Retrospective Audit of Documentation of Local Anaesthesia in The Dental Record

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Contents

Background

Local anesthesia is the temporary loss of sensation - including pain - in one part of the body. It is produced by a topically-applied or injected agent without depressing the level of consciousness. It acts mainly on neural fibers in order to prevent the ionic influx of sodium for neuron impulse (Ogle and Mahjoubi 2012; Malamed 2014). During dental procedures, temporary elimination of pain is essential to build a trust relation between the dentist and the patient. Blocking of pain sensation leads to a decrease in fear and anxiety levels that will promote patient positive attitude towards patient's dental visit.

Careful considerations should be kept in mind when dealing with patients of younger age (McDonald et al. 2011). The techniques for using and delivering local anesthesia is important, especially when administered to those under 18 years as they need behavior guidance. The use of proper language, topical anesthesia, suitable technique, distraction and available sedation options will mostly lead to positive experience during delivering of local anesthesia (Wilson et al. 2007). Beside behavior management, dosage is another issue in paediatric dentistry. Dosage should be calculated carefully to prevent toxicity and prolonged duration of anesthesia which might be a result of trauma to tongue, lip or soft tissues (Malamed 2014).

In addition, gross knowledge of anatomy of head and neck region helps to prevent complications like intravascular injection and hematoma. Last but not least, taking extra care when recording patient medical history is mandatory as well as seeking advice from medical colleague if needed before beginning of treatment (Malamed 2003).

Anatomy (Blanton & Jeske 2002)

Having a thorough and detailed knowledge about local anesthesia before administration is essential for all dental operators. This is important to avoid any possible damage to regional anatomy and any legal consequences after causing harm to patients. By using block technique, local anesthesia can be delivered to maxillary and mandibular branches of trigeminal nerve which need careful considerations of adjacent structure.

The Maxillary Nerve

The maxillary nerve has three divisions: the pterygopalatine nerve, the infraorbital nerve, and the zygomatic nerve.

The most important nerve is the pterygopalatine nerve which divides in two terminal branches; anterior and posterior palatine nerves. The anterior palatine nerve enters the oral cavity via

greater palatine foramen. Among the two branches; the anterior palatine nerve is larger. It divides into a number of smaller nerves at the greater palatine foramen to give the greater palatine nerves. The anterior palatine nerve is responsible for the supply of the hard palate mucosa to the canines. The posterior palatine nerve is the smaller branch of the pterygopalatine nerve. The function of posterior palatine nerve which pass through lesser palatine foramen is to provide the sensory endings to the tonsil.

The infraorbital nerve emerging from the infraorbital foramen encompasses three branches: the anterior, middle, and posterior superior alveolar nerves, which provide sensory endings to the maxillary teeth, the associated periodontal membranes, and gingiva on the lateral aspect of the maxilla. The patient will not experience any sensory sensation after delivering anesthesia to this nerve. The terminal branches of the infraorbital nerve from the infraorbital foramen fan out in the direction of the lower eyelid, nose and upper lip. Injury to the infraorbital nerve could possibly happen during apical endodontic surgery in the region of the upper canines and premolar teeth and during sinus lifting procedure. Injury to the nerve is likely going to result of neuroma with permanent loss of sensation. However, the injury to the terminal branch that ends in the lip is self-limiting and will repair themselves.

Lastly, the zygomatic nerve that divides into the temporal and the facial branches. The temporal branch supplies the skin of the temporal anterior region while the facial branch gives supply to prominent part of the cheek.

The Mandibular Nerve

The mandibular nerve is the third branch of the trigeminal cranial nerve. It contains both a motor and a sensory branch. The internal branch consists of two nerves; the lingual and the buccal nerve. These nerves supply extensive areas of the oral mucosa. The inferior alveolar nerve (The middle branch) supplies the mandibular teeth, lower lip mucosal membrane, skin and skin of the chin. The auriculotemporal nerve is part of the external branch is not related to dentistry as it is never anesthetized.

