



Inside this issue:

- An audit on prescribing practices by dentists at the National Dental Centre, Berakas **2**
- Audit on the recording of root canal working length measurement and the reports on radiographs taken during endodontic treatment **9**
- Audit of patient failure to attend orthodontic appointments and clinical time lost as a consequence at the National Dental Centre and Seria Dental Clinic during January 2012 **14**
- Audit of clinical waste (except amalgam) management in dental clinics **21**
- An audit on the documentation of history of traumatic dental injuries at presentation by Paediatric Dentists in Brunei Darussalam **24**

Welcome Address

Welcome to the second issue of CAD Bulletin. It is hoped that you will find the topics and contents not only interesting and informative, but also that they will spur us into improving the ways we practice our profession. Your attention is drawn to the excellent report on our prescribing practices (or 'failure' there of) as well as that improvements need to be achieved in terms of our basic management of clinical waste (non-amalgam).

As a department, we have a long way to go to reach international standards and clinical auditing can be one way of taking a step in the right direction. Improvements may not be achievable overnight but every step (no matter how small) in the right direction counts.

Dr Grace Ang
Head of CAD

2nd CAD Workshop

On Sunday, 20th April 2014, the Clinical Audit Division once again conducted a one day workshop on planning and designing of clinical audits.

The workshop began with a series of lectures attended by 33 dentists. The lectures aimed to provide participants with step by step guides to conducting clinical audits, as well as writing audit proposals and reports.

Following the lectures, workshop participants were divided into groups and given the task to produce an audit proposal. The workshop was concluded with short presentations by each group on their proposed audit projects.

It is hoped that, through this workshop, participants will have better understanding on how to design clinical audits and will be encouraged to undertake such projects.



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An audit on prescribing practices by dentists at the National Dental Centre, Berakas

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BACKGROUND

Safe and effective prescribing is becoming an important issue, whereby drugs should only be prescribed when they are essential and in all cases, the benefit of prescribing should be considered in relation to the risk involved. Prescription of drugs should meet the identified needs of the patient and be in their best interest. Ideally, the prescriber should support this by discussing and clarifying the use of the proposed medication with the patient.

Prescribing error is defined as incorrect drug selection for the patient which can include the quantity, indication for, or prescribing of a contraindicated drug (Williams, 2007). Hence, medical history of every patient should be checked, updated and recorded at each visit.

Dentists should also be familiar with the current guidance from the British National Formulary (BNF) regarding a drug's use, the side-effects and contraindications of the drugs intended for prescription especially in patients with polypharmacy. In August 2011, the Scottish Dental Clinical Effectiveness Programme (SDCEP) issued an updated manual - Drug Prescribing for Dentistry Dental Clinical Guidance to aid easy access to the information most relevant to dentistry, based on current edition of BNF at the time of release.

In addition, importance of legible, unambiguous and complete prescriptions should not be underestimated. A guide to prescription writing adapted from BNF and the National Standard Drug List (NSDL) for Ministry of Health (MOH) Brunei Darussalam 4th edition (2004) is available.*

By adopting standard prescribing practices, errors can be minimised. According to a study by Williams in 2007, the estimated rate of prescribing error had been reported to be 11%. These errors can result in increased risk of death, adverse drug events, increased hospital stay and cost (Lewis *et al.*, 2008).

* please see note on page 27

Some of the concerns raised by dispensary staff at the National Dental Centre (NDC) are: prescriptions are not well-written (illegible), unusual prescriptions in particular for antibiotics in terms of quantity and dosage, patients questioning reasons for the medications given to them due to lack of explanation by the prescriber, and inconsistent style of prescription writing among the prescribers.

There are limitations in Brunei's Ministry Of Health's current⁺ prescription forms such as the lack of a section to include patient's identity or medical record number, and inadequate space for the required prescriber's details.

AIM

To audit on prescribing practices by dentists at the NDC, Berakas and to assess quality of prescription.

OBJECTIVES

The objectives of this audit were:

1. To detect prescription errors;
2. To determine the drugs prescribed by dentists at the NDC: type of drugs, dose, duration and frequency should be in accordance with current guidelines (especially in regards to antibiotics); and
3. To assess legibility and completeness of prescriptions written by dentists at NDC.

MATERIALS AND METHODS

Prescriptions were collected from the Dispensary Unit, Block B, NDC from 11th to 19th December 2012, and their corresponding medical records were traced. Data collection was conducted by the main auditor, where information was gathered from five main domains: patient's details, prescriber's details, style of prescription writing, drug details/regimens and medical records. The criteria assessed are listed in the proforma* and were manually recorded for each prescription as:

- Yes, if present;
- No, if absent;

⁺please see note on page 8

- Noted down in the comments if they were not applicable, such as if they were no alterations made in that particular prescription;
- Where appropriate, name of drug, dose, frequency and duration of the course were specified;
- Where applicable, relevant medical conditions/history and medications were recorded as well as diagnosis of the dental condition being treated including other treatment done or planned by the dentist written in the medical record;

Patient's home address and prescriber's practice address were excluded from the assessment criteria as these are not required by the Dispensary Unit at NDC. Prescriptions where their medical records were not available were excluded from the audit.

To assess the legibility of the prescriptions, the main auditor cross-checked the prescriptions with the dispenser-in-charge in the NDC.

All data obtained were analysed using Microsoft Excel 2010. Simple descriptive analysis for criteria assessed were performed. The prescription accuracy score for each prescription was obtained as a percentage by dividing the number of YES responses by the TOTAL of YES and NO responses, and multiplying by 100%:

$$\text{Prescription Accuracy Score} = \frac{\text{YES}}{\text{YES} + \text{NO}} \times 100\%$$

STANDARD

It is known that prescribing errors are serious and recognised as a risk to patients. Hence, 100% prescription accuracy should be expected. However, due to the limitations of the current⁺ MOH's prescription forms, it was proposed that the minimum prescription accuracy of 90% be considered acceptable.

RESULTS

Prescription errors

A total of 100 prescriptions with medical records were retrieved during the audit period. The frequency for criteria assessed is shown in Table 1. All prescriptions were written in permanent, indelible ink, and had avoided the use of unnecessary decimals, which could have resulted in confusion especially with regards to drug dosages. Even though every prescription audited had patients' names and the drugs prescribed written down, 22% did not have the pa-

tients' full names, lacking the last name; and 39% had abbreviated the name of the drug being prescribed.

Most criteria assessed scored more than 50%, except for stating quantity of the drug to be dispensed, where only one-third of prescribers specified this in their drug prescriptions. Nearly all prescriptions were precisely written without requiring any alterations – out of the 10 prescriptions that had alterations, only 3 had the alterations corrected appropriately as outlined in BNF and NSDL guidelines (crossed off properly, dated and initialled). However, none of the prescriptions had prescriber's contact number written on the form.

Table 1. Scores in percentages for criteria assessed.

CRITERIA ASSESSED	SCORE (%)
PATIENT'S DETAILS	
Full name	78.0
Date or year of birth/age	67.0
Record/IC number	82.0
PRESCRIBER'S DETAILS	
Name of Officer	69.0
Designation	93.0
Contact No	0.0
BMB No	53.0
PRESCRIPTION WRITING	
Legibility	90.0
Written in permanent ink	100.0
Signed in ink	99.0
Date of prescription	99.0
Alterations, if any, are corrected appropriately (crossed off, dated and signed)	30.0
Diagonal line drawn across blank part of prescription	70.0
Directions in English and/or with accepted Latin abbreviations	58.0
Unnecessary use of decimals avoided	100.0
Appropriate units used	95.1

⁺please see note on page 8

Table 1 (con't)

CRITERIA ASSESSED	SCORE (%)
DRUG DETAILS/REGIMEN	
Name of drug (in full and not abbreviated)	61.0
Drug dose	55.0
Dose frequency	89.0
Duration	59.0
Quantity specified	31.0
Formulation specified	74.0
MEDICAL RECORDS	
Medical history recorded including allergies	75.0
Current medications (if relevant)	66.7
Dental condition/problem being treated (complain of and/or diagnosis)	91.0
Treatment provided for the dental condition	86.0

A common but minor mistake made by dentists was the dosage for Paracetamol where this was written as 1000 milligrams. As outlined in the BNF guidelines, the appropriate unit would be 1 gram (for quantities of 1 gram or more). Also frequently noted in prescriptions written by a particular dentist was that the directions and dose frequencies were simplified as “1-1-1”, which was to instruct the patient to take one tablet for three times daily. This should have been written precisely in English and/or with approved Latin abbreviations.

In terms of recording or updating medical history of patients, 3 out of 4 dentists had complied with this requirement and the majority had satisfactorily recorded their diagnosis and treatment given to patients (91% and 86% respectively).

Figure 1 shows the number of prescriptions according to the range of prescription accuracy scores. The accuracy scores ranged between 39% (lowest) and 88% (highest), with an average of 71.9%. None of the prescriptions achieved the minimum standard set at 90%.

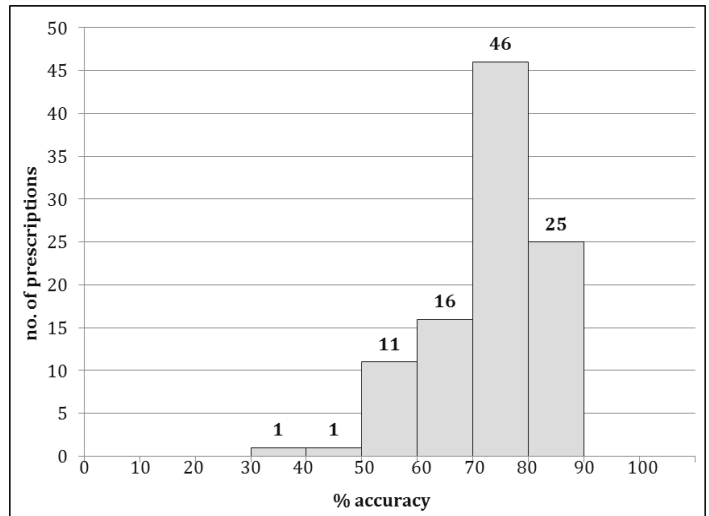


Figure 1. Number of prescriptions according to range of prescription accuracy scores.

