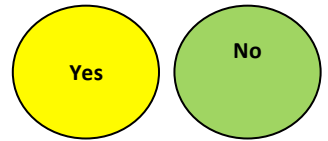
- **Did you / or your child experience any problem/s after treatment?**

i) **Problem with treatment?
If so what was it?**

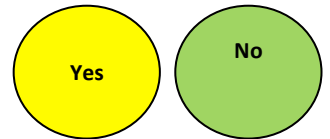
.....



ii) **Needed to be seen as an emergency?**

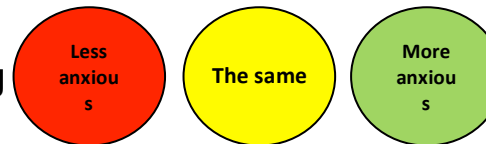


- **Did you / or your child feel nausea or dizziness after treatment?**

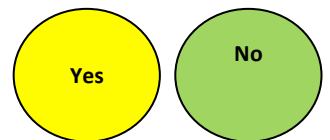


If so, how long after treatment.....

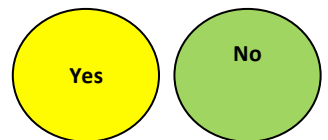
- **Are you / or is your child anxious about having this type of dental treatment anymore?**



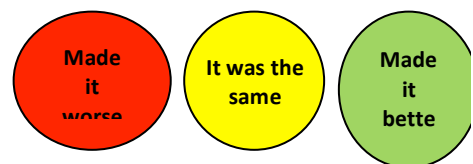
- **Were you given information on post op care after treatment?**



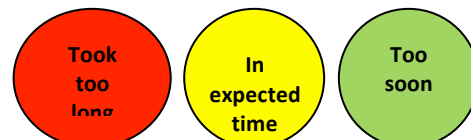
- **Were you given information on post op care about the sedation?**



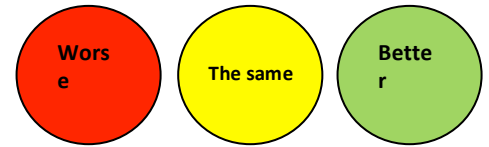
- **Did sedation help relieve your/ or your child's anxiety on the day of treatment?**



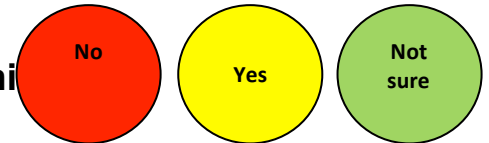
- **How did you / or your child recover from sedation?**



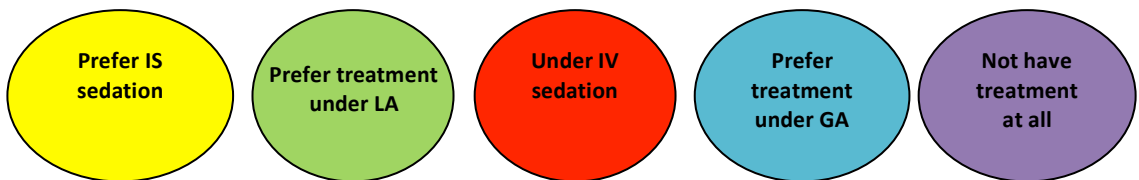
- Was this according to your expectation as described in the leaflet provided?



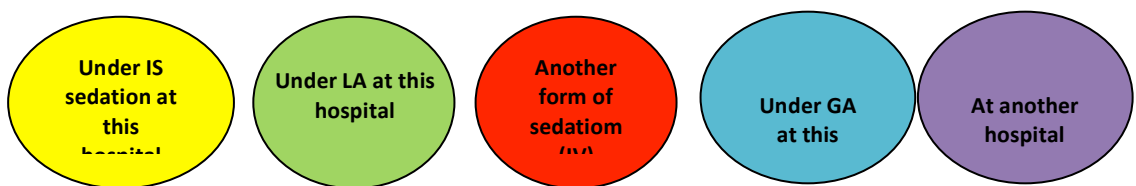
- Overall did sedation help you / or your child have the dental treatment that was needed?



- Would you / or your child have similar treatment if required under (inhalation sedation):



- Would you recommend a similar treatment to a family member or friends (if they required similar treatment):



Post-operative Questions after 10 day or in the 2nd IS appointment:

- **Did you / or your child experience any problem/s after treatment?**

i) **Pain for more than 5-7 days?**

For how many days?.....

Yes No

ii) **Was further medication needed?**

Yes No

iv) **Needed to be seen as an emergency?**

Yes No

- **Was your / or your child's eating affected?**

If yes, for how many days?.....

Yes No

- **Was your / or your child's normal activities affected?**

If yes, for how many days?.....

Yes No

- **Was your / or your child's attendance at school OR school work affected for more than the day of the treatment (1 day)?**

If yes, for how many days?.....

Yes No

Patient's number	Patients sticker	Contacts	Date	Pre-op (on the day)	Post-op (on the day)	Post-op (after 1 day)	Post-op (after 10 days or second IS)
1							
2							
3							
4							
5							
6							
7							