The buccal nerve is mostly not involved in the dental procedure. However, the dentist may need to anesthetise this nerve where sometimes it causes pain as a result of retraction. The nerve direction passes several facial muscles including temporalis and buccinators. As many branches cross the buccinator muscle, the nerve supplies most of the cheek mucosa.

The lingual nerve is the nerve responsible for sensory and taste fibers of the tongue. Lingual nerve separates from the inferior alveolar nerve by nearly 10mm under the cranial base. The inferior alveolar nerve is located backward and slightly to the middle in relation to the lingual nerve. The lingual nerve passes through the medial pterygoid muscle, mylohyoid to the floor of the mouth. Its superficial location is intraorally at the back of the posterior area. It can be detected by the naked eye sometimes on the lingual mucosa between second and third molar teeth. Injury to the lingual nerve is possible especially during the extraction of lower third molar tooth. The likelihood of injury will increase during the third molar extraction procedure if the patient has experienced pericoronitis. Damage to the lingual nerve could be permanent, fortunately microsurgical repair success rates are high.

The inferior alveolar nerve isolates in the premolar region and divides into the incisive and mental nerves, which supply the teeth and periodontal ligaments of the mandibular teeth. The mental nerve further partitions into three to five branches in the wake of leaving the mandible through the mental foramen. The incisive branch stays inside of the mandible, where it proceeds and turns out to join the inferior dental plexus. The relative position of the lingual nerve differs depending upon the age of the patient. As the mandible develops and advances progressively and all the more along the side, the lingual nerve turns out to be more posteriorly and superiorly positioned in relation to the ramus of the mandible. Starting at the third molar region, the inferior alveolar nerve curves at the summit of the molars and proceeds underneath the bases of the first molars.

Local Anesthesia Agents

Several local anesthesia drugs are available to control pain in dental patients. Generally, there are two groups of chemical component: esters and amides (Moore & Hersh 2010). The systemic effect of local anesthesia happens after they get absorbed in the circulation as a vasodilators and this effect is directly related to blood plasma level (Malamed 2014).

Procaine/ Propoxycaine

These are two common types of ester anaesthetics which have been present as a combined agent used until 1989. The dental formation composed of 0.4% propoxycaine (Ravocaine) and 2% procaine (Novocaine). Vasoconstrictor as 1:20,000 of levonordefrin used. Using of this type in dental regional anaesthesia stopped prior to 1990 as it is less effective than amides type; because of the amide type have higher diffusion properties. Moreover, allergy caused by

procaine should be known to affect both patients and dentists. On the other hand, Procaine needs vasoconstrictor to be effective as it is a potent vasodilator (Hawkins and Moore 2002).

In the past, using the amide type of local anaesthetic during general anaesthesia is believed to cause of rare state called malignant hyperthermia. Malignant hyperthermia is characterised by rapid and probably fatal rise of body temperature during general anaesthesia. As a result, ester type at that time was considered to be the agent of choice.

Nowadays the evidence show that amide local anaesthesia can be used for patient at risk of malignant hyperthermia as there is no risk proven (Hawkins and Moore 2002).

Lidocaine hydrochloride

In North America, Lidocaine has become the prototypic dental local anaesthesia drug because it is safe and has super efficacy. Additionally, allergy appear to be rare using this agent as well as hypersensitivity reaction in last 50 years (Hawkins and Moore 2002). In cartridges, Lidocaine is presented as 2% with epinephrine as a vasoconstrictor. Epinephrine concentration varies as 1:50,000, 1:100,000 and 1:200,000 with 1:100,000 considered to be the standard. Lidocaine with epinephrine is characterised by rapid onset and lasts usually between 90-180 minutes which make best option for infiltration and nerve block (Moore and Hersh 2010). After considering that local anaesthesia absorption is affected by tissue vascularity, area to be injected in and subjective tolerance, the maximum dose of Lidocaine with epinephrine is 3.2 mg/lb or 7 mg/kg of person body weight and should not be over 500 mg in total. If Lidocaine administered without vasoconstrictor, a dose of 2 mg/lb or 4.4 mg/kg is the recommended dose without exceeding maximum of 300mg.