Drugs prescribed at the NDC

The audit also looked at the drugs that were prescribed during the stated period (Table 2). 67% of the drugs prescribed were generic prescriptions of an analgesic. Those with combination drug therapies almost always consisted of an analgesic and an antibiotic.

Table 2. Combination of drugs per prescription.

DRUGS PER PRESCRIPTION	NUMBER (%)
One only:	
Analgesics only	67 (67.0)
Mouthwash only	4 (4.0)
Topical corticosteroids only	3 (3.0)
Two drugs prescribed:	
Analgesic and antibiotic	21 (21.0)
Analgesic and mouthwash	1 (1.0)
Analgesic and topical corticosteroid	1 (1.0)
Three drugs prescribed:	
Analgesic, antibiotic and mouthwash	3 (3.0)
TOTAL	100 (100.0)

From the 100 prescriptions audited, nine types of drugs were prescribed with a total frequency of 129. Table 3 shows the different drugs prescribed and the regimen used, where most were for systemic use. Prescriptions were mostly analgesics whereby

Paracetamol appeared to be the most preferred painkiller (55%), followed by Mefenamic Acid (9.3%), and 3.1% were Ibuprofen. The frequency of Amoxicillin and Metronidazole prescribed were almost equal. However, there were variations in their regimens amongst prescribers. The most commonly prescribed course for Amoxicillin was 250 milligrams, three times daily for five days; whereas for Metronidazole this was 400 milligrams, three times daily for three days.

Antimicrobial mouthwash (Thymol tablets and Hexetidine solution) and corticosteroid creams (Triamcinolone Acetonide 0.1%) were the three most frequently prescribed drugs in topical forms.

Table 3. Different types of drugs prescribed and regimens used at the NDC.

NAME OF DRUG	FREQUENCY (%)
SYSTEMIC FORMS	
Antimicrobials	
1. Amoxicillin	
Cap/250mg/tds/5 days	9 (7.0)
Cap/500mg/tds/5 days	2 (1.6)
Syrup/10ml/tds/5 days	1 (0.8)
2. Metronidazole	
Tab/200mg/tds/5 days	3 (2.3)
Tab/200mg/tds/7 days	1 (0.8)
Tab/400mg/tds/3 days	6 (4.7)
Tab/400mg/bd/5 days	1 (0.8)
Tab/400mg/tds/5 days	2 (1.6)
3. Co-Amoxiclav (Amoxicillin + Clavulanic Acid)	
Tab/625mg/bd/5 days	2 (1.6)
Syrup/5ml/bd/5 days	2 (1.6)
Analgesics	
1. Paracetamol	71 (55.0)
2. Mefenamic Acid	12 (9.3)
3. Ibuprofen	4 (3.1)
TOPICAL FORMS	
Antimicrobial Mouthwash	
1. Hexitidine solution	5 (3.9)
2. Thymol tablets	3 (2.3)
Corticosteroids cream	
1. Triamcinolone Acetonide (0.1%)	5 (3.9)
TOTAL	129 (100.0)

DISCUSSION

Before discussing the findings, it is appropriate to consider the limitations of this audit. There was difficulty in retrieving medical records for data collection, hence convenient sampling was used instead of random sampling of prescriptions. The results therefore may be biased as more than one-third i.e. 35 of the prescriptions were from the same dental officer. However, the audit also has its own strengths. A reasonably large sample of 100 prescriptions was included, and dentists were unaware that the audit was being carried out which minimised bias that could happen in this audit.

There were a number of criteria assessed which contributed to the final accuracy scores for each prescription. After these were reviewed, several reasons were found which could help explain why the minimum standard score of 90% was not achieved.

One of the important aspects that should be included in each and every prescription is the patient's name, date of birth, and identity or medical record number. All these basic information are helpful, enabling the dispenser to identify correctly the person whom the drugs are for. For this to be of use, the prescriber should always write these details accurately and completely. Out of all the required items for patient's details, date of birth or age were the most often missed out. Names of patient were also not written in full in about 20% of the prescriptions, where the last names were often omitted. However, 82% had recorded the patient's identification number even though the prescription forms lack a section for this and prescribers had this written down under the address section instead.

Similarly, the prescriber should also provide their details as listed in the NSDL and BNF guidelines. These include name, designation, contact number and their Brunei Medical Board (BMB) registration number. This audit found the use of personalised name stamps to be beneficial in terms of entering these details. However, most prescribers in this audit had used a generic (one-fits-all) stamp which only contain the prescriber's designation, explaining why this aspect scored the highest (93%) in comparison to name and BMB number (69% and 53% respectively).

None of the prescriptions had the prescriber's contact number. This is probably because at the NDC, the dispensary staff can easily contact the officer if there

were any problems with the prescription. However, it would still be good practice to enter the prescriber's contact number in the prescription, as patients may occasionally choose to collect medications from pharmacies located at other government health centres at their own convenience. Moreover, not all medications are available at the NDC or some may be out of stock such that collection may not always be possible at the NDC's Dispensary Unit. Therefore, with a contact number in the prescription, the pharmacists or dispensers from other clinics can easily contact the prescriber for clarification, if necessary, which can reduce prescribing errors.

Written prescriptions should also be readable. Although legibility for a large proportion of the prescriptions was acceptable to the dispenser, the main auditor found it more difficult to decipher the prescriptions. Perhaps the dispenser had grown accustomed to the prescribers' writing and/or recognised the typical drug regimens the prescribers used. Nevertheless, clear legibility in prescribing is essential to avoid errors in interpretation of prescriptions.

In terms of correctly documenting drugs prescribed, only 61% of the prescriptions had the drugs' names written in full and was not shortened. The most commonly abbreviated was Paracetamol (written as PCM). Another point noted was that the majority of prescribers used brand names when prescribing. Nevertheless, it should always be emphasised that generic names are preferred when writing prescriptions.

Instructions on how to take or apply the drug were most often not written down when prescribing the topical drugs. Oral medications, mouthwashes and topical creams should specify the amount to be used, gargled/applied, the frequency and duration must be clear in the prescriptions. This can also serve as an aid for the dispenser to reinforce instructions verbally, when the patient collects them.

Quantity of the medication to be dispensed was also lacking in about 70% of prescriptions. This is acceptable if duration of therapy is specified, hence allowing appropriate or exact quantities to be calculated and dispensed. However, it was found that less than half of prescriptions did not indicate the duration of the prescribed course.

The most commonly prescribed drugs were analgesics followed by antibiotics and topical drugs. This is in agreement with an audit of drug prescribing practices of dentists in India (Sarkar *et al.*, 2004). However, they found that the most preferred analgesic was Ibuprofen, instead of Paracetamol which we found to be the most commonly prescribed analgesic for pain relief after simple extractions in this audit. This could be attributed to Paracetamol being the relatively safer choice for use during pregnancy and amongst the elderly, but only when taken in recommended doses for short duration. This is consistent with management of acute pain in dentistry as reported by Haas in 1999.

For acute dentoalveolar infections, Amoxicillin was the preferred drug compared to Metronidazole or Co-Amoxiclav, which is in adherence with the SDCEP guideline. This is a reasonable choice as studies have shown that main isolates from dental abscesses are a complex mixture of facultative and anaerobic bacteria which are often resistant to penicillin (Lewis *et al.*, 1995). However, it must be kept in mind that the primary management of these infections is by establishing drainage, and that antibiotics are only used as an adjunct in patients showing signs of systemic involvement such as pyrexia and trismus, presence of facial cellulitis, evidence of spreading infection or for those who are immune-compromised, for example, patient with poorly-controlled diabetes (Ellison, 2011 and SDCEP, 2011). Ellison (2011) also proposed that following drainage, antibiotics prescribed as a 3-day regimen should be adequate but the patient should be reviewed on the third day before deciding to continue the course to five days.

There was little written evidence in the medical notes which supported the use of antibiotics in this audit – most dentists had recorded the presence of abscess and had treated appropriately such as temporising or extraction of the offending tooth, but had failed to explain in their notes whether antibiotics were really essential in the particular case (e.g. systemic involvement or patient was medically compromised). Two records did not specify any rationale for their use and appeared to have prescribed antibiotics as their sole management for these infections. On the other hand, two records had supported the need for antibiotics prescription specifying that there was systemic involvement (signs of spreading infection and febrile patient).

Another observation was that Metronidazole appeared to be the drug of choice for one of the dentists as prophylaxis for on-going and/or completed endodontic treatment, even in the absence of signs and symptoms indicating need for a systemic antimicrobial. There are increased risks of complications such as gastrointestinal upsets, fatal anaphylactic shock and especially, development of resistance as a result of indiscriminate antimicrobials (Dar-Odeh *et al.*, 2010). Therefore, antibiotics should be prescribed only when there is a clear indication for their use.

Apart from prescribing antibiotics appropriately and effectively, antibiotics should be prescribed at the appropriate frequency and dose so that the minimum inhibitory concentration is exceeded allowing infectious bacteria to be killed rather than being inhibited. Use of too small a dose or prolonged duration of therapy has been shown to increase risk of antibiotic resistance (Guillemont *et al.*, 1998).

