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DENTAL TRAUMATOLOGY

The role for 'reminders' in dental traumatology: 4. The use of a computer database for recording dento-alveolar trauma in comparison to unstructured and structured paper-based methods

Day PF, Duggal MS, Kiefte B, Balmer RC, Roberts GJ. The role for 'reminders' in dental traumatology: 4. The use of a computer database for recording dento-alveolar trauma in comparison to unstructured and structured paper-based methods. © Blackwell Munksgaard, 2006.

Abstract – The aims of this study were to investigate the effectiveness of a computer database (CD) developed for this study, a plain paper unstructured history (USH) and structured histories (SH) for the recording of important prognostic factors for simulated dento-alveolar trauma. Twelve vocational trainees, seven postgraduates in paediatric dentistry and 24 general dental practioners were randomly assigned to using USH, SH or CD. Each dentist visited a series of simulated trauma cases (with models, photos, radiographs and actors) and was asked to record important prognostic factors for each injury and make a diagnosis. There were a total of 243 dentist contacts with the trauma stations. The average percentage of important prognostic factors recorded per station was: USH 53%, SH 75.3% and CD 58.6%. SH was significantly better than the other two methods ($P < 0.001$, ANOVA). Interestingly, those general dental practitioners (GDPs) who qualified prior to 1990 were significantly poorer at recording important prognostic information using CD. This effect was not obvious when using USH and SH. It was also seen that USH and SH were significantly better at helping clinicians reach a correct diagnosis as compared with CD ($P < 0.001$, chi-squared). A paper-based SH was the most effective method for collecting essential prognostic information for simulated trauma cases used in this study. At present, the introduction of our CD for recording of trauma is not justified without significant modification.

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Key words: diagnosis; dento-alveolar trauma; reminders; prompts; computer-based reminders; OSCE stations

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Dental trauma occurs frequently in the childhood population (1–3) and has a significant impact for the patient (4, 5) and the dental health services (6). However, most treatment protocols are based on empirical data and randomized controlled trials are 'non-existent' (7). In this editorial (7), the problems

relating to performing randomized controlled trials in dental traumatology were discussed. Similar to cleft lip and palate surgery, insufficient numbers present in any one unit presenting particular difficulties in gathering data from a sufficiently large sample in a reasonable time frame. In addition, teeth in growing children and adolescents must be followed up over a period of 5–10 years in order to determine the eventual consequences of treatment, i.e. tooth loss or survival. The comments by Trope (7) are not new and have repeatedly appeared in the dental traumatology literature over the past 13 years (8). Despite these pleas, multicentred trials have not occurred. One of the reasons for this is the lack of standardized recording, which would allow larger prospective studies to be carried out with adequate number of patients for statistical power. Before multicentre randomized trials can begin, data that are collected for different types of injury should be standardized allowing comparison between centers. This was the aim of the previous paper in the series (9).

Having established a standardized dataset to be collected for each injury, the question remains how the data should be recorded. It would be reasonable to assume that the use of a computer database (CD) for collecting information related to traumatic injuries would aid in conducting prospective multi-centre-controlled trials. A web-based CD would also solve the problem of standardized data collection between participating centres and allow for one central database.

CDs lend themselves to data collection because they can provide better record control and easier document storage and access (10), however, the design of the software and hardware must incorporate the following features to gain acceptance with clinicians.

- Essential data are easy to record in a systematic fashion where duplication is avoided. The moment a clinician feels unable to express himself/herself on the CD and reaches for a pen, the CD is doomed.
- A print out must be available to place the patients' records, preventing the clinician having to duplicate their records and the consequential failure of the project.
- The advantage of using a keyboard to input the data is the ability to read it. It has been shown (11) that despite meetings and audits seven out of the nine dentists' handwriting fell below the agreed standard. For patients seen in the dental hospital by multiple dentists, the clinical records need to be a clear summary of what was seen and done, as opposed to 'a brief illegible graffiti which even the writer has trouble in deciphering at the subsequent visit' (11).
- To try and ensure that the data collected are thorough enough for research but yet quick to fill in for the busy clinical operator.
- A consistent setup that allows clinicians to find information very quickly when they are familiar with the database. At a review appointment for dento-alveolar trauma, there is a battery of special tests that frequently need to be performed. By having a set layout for these, the results from previous visits are easy to find.
- Should be able to record the correct diagnosis.

The use of computers brings with it a number of disadvantages; these include cost, risk of theft, training issues for the dental team and the problems with computer software crashing with the subsequent loss of data. The use of the Internet brings with it the additional problems of cost, security and access. The use of a keyboard to input data can take time to adapt to and can slow the operator down. Therefore, care has to taken to ensure that the design of the database is computer friendly with minimal amounts of writing required.

An additional problem having built a CD is how to test if it is effective at recording these important prognostic factors. Stephens et al. (12) developed computer expert systems, a more complex database which gives advice as well as recording data, for orthodontic diagnosis and treatment. When they investigated the literature between 1987 and 1993, 458 papers were published describing expert systems; however, only three of these papers reported any clinical trials on their effectiveness and validity. While reporting the testing of their own system they suggested that one of the main problems lay with the development of a gold standard against which to compare the expert system. This is the main reason and advantage of developing the important prognostic factors to record for each type of dento-alveolar trauma discussed in the previous paper (9). These prognostic factors then act as a gold standard against which different methods of recording, including the CD, can be compared.