Lidocaine is metabolized by the liver via microsomal fixed-function oxidases and is converted to monoethylglycerine and xylidine. With 10% of Lidocaine unchanged, it is excreted by the kidneys. Allergic reaction from Lidocaine has not been documented. When Lidocaine is given in a correct way with proper dose adverse drug reaction are rare. But when it happens it is mostly related to the administration technique more that the drug itself, mainly when intravascular injection deliver and cause systematic exposure (Jackson et al. 1994). Contraindication includes (Ogle and Mahjoubi 2012):

- Heart block, second or third degree (without pacemaker)
- Serious adverse drug reaction to lidocaine or amide local anaesthetics
- Concurrent treatment with Class I antiarrhythmic agent
- Severe hepatic disease

Mepivacaine

With reasonably rapid onset (2-3 minutes for infiltration and 5-8 for inferior alveolar nerve block), Mepivacaine is another local anaesthetic agent that belongs to the amide group. Mepivacaine has a medium duration of action of less than one hour for plain mepivacaine when infiltrated in maxilla and about 2 hours when used for regional anaesthesia. Longer anaesthetic duration can be achieved by adding vasoconstrictor, either epinephrine or levonordefrin. Mepivacaine 3% has a shorter duration because it causes minimal vasoconstriction. The 2% mepivacaine with vasopressin (epinephrine or levonordefrin) provides the longest anaesthetic duration of all types of mepivacaine. 3.0 mg/lb or 6.6mg/kg of body weight is the maximum recommended dose of mepivacaine. For the child patient the recommended dose is 3.0 mg/lb to maximum of total of 5 cartridges of 2% or the 3% mepivacaine. Like lidocaine, the leeway of mepivacaine is altogether because of liver metabolism system, and relies on upon the liver blood flow and the action of the metabolizing compounds. Mepivacaine is pregnancy category C and therefore should not be used for pregnant patients.

Prilocaine (Citanest)

Prilocaine is another type of amide local anaesthesia used mainly for infiltration. As a secondary type of amide, Prilocaine is unique from other amide types. Two types of Prilocaine are available: with and without epinephrine respectively. The concentration of Prilocaine in both types is 4% where the epinephrine concentration is 1:200,000. The onset time and duration of the two types differ. On one hand, when we use Prilocaine for infiltration, type one starts approximately in 2 minutes while type two needs up to 3 minutes (Malamed 2003). The duration of the plain type and added epinephrine type is 2 hours and 1 hour respectively. The recommended dose of both types is 2.7 mg/lb or 6.0 mg/kg of body weight. For the grown up patients, the dose should not exceed 400 mg. Liver and kidneys share the metabolism of Prilocaine and the excretion happen solely by the kidneys. Using Prilocaine in very high doses can lead to cyanosis and affect the blood oxygen carrying capacity. Therefore using it should be avoided with following patients (Ogle and Mahjoubi 2012):

- Patient of high risk of methemoglobinemia
- Sickle cell anaemia
- Cardiac and respiratory failure with hypoxia

Articaine

Articaine is the most recently introduced local anaesthesia. It also belongs to the amide group of local anaesthesia like Lidocaine. What is special about Articaine is the drug structure, it does not include benzene ring like other amides. Containing a Thiophene ring instead of the benzene increases Articaine's lipid solubility making it more able to cross barriers formed by lipids (Ogle and Mahjoubi 2012). Articaine has the ability to undergo biotransformation in the plasma because of the presence of an additional ester group. Articaine hydrochloride is available in concentration of 4% with either 1:100,000 or 1:200,000 epinephrine (Malamed 2014). The ester element means that Articaine has an extremely short plasma half-life, around 28 minutes. The anaesthetic characteristics of Articaine like onset time, potency and duration are very comparable to 2% Lidocaine with epinephrine. But Articaine has a greater incidence of lingual and mandibular paraesthesia. However, there is one report on toxicity reaction resulting from using Articaine as a local anaesthesia (Haas and Lennon 1995).