Guidelines on optimum duration of antibiotic therapy for many dental infections are based on expert opinions rather than rigid support by randomised controlled trials. SDCEP and BNF recommends Amoxicillin at a dose of 250mg three times daily for five days as first line of antibiotics for dentoalveolar abscesses, which is in agreement with the findings in most of the prescriptions in this audit. For severe cases, the dose should be doubled to 500mg which may explain why a few had chosen to prescribe this dose.

Also advised in the above-mentioned guidelines are that, apart from Erythromycin, Metronidazole can be prescribed as an alternative for patients with penicillin allergy at a dose of 200mg three times daily for five days. Metronidazole is also prescribed for 200mg three times daily for three days for cases of Acute Necrotising Gingivitis and in cases of Acute Pericoronitis. There were noted differences in the regimes for Metronidazole, not just among practitioners but also by the same dentist. Some had prescribed as recommended but the others had either prescribed 200mg three times a day for a week or, had doubled to 400mg two or three times a day for three or five days.

Syrup formulations of antibiotics were mainly prescribed for paediatric patients aged 16 years and below. All of the prescriptions for these patients had used age as a guide to determine the dose following

guidelines in SDCEP, except for Co-Amoxiclav where the specified dose for certain age groups for the suspension corresponded to manufacturer's recommendations.

CONCLUSION

To ensure safe and effective prescribing, prescriptions must be written accurately and legibly, complete with the required details as outlined in BNF and NSDL guidelines. This audit is the first to be conducted by this department at the NDC, and it was found that none of the prescriptions met the standard set. The average prescription accuracy was only 71.9%. A few areas requiring improvement were identified, particularly in prescription writing.

RECOMMENDATIONS⁺

Findings of this audit should be shared with all dentists as a CPD lecture to draw attention to common prescription errors discovered in this audit, and emphasise the importance of proper prescription writing. A re-audit will be conducted after 6-12 months following this to determine if there are any improvements in prescribing practices.

To ensure prescribers' details are recorded in each prescription, personalised name stamps should be made available to all officers, which must contain all the necessary details. This should include the officer's full name, designation and BMB number. A separate name stamp bearing the name of the health centre or clinic with the contact number may also be useful to ensure complete information is provided in each prescription form as dentists, especially those in primary oral care services, may not necessarily remain at any one particular clinic. It should be reminded as well that proper use of these stamps are crucial to allow them to be readable by the dispensers.

An improved version of the MOH prescription form can be formulated, with allocated fields for entry of appropriate details. For example, identity or record number can replace the section for patient's address. A designated area to place prescriber's name stamps and details may be helpful.

Another way that could minimise all the problems mentioned would be the use of electronic prescriptions where all the appropriate details would have already been entered eliminating legibility issues. This will likely be implemented with the full set up of Bru-HIMS. Furthermore, unwanted drug interactions

⁺please see note on page 8

as a result of prescribing a contraindicated drug can be prevented, as the patient's medical records including medications prescribed by medical officers are easily retrievable. This is especially true for those who do not carry their medications list with them or are unfamiliar with medical terms that describes their health conditions, hence prescribing errors can be further minimised.

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+ Editors note: This audit was performed and completed before the recent implementation of Bru-HIMS, nevertheless some issues mentioned are not automatically addressed by Bru-HIMS.

Audit on the recording of root canal working length measurement and the reports on radiographs taken during endodontic treatment

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INTRODUCTION

Accurate dental records can help practitioners reach a diagnosis by providing detailed information about the changing oral health status of a patient (Day and Duggal, 2006).

In the United Kingdom, regulation 20 of the Health and Social Care Act 2008 emphasizes on accurate record keeping as the basic standard of care in the National Health Services (NHS, 2010).

Records are essential for medico-legal reasons [European Society of Endodontology (ESE) Quality Guidelines, 2006].

The ESE Quality Guidelines (2006) also states that: "The following **should** be recorded:...working length (W.L.) of canals and their reference points, number of radiographs, reports on radiographs taken,..." . Pre-operative, working and postoperative radiographs of all teeth undergoing root canal treatment should be kept on file (Canadian Academy of Endodontics, 1998).

A well-performed root canal treatment has a success rate of over 93% (Strindberg, 1956; Byström *et al.*, 1987 and Sjogren *et al.*, 1990). This is dependent on a multitude of interrelating factors including correct working length estimation. However, no data is available that directly correlates the success of root canal treatment to correct W.L. measurement *per se*.

An underfilled root which implies an underestimation of W.L. has a success rate of 68% at 8-10 years, whereas an overfilled root which implies an overestimation of W.L. has a success rate of 76% at 8-10 years (Sjogren *et al.*, 1990).

Therefore, an inaccurate estimation of the W.L. can potentially reduce the chances of success of endodontic treatment.

AIMS

The aims of this audit were:

1. To determine whether root canal working length measurement/s and their reference point/s are being recorded
2. To determine whether radiographs (pre-operative, working and post-operative) are being taken and kept on file for endodontic treatment cases undertaken by the Endodontics Unit, National Dental Centre.

STANDARD

As discussed earlier the ESE Quality Guidelines (2006) states that: "The following **should** be recorded:...working length of canals and their reference points, reports on radiographs taken..."

As such, all cases (100%) undergoing root canal treatment should have records of: the working length/s measurement and their reference point/s as well as the number of radiographs and reports of the radiographs taken.

MATERIALS AND METHODS

Clinical case notes of patients seen in the Endodontics Unit from July 1, 2011 to December 31, 2011 from 3 operators in the Endodontics Unit were retrieved and checked.

The sample was chosen randomly from the log book of each operator.

Total sample size was $n=100$ ($n=34$ for operator A, $n=33$ for operator B and $n=33$ for operator C).

Inclusion criteria:

1. Teeth that had undergone primary root canal treatment
2. Permanent teeth with complete root formation
3. Completed cases.

Exclusion criteria:

1. Retreatment cases
2. Primary teeth
3. Teeth that had undergone surgical endodontics
4. Teeth with apical root resorption
5. Permanent teeth with incomplete root formation
6. Apexification cases
7. Incomplete cases.

A data collection sheet was used to collect and record the relevant data.

All data was obtained from the clinical case notes (as written by the clinicians). Additionally, reports on radiographs (i.e. whether pre-operative, working length and post-operative radiographs were taken) were regarded as being recorded if documentation was found on either the clinical case notes or the radiographic request forms.

Data collection was carried out by the three Dental Surgery Assistants (DSAs) in the Endodontics Unit. Each DSA was assigned to collect two sets of data; one set each from two out of the three operators whom they do not normally assist in clinics in the Unit i.e. Data from Operator A's clinical notes was collected by DSA B and DSA C; Data from Operator B's clinical notes was collected by DSA A and DSA C; Data from Operator C's clinical notes was collected by DSA A and DSA B. The data from each Operator was collected at different times by the two designated DSAs.

Data analysis was carried out using Microsoft Excel 2007.

RESULTS

Table 1 shows the number of cases where the following parameters i.e.:

- working length recorded for each root
 - their reference point/s
 - pre-operative radiograph of the tooth
 - working length radiograph of the tooth
 - post-operative radiograph of the tooth
- were recorded in the clinical notes for each of the three operators (A, B and C).

The total percentage of cases where the parameters were recorded in the clinical notes by the three operators combined are shown in Figure 1.

Table 1. Number of cases where each parameter was recorded by Operators A, B and C.

Note:

Numbers noted in black refer to data collected by the first DSA

Numbers noted in blue refer to data collected by the second DSA

Operator	Total number of cases	Number of cases				
		Working Length (W.L.) recorded for each root	Reference point/s for each root stated	Pre-op radiograph taken	Working length radiograph taken	Post op radiograph taken
A	34/34	34/34	10/12	21/22	3/6	9/13
B	33/33	32/33	27/30	32/33	6/13	32/33
C	33/33	1/3	0/0	33/33	31/32	32/32
Total	100/100	67/70	37/42	86/88	40/51	73/78

The discrepancies in the results obtained will be addressed in the discussion below.

DISCUSSION

The ESE has put forward a number of key parameters to be recorded for root canal therapy.

A few of these parameters were included in our audit, and these were chosen as the minimum essential facts needed to be recorded for each case in our dental records. These parameters were the ones most likely to have an impact on the success of root canal therapy. Other parameters described by ESE were required for medico-legal reasons.

The results obtained showed that the standards were not achieved for all the parameters measured.