Articaine may be considered to be the anaesthetic of choice for long dental procedures like full mouth restoration, multiple and single implants placements, periodontal surgeries and long cosmetic and restorative procedure because Articaine is an intermediate acting local anaesthetic agent (Hawkins and Moore 2002). Onset of 4% Articaine varies from one and half minutes to three minutes for infiltration, while the inferior alveolar nerve block takes slightly longer. The duration of soft tissue anaesthesia ranges from 3-4 hours and 2-3 hours for inferior nerve block and infiltration respectively (Donaldson and James-Perdok 1987). Little data supports the ability of Articaine to produce lingual and palatal anaesthesia following performing buccal infiltration injection. Electrical stimulation of tooth pulp and lingual soft tissue was used to test the difference between Prilocaine and Articaine following buccal infiltration. There were no significant difference between the two agents in their ability to produce anaesthesia for tested sites (Haas and Harper 1991). A systematic review comparing between Articaine and Lignocaine in 2010 concluded the following: the after effects of this systematic review give backing to the contention that Articaine is more powerful than Lignocaine in giving anaesthetic achievement in the first molar area for routine dental methods. Moreover, both medications seem to have comparable unfriendly impact profiles. The clinical effect of Articaine is higher in post-injection pain scores than Lignocaine is insignificant. Subsequently, Articaine is a better analgesic than Lignocaine for use in routine dental systems. Its use in youngsters under 4 years old is not suggested, subsequent to no information exists for backing such utilization (Katyal 2010).

Bupivacaine

Bupivacaine is a long acting amide local anaesthetic that is four times as potent as Prilocaine, Lidocaine and Mepivacaine. With additional chemical features (4 carbons) than Lidocaine and Prilocaine, it provides a higher lipid solubility and enhanced protein binding properties when compared to other short and intermediate agents (Hawkins and Moore 2002). Being a long acting local anaesthetic, Bupivacaine is most useful to control postoperative pain (Brothers and Publishers 2006). Duration of action is 4-6 hours longer than Lidocaine which stays only for 1-2 hours. For example: Bupivacaine can be used after complicated third molar extraction to reduce pain for approximately 12 hours post procedure (Ogle and Mahjoubi 2012).

Bupivacaine is available in plain form in multiple concentrations of 0.25%, 0.5%, and 0.75%, or is combined with 1:200,000 epinephrine. Most commonly used doses in dentistry are in the 0.25% and the higher recommended dose is 0.6 mg/lb or 1.3 mg/kg and total dose of not more than 90 mg. Bupivacaine is contraindicated for pregnant female and should be used with caution if patient using beta channels blockers. Bupivacaine is metabolized in the liver by amidases and is excreted via kidneys (Ogle and Mahjoubi 2012).

Local Anesthesia Vasoconstrictors

To constrict blood vessels, vasoconstrictors like epinephrine and levonordefrin are added to local anesthesia at the injection site. This results in a drop of the absorption rate of local anesthesia in the blood stream, therefore lowering toxicity risk and extending the action around the site (Malamed 2014).

Epinephrine

Adrenaline or epinephrine is the vasoconstrictor component of local anesthesia. It is a sympathomimetic amine. Tremor and tachycardia are some of the local anesthesia adverse reactions caused by epinephrine. Adrenaline is added to local anesthesia to increase its duration by opposing the vasodilation effect. The vasoconstriction effect decreases the systemic absorption of local anesthetics, therefore lowering the possibility of systemic toxicity. Another purpose of adding epinephrine to local anesthetics is to achieve hemostasis at the surgical site, as it causes vasoconstriction by stimulating specific receptors (α and $\beta 2$) in the vessels supplying the skeletal muscles (Ogle and Mahjoubi 2012).

Epinephrine has an effect on cardiac and respiratory systems. It acts as bronchodilator on the respiratory system due to action of $\beta 2$ receptors. Whereas to its cardiovascular affect,

epinephrine increases cardiac efficiency as β1 receptors raise the heart rate produce more contractions.

Adverse effects of epinephrine range from simple headache and anxiety to palpitations, tachycardia and hypertension. As a result, any patient with cardiovascular problems or hypertension should not be given more than two carpules. This mostly applies to elderly patients who are suspected to have any cardiovascular diseases as a general roll. In addition this group of patients needs to have their blood pressure taken before administration of any drug containing epinephrine including dental local anesthesia (Jastak and Yagiela 1983).

Levonordefrin

Is another vasopressor (vasoconstrictor) which is regularly combined with mepivacaine local anesthetic agent. This non-epinephrine agent lacks the activity at β2 receptor. Therefore, it increases systolic, diastolic and mean arterial pressure which leads the heart rate slower. Unlike the epinephrine who increase the heart rate and systolic pressure but lower diastolic pressure. Levonordefrin has been recommended as a different option for epinephrine-containing local anesthetics while treating patients with cardiovascular heart illness since it doesn't build heart rate. In any case, advocates neglect to consider its undesirable impact on blood pressure. A concentration of 1:20,000 of levonordefrin proven to produce equal efficacy when used after infiltration as the standard most common used 1:100,000 epinephrine. Furthermore epinephrine and levonordefrin influences of anesthetic absorption and local hemorrhage are similar (Becker and Reed 2006).

Managing Emergencies

Overseeing Emergencies, including life-undermining occasions, can occur whenever. However, the anxiety connected with dental procedures can increment the danger of what happened. About portion of all emergencies happen around the time of injection, so be set up with a composed convention. In expansion to the strides that dental specialists can take while regulating anesthetics, the dental team can keep a few situations by dependably taking after specific systems. Keep in mind the significance of the medical history. Continuously get complete data about any alteration in wellbeing status on the other hand drugs at the preoperative arrangement and redesign it toward the start of every appointment (Protzman and Clark).

- Before the nearby sedative or anesthesia is regulated, address any fears or anxiety the patient might be encountering.

- Make beyond any doubt the patient is in a supine position for the injection.
- Watch patients all through the administration of the local anesthesia. Try not to allow them to sit unbothered taking after the infusion.

To be set up for any possibilities, dental workplaces must not just have an arrangement for overseeing emergencies. Additionally, survey the composed arrangement all the time. The arrangement ought to incorporate systems for tending to occasions, for example, quiet obviousness, breathing issues, seizures, drug-related responses, or thoracic pain (Blanton and Jeske 2003).

Imperative part is to know who will call the local medical emergency in the instance of any life-debilitating emergency. Life threatening emergencies incorporate a patient having trouble breathing, mid-section agonies or trouble swallowing what's more, or quick facial swelling or redness.

- In an emergency, ensure that one staff member at least with the patient at all time
- Monitor breathing and heart rate until medical support arrive
- Be prepared to assist with cardiopulmonary resuscitation (CPR)
- Know the place of the emergency kit and drug available in your practice

The office emergency kit should include the drugs and equipment necessary for addressing a wide range of emergencies. Emergency oxygen should be available as well. Everyone in the practice setting should know how to access this kit or equipment and how to correctly use it.

Unfavorably allergic reactions are among the most well-known life debilitating emergencies in the dental setting and should be tended to immediately. Particular arrangements should be set up for overseeing hypersensitivities to local anesthetic in patients and ought to be routinely surveyed with the whole treatment group. While unfavorably susceptible responses are uncommon, they can occur. An expedient reaction, including calls to local medical emergency team by an assigned staff part, ought to be a piece of the arrangement. Reaction arrangements must to be surveyed quarterly and in yearly OSHA preparing to guarantee a brief reaction to any possibly life-undermining hypersensitive responses (Eggleston and Lush; Scarlett 2010).

Recognizing and Managing Contraindications, Allergic Reactions, and Side Effects

Half of the emergency situations happens just before or after administrating local anesthesia. Complications of local anaesthesia can include systemic toxicity to the central nervous system and cardiovascular systems. CNS effects include a feeling of lightheadedness followed by drowsiness, numbness of the tongue and perioral region, dizziness, headache, nausea and vomiting, muscle twitching, tremors, and convulsions (British National Formulary). Each product has a maximum amount based on the patient's weight. While most items are metabolized in the liver, plasma or both, the half-life of the item is additionally imperative. This is the time that it takes to diminish power significantly to half (Scarlett 2010). For 2% Lidocaine, this is about 90 minutes, and the half-life for 4% Articaine is 30 minutes. Except for Prilocaine, which is metabolized in the kidneys and plasma, the amide linkage anesthetics are metabolized in the liver. In this manner, weakness in liver capacity is a key contraindication to local anesthesia. Allergies to local analgesics can be affirmed by intradermal testing by sensitivity pro. Most unfavorably susceptible responses are restricted to the external tissues what's more, can be treated with antihistamines; the more genuine ones require treatment with epinephrine (Uckan et al. 1998).