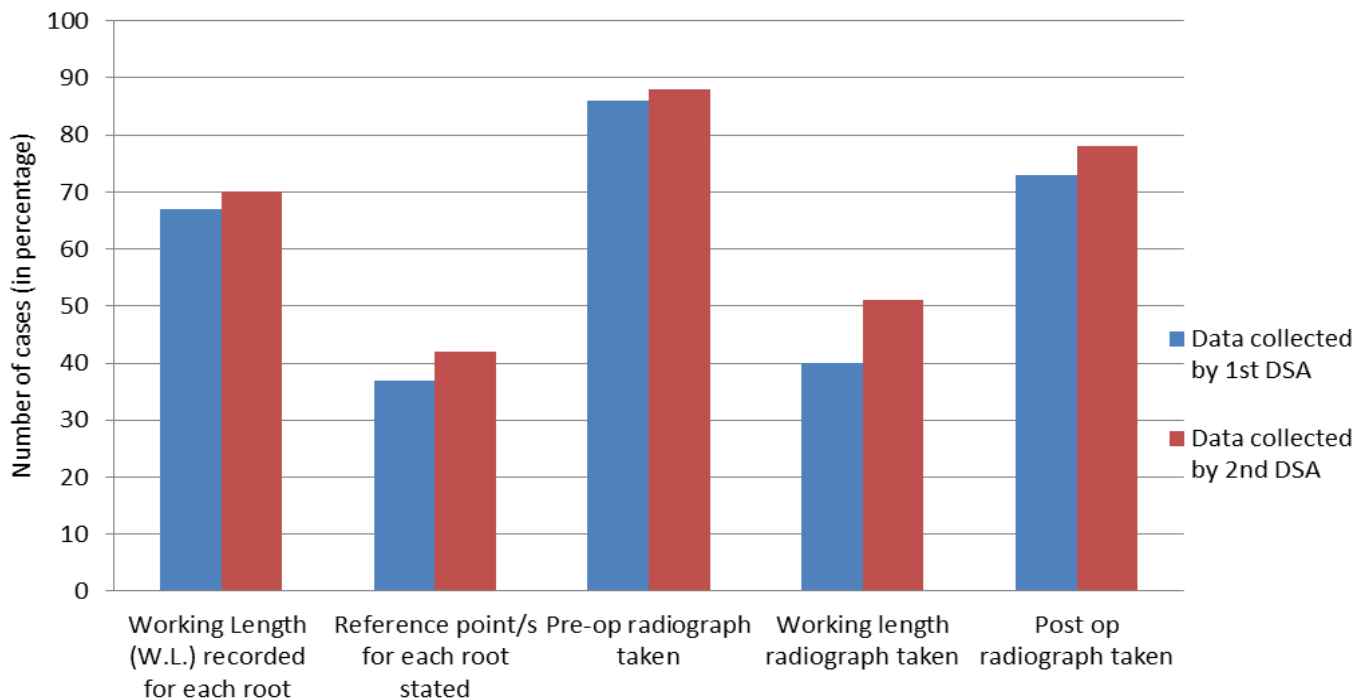


Figure 1. Total percentage of cases where parameters were recorded for all operators.

The highest percentage noted (86%/88%) was for the recording of pre-operative radiographs (either noted in the clinical notes or on the radiographic request form). The Endodontics Referral Form that is being used by the Unit requires all referrals to be accompanied by a recent pre-operative intra-oral radiograph of the tooth in question. However, it was found that during retrieval of clinical notes from medical records, some radiographic film mounts or radiograph folders were missing from patients' files. This could also account for the low percentage noted for records of working length and postoperative radiographs taken (40%/51% and 73%/78% respectively).

Another factor that could contribute to the low percentage of records for working length radiographs is the use of the electronic apex locator for measurement of root canal length. Brunton *et al.* (2002) concluded in a study that the use of an electronic apex locator (EAL) as an aid to endodontic therapy could reduce the need for diagnostic (or working length) radiographs for working length determination. The use of an EAL reduces patient exposure to radiation during endodontic therapy by 85% (Muthu and Sivakumar, 2006). Furthermore, EALs have been shown to have a similar accuracy on their own to working length radiographs in a mature permanent root (Martinez-Lozan *et al.*, 2001).

In our audit, a low percentage (67%/70%) was noted for working length measurement recording with an even lower percentage (37%/42%) for reference point/s recording. The estimation of working length is of paramount importance in root canal therapy. If the working length estimation is short, the apical one-third of the root canal system will not undergo mechanical instrumentation and chemical disinfection. This leaves several millimetres of untreated, potentially infected canal space, thereby increasing the risk of endodontic failure. Similarly, if the working length estimation is long, there is an increased risk of extrusion of intracanal microorganisms and infected dentine into the periradicular tissues, also leading to an increased risk of treatment failure. Working length is measured from a reference point on a tooth's cavosurface within the clinician's field of view to a point at or close to the tooth's apex (Day and Duggal, 2006). Based on the definition described, the recording of working length/s must come hand in hand with a recording of their respective reference point/s because a figure for working length in itself would be arbitrary without its reference point and would be of little value. Recording of both parameters is essential as it allows for the continuity of treatment at the next visit.

An interesting finding in our audit was the slight discrepancy between the first and second DSA's data

collection for a number of parameters across all three operators. Various factors could be attributed to this including:

- the parameter was used but recorded in a different manner and subsequently perceived as non-recording by the DSAs. For instance, the use of the electronic apex locator was frequently abbreviated to 'EAL' and 'AL' in clinical notes and these terms might not have been familiar to the DSAs
- the parameter was used and recorded but not picked up by the DSAs due to the notes being illegible.

One of the drawbacks of retrospectively collecting data from clinical notes is that the required information is not easily available at a glance. Furthermore, root canal therapy is most usually done in multiple visits and the data to be collected may be from different appointment visits and thus require a time-consuming ploughing through of the clinical notes. This daunting task was given to the DSAs who may not have had a keen eye for extraction of the data.

CONCLUSION

There is a poor track record of documenting root canal working length measurements, their reference points as well as the reports on radiographs taken during endodontic treatment by the Endodontics Unit, National Dental Centre with none of the parameters meeting the standard of 100%.

There is currently no standardized and reproducible method of recording pertinent information during root canal therapy within the Endodontics Unit.

RECOMMENDATIONS

- To introduce a simple and standardised template, in the form of a reminder stamp, for documenting essential key parameters in our dental clinical notes for cases requiring root canal therapy. The use of a stamp was found to give a 30% improvement for recording operational steps involved in orthopaedics (Din *et al.*, 2001). In another study, it was found that there was a statistically significant difference in the presence of working length recording when a predesigned stamp was used when compared to the conventional method of recording working length in endodontics (Day & Duggal, 2006). The same study also found that the time taken to find the working length record on an imprint of a stamp was less

(10 seconds) than when no stamp was used (over 1 minute).

- To implement/pilot the use of the reminder stamp in the Endodontics Unit.
- To re-audit in 12 months' time with the operators themselves as data collectors to minimise misinterpretation of information in the dental clinical notes.
- To include in the re-audit, an additional parameter of whether the electronic apex locator was used in place of radiographs for working length measurement. This information can be easily extracted from the reminder stamp.
- To introduce the reminder stamp to all dental clinics.

ACKNOWLEDGEMENTS

We thank our DSAs for taking time from their busy schedule to trace and compile the results of our audit. Also the invaluable contribution from each operator for making this venture a success.

Special thank you to CAD members for their comments and guidance.

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Audit of patient failure to attend orthodontic appointments and clinical time lost as a consequence at the National Dental Centre and Seria Dental Clinic during January 2012

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BACKGROUND

Failure of patients to attend orthodontic clinics with little or no advance notice results in loss of the clinical slots. This can be considered as a drain on resources, financially as well as in terms of efficiency and productivity.

At present, the Orthodontics Unit lacks detailed collaborative data on various parameters related to patients who fail to attend appointments as well as the impact this has on clinical time. It is therefore desirable to audit the incidence of patients' failure to attend appointments at our clinics and identify if any changes to current practice are required.

AIM

The aim of this audit was to determine the frequency of patients' failure to attend orthodontic appointments and the proportion of clinical time that is subsequently lost in January 2012 at the National Dental Centre (NDC) and Seria Dental Clinic.

OBJECTIVES

The audit was conducted with the following objectives:

1. To determine the percentage of orthodontic clinic appointments where patients fail to attend at the NDC and Seria Clinic.
2. To determine the percentage of clinical time lost due to patients' failure to attend (FTA) these appointments.
3. To compare the above results with the gold standard.
4. To estimate 'dollar costs' to the services as a result of clinical time lost due to patients' failure to attend.
5. To identify if there is a link between patient demographics or treatment parameters and FTA.
6. To ascertain methods patients successfully utilize to remind themselves of appointments.

STANDARD

Although there is no internationally accepted gold standard with respect to patients' failure to attend,

Jackson (2009) suggested that the gold standard be 5% or less. Since it is unrealistic to expect full attendance for all appointments, this audit will set the gold standards as:

1. Not more than 5% of total orthodontic appointment's given at the NDC or Seria Dental Clinic should be affected by patients' failure to attend.
2. Not more than 5% of total orthodontic-appointment-clinical time at the NDC or Seria Dental Clinic should be affected by patients' failure to attend.

MATERIALS AND METHODS

This prospective study was conducted in January 2012, whereby appointment data for orthodontic clinics in the NDC and Seria Dental Clinic during the period was collected.

However, for the NDC, data was available only for the orthodontic clinics managed by three orthodontists as one was away and another had declined to participate, so results cannot be claimed to be representative for the NDC. All orthodontic clinics in Seria were involved and may be taken to be representative of orthodontic appointments at Seria Dental Clinic for January 2012.

Inclusion criteria:

All patient appointments given for orthodontic clinics by the participating orthodontists at the two locations.

Exclusion criteria:

1. 'Appointments' given for 'emergency or casual' cases e.g. if a patient had requested for an appointment to repair braces. Such cases are usually seen on the same day they contact our clinics and are thus squeezed in as an 'emergency' rather than being given a true appointment.
2. Walk-in patients: Patients who are not normally scheduled (for an appointment) but, who turn up on the day, and are occasionally seen by the orthodontist (if they are willing to wait).

Data collection

Data was collected using a proforma sheet*. The orthodontists and their Dental Surgery Assistants' were briefed on how to record the data into the sheets and provided with written instructions as well as definitions of relevant criteria to be recorded:

- **type of treatment** that the appointments were scheduled for (*following current practice for recording daily returns in orthodontics*)
 - patient demographics in terms of:
 - ◊ **gender**
 - ◊ **age** groups (*following current practice for recording daily returns*)
 - ◊ whether the patients were **new** to the orthodontic clinic or were **repeat** attendees – a repeat attendee was one who had previously attended the orthodontic clinics within the last 12 months period
 - period of **clinical time** the appointment was booked for, which was calculated from the interval between one appointment and the next (recorded in minutes).
 - **time** of the appointment and the time the patient actually turned up,
 - giving **status of attendance**, designated as:
 - ◊ **On time** - if the patient attended within the first 1/3 period of the appointment slot. (e.g. *if an appointment slot of thirty minutes had been allocated for patient A, and if patient A had attended within the first 10 minutes of the appointment time, he was considered as having been 'on time'*),
 - ◊ **Late but was treated** - if the patient had attended after the initial 1/3 period of the appointment; but was treated.
- Status of **FTA** was defined as:
- ◊ **late cancellation** - where the patient had either cancelled his/ her appointment within the 24 hours prior to the actual appointment and, where, due to the late notice the slot could not be given to another patient ; or
 - ◊ **complete no show** –where the patient had completely failed to show up for the appointment that day, or
 - ◊ **late and reappointed**—where the patient had turned up late and was not 'squeezed in' on the same day, but instead was re-scheduled
- For those patients who did attend, data was also recorded for :

- ◊ whether the patients were dependant on others for transport in order to attend for treatment
- ◊ the method the patients utilized to help them remember their appointments.