The most widely recognized symptom of injections is syncope. Patients with a past filled with syncope should be considered for treatment with diphenhydramine. Allergic responses to amide linkage analgesics are moderately uncommon and for the most part credited to the preservative or antioxidants agents found in the analgesic. For documented allergy to both ester and amide groups, Diphenhydramine can be used for procedures of short duration. Most reported allergic reactions are caused by the preservatives methylparaben and metabisulfite. Metabisulfite is added as an antioxidant when vasoconstrictors are used in aesthetics. For patients reporting a documented allergy to sulphites, avoid aesthetics containing vasoconstrictors. For such patients with documented sulphite allergies, plain aesthetics such as Mepivacaine 3% or Prilocaine 4% are available without the preservative (Meechan 2002).

Latex sensitivities are usually reported among patients. Notwithstanding, the latex plug toward the end of the cartridge is not made of "normal" latex regularly ensnared in latex sensitivities. While the latex plugs have not been ensnared in accessible case reports of unfriendly responses among dental patients, producers of dental analgesics must name any items that contain latex in cartridge anesthetics (Shojaei and Haas 2002).

In addition to allergies, different contraindications are particular to specific anesthetic agents. Levonordefrin, a distinct alternative for epinephrine, ought not to be utilized at the point when a patient takes tricyclic antidepressants; what's more, lessened measurements of epinephrine are prescribed. For patients with critical cardiovascular ailment, the dental specialist may decide to counsel with their doctors (Malamed 2003). Recreational utilization of cocaine by patients can build the danger of blood weight and cardiovascular arrhythmias with injectable anesthetics. Data show that Lidocaine and Prilocaine might be the most secure for use among pregnant and lactating women. Paresthesia has been reported once in a while after local anesthesia with a large portion of the amide linkages (Haas and Lennon 1995).

Thus, recording the details of the Local anaesthetics is essential and important to facilitate better management in case of emergency or any associated complications.

Introduction

Appropriate record keeping of local anaesthetic (LA) is mandatory for safe dental approach. Standard for the Dental Team, implemented by the GDC in 2014 and the clearly mentioned the following: 'careful contemporaneous records must be kept, including details of the techniques and drugs used in the control of pain and anxiety'. In United State, the American Academy of Paediatric Dentistry supported this approach and they stated to follow these aspects in regards of LA documentation:

Must include:

- The type and dosage of local anesthetic
- Name and dosage of the Vasoconstrictors
- Weight if the maximum dose is a concern (children, special medical issues)
- Sedative drug agents if used in combination of local anesthetic
- Post injection instruction to parents and the patient

May include:

- Type of injection given
- Needle selection
- Patient reaction to the injection

Why this Audit

A variation in the documentation of LA usage in the Department of Paediatric Dentistry at Eastman Dental Hospital.

Aim

To audit the documentation of LA in dental records in the Department of Paediatric Dentistry at Eastman Dental Hospital.

Standards

Local Trust Policy, General Dental Council Standard for dental team and the guidelines of American Academy of Pediatric Dentistry (AAPD) were used to set the standard. 100% of patients, who required LA for dental treatment, should have the following documented in their dental records (General Dental Council 2013; AAPD Council 2009):

- the name of LA
- the concentration and the dose of LA administered
- the batch number and the expiry date of the drug

- the name and the concentration of vasoconstrictor
- Root of administration and post-operative instruction

Writing the information directly in the dental record is the only method we recommend, as local anaesthesia cartridge sticker might be lost and detached as well as to prevent cross infection.