Compilation and Analysis

Data collected were compiled into SPSS Version 15 and analysed separately for the NDC and Seria Dental Clinic. Descriptive statistics were calculated. Analysis of Variance (ANOVA) was utilized to elucidate if gender, age group, whether the patient was new to the clinic, or treatment type significantly affected FTA in our sample. Significance was set at $P < 0.01$.

To estimate costs to the services as a result of patients' failure to attend appointments, the total clinical time affected by FTA was collated in minutes and subsequently converted to hours. This was then multiplied by an 'average cost per hour' derived from (the average of) all the participating orthodontists' salaries, and included clinical allowances where applicable. The 'average cost per hour' was calculated as follows:

Total number of working days in January 2012 = 20 days

Working hours per day = 7.5 hr

Average cost per orthodontist per month =

{ \$5400 + [2x (\$5400+\$1200)] + [\$7010+\$1250] + [\$10000+\$1250] } divided by 5 orthodontists = \$7622 per month

'Average cost per hour' in January 2012 = \$ 7622 divided by (20days x 7.5hrs) = \$50.81 per hour

RESULTS

A total of 508 appointments at the NDC and 296 appointments at Seria Dental Clinic were available for analysis, with the status of attendance for the NDC and Seria Dental Clinic presented in Figure 1. The pattern of attendance for both the NDC and Seria Dental Clinic were fairly similar with the majority of patients being 'on time' for their appointments. Since all patients who were late for their appointments were attended to (NDC= 20.1%, Seria =25.7%), there were no re-appointments.

A total of 14190 minutes had been allocated for orthodontic appointments at the NDC, of which 1900 had been affected by FTA. For Seria Dental Clinic, a total 6210 minutes had been allocated for appointments, of which 1560 had been affected by FTA.

* please see note on page 27

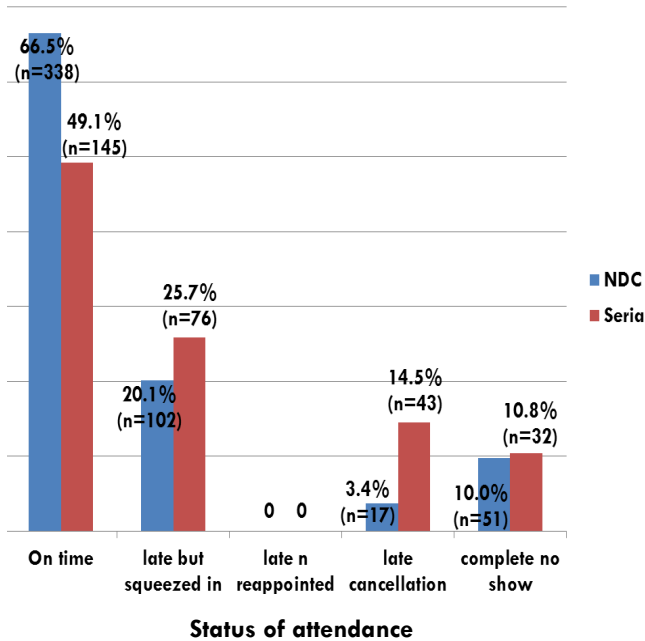


Figure 1: Chart to represent status of attendance for NDC and Seria based on percentage representation within each location (n= number of cases).

FTA rates and comparison with gold standard

The FTA rates in terms of number of appointments were very similar to clinical time lost within each location:

- **NDC** at 13.4% and 13.4% respectively.
- **Seria Dental Clinic** at 25.3% and 25.1% respectively

Both locations **failed to meet the gold standard.**

Costs

NDC was estimated to have incurred costs of **\$1608.98** ([1900min /60] x \$50.81) during the month of January 2012, as a result of (lost) clinical time affected by the FTAs.

Seria Dental Clinic was estimated to have incurred costs of **\$1321.06** ([1560 min/60] x \$50.81).

Frequency distribution within parameter groups and ANOVA

Table 1 presents the frequency distribution within parameter groups (gender, age group, whether new to clinic and type of treatment) for all appointments as well as the frequency distribution of the FTAs within each group, for the NDC and Seria Dental Clinic ('n' represents the number of cases).

A cursory comparison of the FTA frequencies for each parameter, against the distribution (of that parameter) in all appointments given at that location, seems to imply that:

- At the NDC, appointments given for consultation, fit appliance and review procedures experienced a higher representation of FTA.
- At Seria Dental Clinic, appointments given to females, 12-16 year olds and repeat attendees experienced a higher representation of FTA.

However, for both locations, Analysis of Variance conducted for the various parameter groups with the dependant variable being 'Failure to attend', **did not** single out any one parameter as being significantly more prone to FTA (p<0.01) .

Transport status

Data on transport status was collected only for those patients who had turned up (NDC= 440, Seria=221) The majority of the successful attendees had been dependant on others for transport (NDC= 57.1%, Seria = 74.4%).

Methods used to remember appointments

Figure 2 presents the data collected for patients who had turned up, where, for a few (NDC= 14, Seria= 10), data was not noted (missing). The most popular method reported was to refer to the appointment card, with other methods being almost equally distributed. A small number of patients had reported utilizing multiple methods.

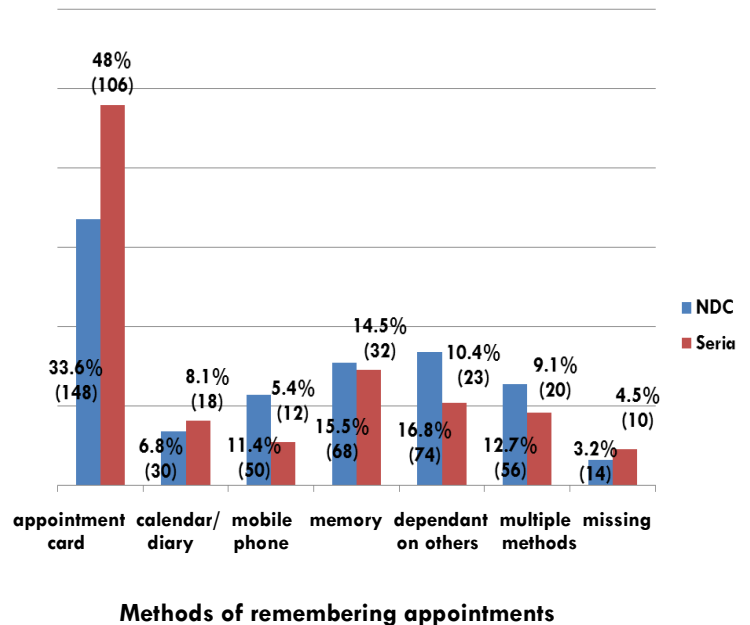


Figure 2: Distribution of methods of remembering appointments. (..) represents number of cases.

Table 1: Frequency distribution within parameter groups for the NDC and Seria Dental Clinic.

Parameter	NDC		Seria	
	Distribution in all appointments given (n)	Distribution in FTA (n)	Distribution in all appointments given (n)	Distribution in FTA (n)
Gender				
Male (n)	29.1 % (148)	27.9% (19)	29.1% (86)	24.0% (18)
Female (n)	70.9% (360)	72.1% (49)	70.9% (210)	76.0% (57)
Total	100% (508)	100% (68)	100% (296)	100% (75)
Age group				
<11 years old	5.5% (28)	5.9% (4)	6.1% (18)	6.7% (5)
12 -16 yrs	15.0% (76)	16.2% (11)	39.2% (116)	48.0% (36)
17-21 yrs	31.7% (161)	33.8% (23)	34.8% (103)	29.3% (22)
22-55 yrs	47.6% (242)	44.1% (30)	19.9% (59)	16.0% (12)
>55 yrs	0.2 (1)	0.0 (0)	0.0 (0)	0.0 (0)
Total	100% (508)	100% (68)	100% (296)	100% (75)
Attendees				
New attendees	18.9% (96)	19.1% (13)	9.5% (28)	5.3% (4)
Repeat attendees	81.1% (412)	80.9% (55)	90.5% (268)	94.7% (71)
Total	100% (508)	100% (68)	100% (296)	100% (75)
Treatment type				
Consultation	13.0% (66)	19.1% (13)	8.8% (26)	5.4% (4)
Fit appliance	14.2% (72)	20.6% (14)	3.4% (10)	0.0 (0)
Appliance adjustment	53.9% (274)	38.2% (26)	69.2% (205)	70.3% (52)
Remove (debond) appliance	2.7% (14)	1.5% (1)	5.4% (16)	6.8% (5)
Review	8.9% (45)	14.7% (10)	9.8% (29)	13.5% (10)
Miscellaneous and general dentistry	7.3% (37)	5.9% (4)	3.4% (10)	4.0% (3)
Total	100% (508)	100% (68)	100% (296)	100% (75)

DISCUSSION

FTA rates, gold standard and costs

George and Rubin (2003) reported FTA rates ranging from 5.5 – 55% in medical general practice. FTA rates of 9–13.6% have been reported for orthodontic clinics in the UK (Jackson 2009 and Richardson 1998), with rates as high as 25% occurring during the long school holiday periods (Wong *et al.*, 2004). Whether FTA is calculated in terms of number of appointments or in terms of clinical time affected, our FTA rates were high for both NDC and Seria, falling far short of the gold standard. The cost implications to our services as a result of the FTAs are estimated to be high.