Method

- The audit was registered then approved by the local clinical effectiveness committee in May 2015
- A retrospective evaluation of a random sample of patient records where LA was used for dental treatment over the period of August to September 2015 (first cycle) and January and February 2016 (Second Cycle) using a standardised data collection sheet.
- Patients' notes who required dental treatment were selected by allocating the treatment clinics codes.
- Notes were audited in medical records office in the hospital.
- Notes for patients included where treated by all clinicians' levels in the department
- Treatment was done in the paediatric dental clinics
- All the patients were referred by general dental practionar or orthodontic department
- Treatment included fillings under local anesthesia, dental extractions, and surgical treatments.
- Local anaesthesia used either 2% lidocaine with 1:80,000 vasoconstrictor or 4% articaine with 1:100,000 vasoconstrictor.
- Details recorded should include the information in the data collection sheet (see bellow)
- Patients who required LA for dental treatment under general anaesthetic were excluded

Data Collection Sheet

Method of recording information:

- Written
- LA Sticker
- Both

Information recorded:

- LA Agent:
  - Name
  - Concentration
  - Dose

- Vasoconstrictor
    - Name
    - Concentration
- Route of administration
- Batch number
- Expiry date
- Post-operative instruction given

Results

Results of dental records were recorded in two cycles and results are shown in Table 1 and 2. In the first cycle, 97 patient's dental records that required LA during their dental treatment between August and September 2015 were audited. LA agent name, concentration and amount given were recorded in 98% (n = 98), 87% (n = 90) and 85 (n = 88) respectively. Where the recording for batch number and expiry date were only 10% (n = 10). The root of administration was recorded in 87% (n = 90) and the post-operative instruction for either patients or their parents was recorded in less of the half of the total records (42%, n = 43). After cycle one results, the data were fed back to all staff during the department meeting in October 2015. Furthermore, all staff were emailed a reminder of the audit standard the relevant, Local Trust Policy and the AAPD guidelines before starting cycle two.

In the second cycle, 93 dental records of patients needed LA during their dental visit were included in period of February and March 2016 (three months after cycle one). 100% (n = 93) were given to recording of names of LA agent and the vasoconstrictor. 98% (n = 91) were given for both LA drug concentration and dosage given to the child and 97% (n = 90) was achieved in recording vasoconstrictor concentration. Expiry date and batch number were recorded in 86 (n = 92) while 81% (n = 87) was the score of post-operative instruction recorded in the notes.

Cycle (Dental Record included)	Written	Both written and Sticker
One (97)	94	3
Two (93)	92	1