Although the NDC had proportionately less FTAs compared to Seria Dental Clinic, most of the FTAs however, were made up of patients who did not contact the clinic to cancel their appointments. In contrast, for Seria, more than half of the FTAs were made up of patients who did call up prior to the appointment to cancel the appointment. Late cancellation cases were included into FTA data, as due to insufficient notice to book in another patient into the recently vacated clinic slot, the clinic's time allocated for treatment was designated as having been 'lost'. It can be argued that, despite the short notice, because patients had called up to cancel their appointment, this prior knowledge would have given the orthodontist the opportunity to utilize the (cancelled) time to conduct other duties and thus the 'lost' clinical time may not have been so costly to the services as a result.

Nevertheless, even disregarding the 'late cancellation' group, the proportion of 'Complete no show' (NDC = 10%, Seria = 10.8%) still falls far short of the gold standard, albeit being comparable to other published reports of 9–13.6% (Jackson 2009, Richardson 1998). Ultimately, under-utilized clinical time can be eventually translated as less time for managing cases, which can result in making little headway into the ever increasing orthodontic fixed appliance waiting list.

Of the patients who did attend our clinics, all who had turned up late were still treated (NDC = 20.1%, Seria = 25.7%) which implies that either clinics may be prone to over-run or that some of the clinical time 'lost' to FTA are utilized to attend to the late attendees. Data was not collected for 'walk-in' patients or those who had turned up requesting repairs

or other attention. The significance of attending to such patients and its subsequent effect on any 'lost' clinical time is unclear.

Reasons for FTA and reminders

Richardson (1988) and Murdock *et al.* (2002) had identified various reasons as to why patients fail to attend, which included the lower social classes, public health services, travel distance, transport difficulties for the patients, illness as well as patient apathy or forgetfulness.

This audit did not attempt to identify reasons for FTA in our sample, or to compare FTA in the public service against that in the private sector. However, in terms of transport, it is interesting to note that for our successful attendees, the majority had actually been dependant on others for transport; suggesting that for our successful attendees, being dependant on others for transport did not prevent the keeping of appointments. Unfortunately, as data on transport dependency was not collected from those who had FTA, it is unclear if this factor played a role in their failure to attend.

Data on reminder methods were collected from the successful attendees to ascertain the more popular forms of self-reminding methods. This revealed that the majority of our successful attendees had utilized the appointment card, with some using multiple methods, implying self-motivation. A small number had depended on others to remind them of their appointments. Data on how patients remembered their appointments was not obtained from those who had failed to attend. If those who had failed to attend had forgotten their appointments, then, clinic instigated reminder systems like automated short messaging system i.e. SMS (Downer *et al.*, 2005), or sending postal reminders (Can *et al.*, 2003), may help reduce FTA rates for these patients. However, if FTA is due to patient apathy, perhaps patient education (Murdock *et al.*, 2002) could help reduce FTA rates for this group of patients.

It is likely patients FTA for a variety of reasons whereby individual patient characteristics and circumstances influence failure to attend appointments. Studies need to be carried out to investigate why our patients fail to attend, especially the 'complete no show' category.

As ANOVA failed to show any particular parameter as being significantly more prone to higher FTA

rates, attempts to reduce FTA have to be addressed to all patients.

Limitations in this audit

- It is quite possible that FTA rates vary from one month to another. This audit is limited in that it was conducted only for the month of January. Most of our patients are of school or college age so auditing during other months would be affected by various school activities which was expected to skew our results, e.g. February – national day practices, followed by exams/ tests, term breaks and other activities in other months.
- Collection of data was burdensome and tedious, so it was desirable to limit the audit to the shortest period which would enable adequate FTA data collection for meaningful analysis. Within the period of the audit, each location was successful in providing more than the estimated minimum 30 FTA cases required for determination of overall FTA rate.
- The orthodontic clinics in Tutong were not included in the audit as these clinics operate only a maximum four days a month in 2011/2012 and it was estimated that collection of data for the one month period of the audit may not reveal sufficient number of Tutong FTAs for appropriate analysis. For reasons previously cited, we were not keen to extend the audit period.
- Not all orthodontists in the NDC were involved and results obtained for the NDC cannot be claimed to be fully representative for orthodontic clinics at the NDC.
- Although data was gathered for the patients who did attend with respect to their transport status and methods of remembering appointments, this was not elicited from those who had failed to attend, precluding comparisons between the two groups. This was not in the scope of the audit.
- Estimation of cost to the services caused by the FTA assumes the 'lost' clinical time was wasted and not utilized (e.g. catch up on other work of non-clinical nature or, used to compensate for over-running patient treatment sessions, or to attend to non-appointed cases) and thus may be an over estimate of the cost impact on or services.

CONCLUSIONS

Whether FTA is calculated according to number of appointments or clinical time, this reveals similar results for both the NDC and Seria Dental Clinic. Both locations showed very high FTA rates falling far short of the gold standard, with possible resultant cost implications due to lost clinical time.

There were FTAs in almost all parameters and Analysis of Variance did not reveal any significant difference in FTAs amongst the parameters studied. Attempts to reduce FTA has to be directed to all our patients rather than just concentrating on a few selected parameters. Various measures have been recommended to try reduce FTA rates. It is unknown how effective these will be. A re-audit is required to ascertain the effects of implementing such measures.

RECOMMENDATIONS

As the data failed to indicate if any particular parameters were significantly more prone to FTA, any measures implemented to reduce FTAs in our setting should be aimed at all patients. No one method is expected to provide the magic effective solution. Clinics are recommended to invest more effort in patient education to ensure patients are aware of the consequences and effects of missing their appointments; give reminders and consider double booking certain procedures.

Patient education and engaging their interest in treatment

Verbal and written advice may be given at the time of making a first appointment and further reinforced during the subsequent visits for those who appear to require more reinforcement.

Advice should include:

- information that if patients fail to attend, the clinic slot set aside for them is lost, affecting other patients who may be waiting for a slot.
- Request that the patient call and cancel his/ her appointment with sufficient notice should he/ she realize that he/ she is unable to keep the appointment.
- That by doing so, the appointment slot given to them may be reallocated to others.
- Stressing the benefits to the patient's treatment and management by keeping appointments and explanation of the negative effects on treatment length, should there be missed appointments.

Reminders and double booking

- At the time of making appointments, we should also confirm that the date and time will accommodate the patient (and/or transport provider), although this ideal may not be always possible given the clinics' usually fully booked schedules.
- For those who have mobile phones, we can remind them to input the appointment reminder into their phones at the time the appointment is made.
- Automated short messaging system can be used on a trial basis to evaluate its effectiveness in our situation.
- Postal reminders too can be used on a trial basis to study its effectiveness in our situation.
- In the meantime, clinics can try calling up patients (who agree to be contacted this way) to remind them of their appointments, preferably with sufficient notice such that if the patient is unable to attend, there will be adequate time to book another patient in.
- Reminders should not be sent too early as patients can forget. Perhaps a reminder phone call made 2-3 days before the appointment may be a suitable interval.
- Sufficient trained dental surgery assistants (DSA) or reception staff are required for reminder calls to be made
- If DSAs are to make these reminder calls, there also need to be sufficient time set aside from clinics for the calls to be made.
- Where there is insufficient trained staff to call up every patient, perhaps clinics can concentrate efforts on the new patient, the persistent poor attendee and long appointment slots (e.g. for fitting or removal of appliances).
- Negative reinforcement e.g. fines for missing appointments are not recommended as any possible positive effect it may have on reducing FTA may be outweighed by negative perceptions of the services.
- For those who are repeat FTAs, attempts need to be made to understand reasons for the patient non-attendance as personal circumstances will require flexibility. Perhaps such cases should be double booked.

Research and re-audit

- Research needs to be conducted to investigate FTA rates in other periods to ascertain if differences do exist, and identify reasons our patients fail to attend.
- A re-audit is planned over the same period once agreed changes are implemented to see if there

will be actual improvement in FTA rates, and to ascertain the extent of any improvement.

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Audit of clinical waste (except amalgam) management in dental clinics

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BACKGROUND

Proper segregation of different types of waste into suitable colour-coded receptacles is critical (1) to safe management of health-care waste and (2) to help control management costs. The segregation of the different waste streams is also necessary to reduce the risk of exposure and injury, such as needle-stick injuries, for all staff handling this waste. For segregation to work effectively, the staff must be provided with sufficient colour-coded waste receptacles. (UK Department of Health, 2011)

There are **three** different types of waste receptacles available in hospitals and health centres under the Ministry of Health, Brunei:

1. **yellow (clinical waste) bags**
2. **black (domestic waste) bags**
3. **yellow sharps bins**

Clinical waste including sharps require disposal by incineration, while domestic waste can be disposed of at landfills.

AIMS

The aims of this audit were:

1. To assess whether all dental clinics are provided with colour-coded receptacles (yellow bags, black bags and yellow sharp bins) in order to allow appropriate segregation of waste.
2. To determine whether these receptacles are properly utilized.
3. To identify clinics that experience problems with the supply of yellow bags and sharps bins.

STANDARD

The UK Department of Health guidelines on safe management on healthcare waste states that 'segregation of waste at the point of production into suitable colour-coded packaging is vital to good waste management'.

Thus, **all waste (100%) must be correctly segregated at the point of production into the correct colour-coded receptacles.**

MATERIALS AND METHODS

A structured questionnaire was developed to aid in data collection. The questionnaire was discussed among the three investigators to ensure consistency in data collection.

All government dental clinics (in hospitals, health centres & health clinics) providing full-time services were included in the audit (see Table 1). Data were collected between June and July, 2012. Clinics involved were visited by at least one auditor.

Table 1: Government Dental Clinics providing full-time services (at the time of data collection).

District	Name of clinics
Brunei-Muara	National Dental Centre, Berakas
	Specialist Dental Clinic, RIPAS Hospital
	Specialist Paediatric Dental Clinic, RIPAS Hospital
	PAPRSB Health Centre, Sg. Asam
	Silver Jubilee Health Centre, Sengkuring
	Berakas B Health Centre, Sg. Hanching
	Muara Health Centre
Tutong	Police Headquarters, Gadong
	Pengkalan Batu Health Centre
Belait	PMMPHAMB Hospital, Tutong
	Lamumin Health Centre
Belait	SSB Hospital
	Seria Polyclinic Sg. Liang Health Centre
Temburong	PIHM Hospital, Temburong

All dental surgeries in each clinic were inspected to identify the following information:

- Whether separate bins for clinical waste (yellow bags) and domestic waste (black bags) were available in each surgery
- Whether these bins were lidded, foot operated and in good working condition
- Whether sharps bins, yellow bags and black bags were available
- Whether proper waste segregation had been carried out

The officer in-charge of each clinic was also interviewed to identify problems associated with the supply of waste receptacles, especially yellow bags and sharps bins. The results were analysed using Microsoft Excel 2007.

RESULTS

93 dental surgeries in **15** Dental Clinics were included in this audit, with a total number of 139 bins.

Waste bins:

- Only **49** out of 93 (**52.7%**) dental surgeries had two bins.
- **41** dental surgeries had only one bin. However, **12** of these surgeries were in cubicle settings.
- **3** dental surgeries, two of which were cubicles, had no bin at all.
- Cardboard boxes or plastic buckets were used in certain places.
- **96 (69.1%)** of the bins were lidded, foot-operated and in good working condition.
- Swing lid and unlidded rubbish bins, which are unsuitable, were also found in some clinics.

Yellow bags for clinical waste (except sharps):

- **69** out of 93 (**74.1%**) dental surgeries were using yellow bags, but of these only **25** were using yellow bags correctly. Domestic waste was found inside the yellow bags from the remaining surgeries.

Black bags for domestic waste

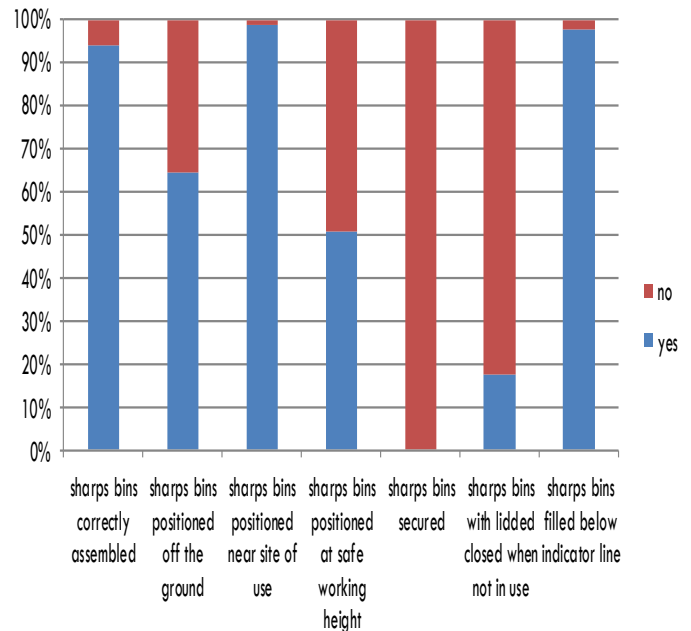
- **46** out of 93 (**49.5%**) dental surgeries were using black bags.
- Clinical waste was found inside 21 out of 46 (**45.7%**) of the black bags.

Sharps bins

- Sharps bins were available in 81 out of 93 (**87.1%**) dental surgeries.

- The percentages of sharps bins correctly assembled, safely positioned, secured and filled below the indicator line are shown in Figure 1.

Figure 1: Results of questionnaire on sharps bins.



Supply of waste receptacles

- Shortage of yellow bags was **sometimes** experienced in **62%** of the clinics, but **never** in **15%** of the clinics. On the other hand, shortage of black bags and sharps bins was **never** experienced in more than half of the clinics.
- The results for shortage in supply of waste receptacles are shown in Figures 2,3, and 4.

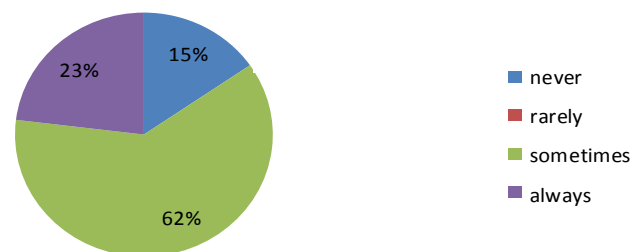


Figure 2: Shortage in supply of yellow bags.

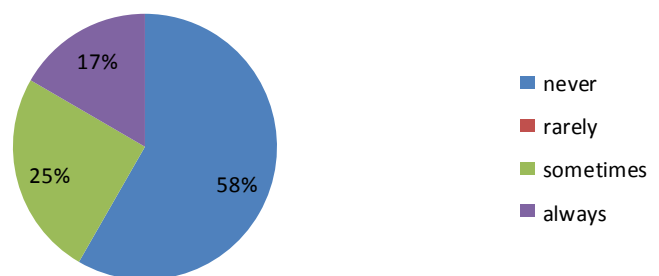


Figure 3: Shortage in supply of domestic waste bags.

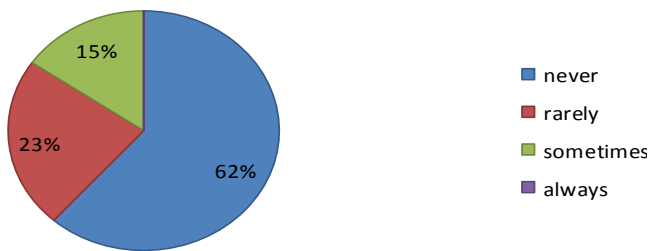


Figure 4: Shortage in supply of sharps bins.

DISCUSSION

Waste bins

- Less than half of the clinics had only one working bin or none at all.
- Due to unavailability of proper bins in some clinics, staff had to use cardboard boxes or plastic buckets instead.
- Waste bins were also shared particularly in cubicle settings such as in Seria Dental Clinic, Tutong Hospital Dental Clinic and National Dental Centre.

Waste bags

- Some clinics were unable to separate clinical from domestic waste because they only had one bin.
- Either yellow bags or black bags were used to dispose of both types of waste.
- Yellow bags:
 - Dental clinics located within hospitals and the National Dental Centre never/rarely had shortage of supply of yellow bags.
 - Some clinics, especially those located peripherally, did not use yellow bags to dispose of clinical waste. This is mainly because the staff were not sure how and where to get the yellow bags from.
 - Shortage of supply- in a few places, bags were cut into half and stapled at one end.
- Black bags:
 - Some clinics were only supplied with black bags and not yellow bags.
 - Black bags were mainly supplied by the contracted cleaners.
 - Shortage of supply (e.g. end of cleaning contract) was experienced in a few clinics and staff had to supply their own bags.

Sharps bins

- Majority of the clinics had sharps bins.
- Clinics without sharps bins had to share.

- Less than 40% of the sharps bins were positioned on the floor or inside cupboards, usually below the sink.
- None of the sharps bins were secured because their size and shape are not standardized.
- Majority of the sharps bins lids were not closed. This was because the audit was carried out during clinical time.

CONCLUSIONS

There is a lack of properly-functioning bins and shortage in supply of waste bags to enable proper waste management in the dental clinics, thereby we were unable to meet the 100% standard for this audit.

There are currently no guidelines on waste management in the dental clinics.

RECOMMENDATIONS

- To ensure each surgery has 2 bins:
 - one bin for clinical waste and one for domestic waste
- The bins should be lidded and foot-operated.
- To ensure sufficient supply of both yellow and black bin bags.
- To formulate guidelines on management of healthcare waste.
- To distribute the guidelines to all dental staff (dentists, dental nurses/therapists/hygienists, dental surgery assistants, dental technologists/technicians, dental radiographers).
- To conduct briefings/lectures on proper segregation of waste.
- To re-audit after the above recommendations have been carried out.

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ACKNOWLEDGEMENT

We would like to thank all Dental officers, Dental Nurses and Dental Surgery Assistants who were involved in this audit project.

Special thanks to SSDN Hj. Shahrina Binti Hj. Md. Hashim for helping us gather results from the Dental Clinic in Pengiran Isteri Hajah Mariam Hospital, Temburong.

An audit on the documentation of history of traumatic dental injuries at presentation by Paediatric Dentists in Brunei Darussalam

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INTRODUCTION

Traumatic dental injuries are often a great cause of concern for patients, caregivers and the attending dentist.

A comprehensive documentation on the history of the traumatic dental injury incurred will help determine any associated components of trauma, define treatment priorities and determine prognostic factors. Furthermore, the information gathered is vital to help identify incidents of non-accidental injury such as child abuse and issues of medico-legal significance.

History taking is a planned, professional conversation between the attending health care professional and the patient or caregiver to obtain concise and adequate information. This contributes significantly to clinical examination, investigations conducted, reaching a diagnosis and formulation of a suitable treatment plan. Therefore, it is an essential component to providing appropriate care for the patient.