Table 1. Results of the two audit cycles

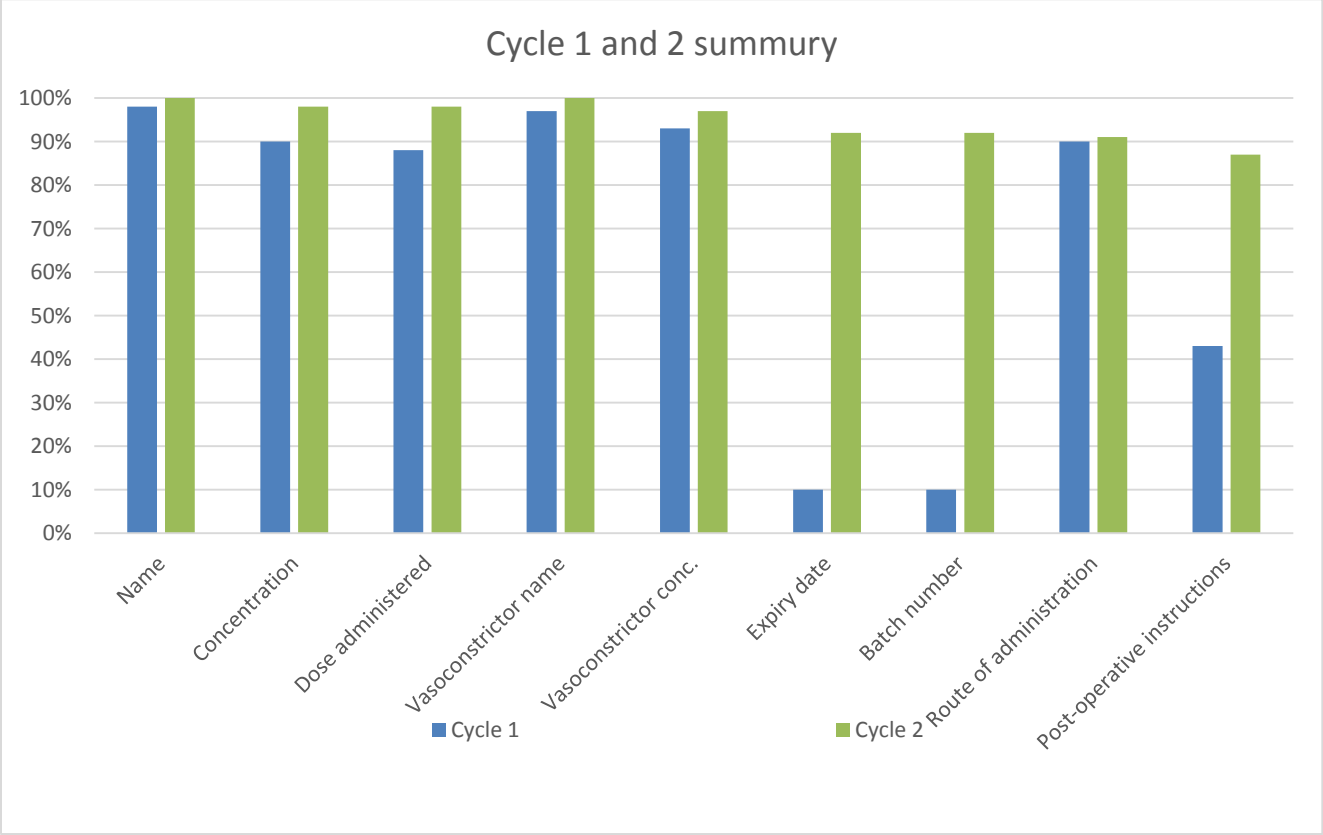

Figure 1. Bar Chart representing results of both cycles 1 and 2.

Discussion

All the aspects of the standard were followed in higher consideration by the dentist writing patients records after first cycle result and recommendations. The percentages of all aspects were higher by the second cycle. However, only two aspects, the local anaesthetic agent and vasoconstrictor used, from the 9 elements achieved the 100% recommended gold standard.

Furthermore, the gold standard was not met for appropriate documentation for the remaining seven aspects. The increase in recording of local anaesthesia batch number and expiry date from only 10 % in cycle one to more than 80% in the second auditing, is point worth mentioning. Recording the local anaesthesia expiry date and batch number is still controversial. While it is considered to be good practice in our local trust and the eneral dental council, it is still not recommended by dental protection. Where dental anesthetic is like many drugs dentists use throughout the dental treatment like sodium hypochlorite and many others that we do not write the expiry data neither the batch number.

Hence, recording the details of local anaesthesia can improve quality service and insure that emergencies can be managed effectively. In addition, it allows service to be monitored regularly. Recording of LA details increased after the recommendations provided to the clinicians, and all details were essential in the record keeping process. For example, the name and the dose is crucial part of recording the LA details. However, the batch number and expiry date were added to the list of details recorded for service quality assessment. Post-opertaive instructions recording is an excellent clinical protocol and can play an important medico-legal reason.

Because local anaesthesia depresses the central nervous system, it is essential to document the dose accurately. This is enforced when LA is given for under 16 years old and when it is enhanced by sedative agents. Lip trauma and soft tissue injuries are among the most common side effect of the local anaesthesia. As a result, post-operative instruction to the child patient and parents minimize the chance of unpleasant consequences and increase patient comfort especially for children.

Action plan

1- Regular reminder to all dental team about the importance of documentation of local anaesthesia during department meeting
2- Ensure that all new staff will be made aware of the current polices
3- To re-audit after 6 months

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