But, often on revisiting the clinical records of traumatic dental injuries, clinicians note that important information has not been recorded especially when using an unstructured history format (Day and Duggal, 2003).

A thorough history of the traumatic incident should include answers to pertinent questions and using a structured history can help achieve this. A structured history consists of patient specific questions or prompts that reminds the clinician to ask important and relevant information.

The paediatric dentists in Brunei Darussalam, at present, do not use a standardised structured history to record clinical information of traumatic dental injuries at presentation.

This audit was undertaken to assess the comprehensiveness of documentation on history of traumatic dental injury collected at presentation using unstruc-

tured history by the paediatric dentists in Brunei Darussalam.

AIM

The aim of this audit was to evaluate the documentation on the history of traumatic dental injuries at presentation by paediatric dentists in Brunei Darussalam.

OBJECTIVES

The objectives of this audit were:

1. To determine if history recording is comprehensive
2. To identify areas of lack of adequate clinical information recorded, if any
3. To assess if diagrams representing the traumatic injury were depicted (e.g. crown fracture)
4. To assess if a provisional diagnosis was clearly stated in the clinical records

STANDARD

A 100% result in the comprehensive documentation on history of traumatic dental injury was set based on a study by Day and Duggal (2006).

MATERIALS AND METHODS

A retrospective audit of the clinical records of all traumatic dental injuries from January 2011 to December 2011 referred to six Paediatric dentists working for the Ministry of Health, Brunei Darussalam was conducted as follows:

The selected clinical records were coded and the data was collected and recorded on a proforma* by a non-paediatric dentist in order to minimise bias.

The history of traumatic dental injury recorded was assessed for the following parameters:

- History of Trauma
 - Location of trauma (where incident occurred)
 - Time injury sustained (approximate day/time)
 - How injury occurred (what happened)

* please see note on page 27

- Current medical history recorded on the day of presentation
- A record of loss of consciousness-if positive or negative
- Record of extra oral examination
- Record of intra oral examination
- If fractured fragment of tooth/avulsed tooth was accounted for
- Who accompanied the patient to the dental clinic at first attendance (e.g. parent or teacher)
- Were any diagrams used to describe traumatic dental injury sustained (e.g. crown fracture)
- If the provisional diagnosis was stated clearly in the clinical records

The information gathered was analysed using Microsoft Excel 2007. The comprehensiveness of documentation on history was determined as a percentage by assessing the total number of positive recordings over the total number of cases for each parameter.

Inclusion Criteria

1. All cases of traumatic dental injuries referred to paediatric dentists working for the Ministry of Health.
2. Traumatic injuries involving both primary and permanent dentitions.

Exclusion Criteria

1. Cases not involving traumatic dental injury referred to paediatric dentists, Ministry of Health.
2. Cases of traumatic dental injury not referred to paediatric dentists, Ministry of Health.

RESULTS

Forty five cases of traumatic dental injury were identified and analysed to assess the comprehensiveness of clinical information recorded. Figure 1 shows results according to each parameter assessed.

The medical history was recorded on the day of presentation for 91% of the cases, but 31.1% failed to record on loss of consciousness.

Only 6.9% accounted for the fractured fragments of tooth/teeth in the case of crown fractures. In the single case of avulsion the avulsed tooth was not accounted for.

Diagrams were used only in 53.6 % of the cases to depict crown fractures.

Regarding the details of the location of traumatic incident, 66.7% recorded the exact location of incident and 75.6% recorded who accompanied the patient to the dental clinic at first attendance.

Although only 91.1% of the cases had the details of an extra oral examination, 100% of the cases recorded a complete intra oral examination and a definite provisional diagnosis.

In this audit, 75 % of the required information was recorded by the paediatric dentists using an unstructured history.

DISCUSSION

This audit included a sufficient sample size whereby collection and analysis of data were conducted by a non – paediatric dentist to minimise bias.

In this audit, three other parameters were assessed, unlike the previous study by Day and Duggal (2006). The additional parameters include:

1. the recording of the adult accompanying child/teen to clinic which is of importance when discussing treatment options and may also be of medico-legal significance
2. to ascertain if diagrams depicting the traumatic dental injury sustained (such as crown fractures) were used and
3. if a definite provisional diagnosis was noted in the clinical records.

This audit has identified certain lapses in the documentation of clinical information, regarding the accounting of fractured fragments of teeth or the avulsed tooth/teeth, loss of consciousness, location of trauma and who accompanied the child / teen to clinic. This information may or may not have been elicited while gathering the history at presentation, but the paediatric dentists have failed to record it clearly in the clinical notes. The lack of documentation could be attributed to either an information overload or information being overlooked.

Some structured history formats provide images of teeth to diagrammatically represent the traumatic dental injury. In this audit, it was noted that most of the paediatric dentists did not draw diagrams to de-

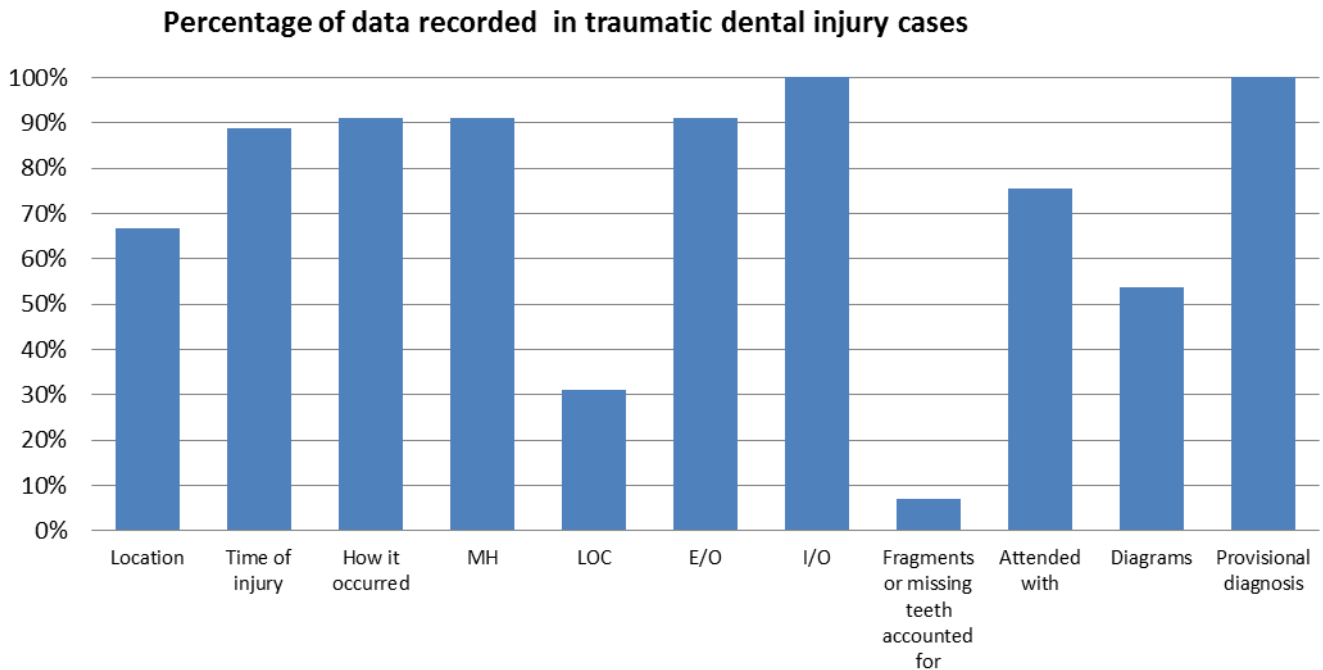


Figure 1: Percentage of cases with positive recording for the parameters audited.

scribe the extent and location of the crown fracture sustained.

However, the provisional diagnosis was clearly recorded in all the cases assessed. This is of considerable importance as only then can suitable treatment options be considered.

Andreasen and Andreasen (1985) described using structured history as essential in determining the prognostically important factors that are recorded at the time of presentation. They also noted that when using an unstructured history to gather information of traumatic dental injuries only 53.5% of the prognostic factors were recorded.

Despite using an unstructured history, the paediatric dentists in Brunei Darussalam have recorded 75% of the information of traumatic dental injury at presentation.

Day and Duggal (2006) conducted a study on the use of structured history for collection of information of traumatic dental injury in various dental hospitals in the United Kingdom. They reported that the majority of these hospitals did not use a structured history especially among the senior members of staff such as Specialists/ Consultants. It was also noted that despite the lack of using a structured history, the senior

members of staff presented detailed clinical recording as opposed to the junior staff or staff in training. In this audit, there was a consistent pattern of documentation of history of traumatic dental injury at presentation among all the paediatric dentists, which could be attributed to their speciality training.

Day and Duggal (2006) have also concluded that the use of a structured history definitely helps to ensure that a minimum set of information is recorded for all dento alveolar injury. In addition, the standardised structured history format would enable consistency in data collection, comparisons between dental hospitals and larger prospective studies to be conducted, with scope for further research.

CONCLUSIONS

The role of a good history and thorough examination in dentistry is crucial.

Recording on the history of traumatic dental injuries should be thorough and precise and include a minimum set of information.

When using an unstructured history for data collection of traumatic dental injuries at presentation, certain lapses in the clinical information recorded with lack of diagrams depicting crown fractures, were noted.

The paediatric dentists provided a detailed recording of most of the information with a definite provisional diagnosis being recorded for all cases. But the results obtained in this audit showed that the set standard has not been met.

The use of a structured history for standardised collection of information could ensure optimum recording of clinical information.

RECOMMENDATIONS

- To design a concise and user friendly structured history taking form.
- To implement the use of this structured history to ensure that essential clinical information at presentation of traumatic dental injuries are recorded.
- To re audit following the use of this structured history to assess its efficacy in recording essential clinical information.

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