For our study we elected to use simulated cases that are also called Observational Structured Clinical Examination (OSCE). These OSCE-based trauma scenarios were used to trial the CD against other methods of clinical recording for different types of dental trauma.

Therefore the aims of our study were:

1. To design and build CD incorporating the features described above for the clinical recording of different types of dental trauma at the initial presentation.

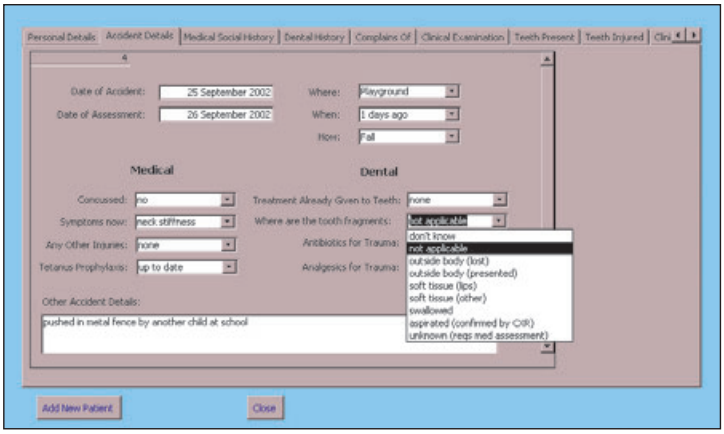

Fig. 1. An example of a drop-down list and the design of a computer database.

2. To compare the quality of clinical records for recording the important prognostic factors using a structured history (SH), unstructured history (USH) or CD for different dento-alveolar injuries presented in an OSCE format.

Materials and methods

The design and building of the CD

The CD was constructed using ACCESS software. The database was a collaboration between the Eastman Dental Institute London and the Leeds Dental Institute, Leeds, UK.

The questions asked in the database were based on the literature review of important prognostic factors to record (9). For recording these important prognostic factors drop-down lists (Fig. 1) was used. This prompts the clinician into making a decision on which of the answers listed was most appropriate. This standardizes the answers and prevents the numerous answers that occur when a clinician is allowed to decide (10). By using drop-down lists only agreed and standardized abbreviations were used, ensuring uniformity of record keeping. This reduces any confusion if the notes are read by another dentist (11, 13).

For questions that have not been shown to be significant in the literature (9) or where a narrative may be required a 'free text box' was provided allowing the clinician to answer the question with an answer of his choice. These answers are relevant to the patients' clinical record but not for dento-alveolar trauma research, for example, current medical history.

Selection of trauma cases and the set up of the OSCE

Once the CD was developed, it needed to be tested against existing methods of recording trauma. Twelve cases of different types of dento-alveolar trauma were chosen to show a range of injuries and diagnosis. Each of these twelve cases was set up as a separate station and was supplemented with models, radiographs, clinical photos and an actor. The actor's role was to play the part of the injured child. Each actor was given a script to ensure that standard answers were given to specific questions asked.

Selection of study group

The study groups were selected by offering four separate 1-day teaching courses on dento-alveolar trauma to various groups of dentists. These groups included:

- Vocational trainees (VTs). These were dentists in their first year postqualification. Their training included a day release scheme from general practice for continuing professional education.
- Postgraduate dental students (PGs), who were 3 months into their specialist training in Paediatric Dentistry at Leeds. These dentists had at least 2 years postqualification experience.
- General Dental Practitioner (GDP). Two courses for 12 participants; each were advertised in the 'Journal of the Postgraduate Dental Education, Yorkshire, UK'. The selection of places to GDPs was coordinated by the postgraduate dental education department and was independent from the principal investigators.

Consequently, this provided a range of dentists with different levels of expertise and experience.

Randomization

There were three experimental groups:

- USH. This was plain paper with no reminders to help the clinician in his clinical history and examination taking. This was the negative control.
- SH. For this we used the SH used at the Leeds Dental Institute. This provides prompts to help the clinician provide a thorough and systematic history and examination. This was the positive control.

- CD. This database provided questions similar to a SH but in computer format. This was the experimental group.

At the beginning of each day's course, dentists were randomly assigned to the three groups of either USH, SH or CD to record the history and examination.

Pre-OSCE introduction to recording method

Having randomized each dentist to the different groups, the CD group had 30 min with our IT expert, BK, who had built the CD to explain the CD and its use. This person was not a dentist and, therefore was less likely to bias the results from the CD group by explaining what to record.

The SH group had a 10-min period with the SH form to check that they were happy with the questions asked on it and had an opportunity to discuss this with the investigators.

OSCE format

The author (PD) explained to all groups that the OSCE was an opportunity to look at different clinical cases and to improve their history taking, examination and diagnostic skills. Participants were allowed to randomly assign themselves to start at one of the OSCE stations. At each station, approximately 15 min was allowed, this was slightly more at first, and less as each became more experienced with what they were doing.

When the dentist had finished their history taking, examination and diagnosis early, they were encouraged to think about how they would treat the injury. This exercise was to keep them interested and thinking as there was considerable variation in how long each dentist took. After approximately 1.5–2 h, the OSCE was stopped. Different groups of dentists (GDP, PG, VT) managed to complete different numbers of stations.

Assessing the quality of the clinical records

The previous paper (9) developed a minimum dataset that should be recorded for each type of dento-alveolar injury. This dataset was used to score the quality of the clinical records for each OSCE station. Each OSCE stations only concentrated on history, examination and diagnosis. Therefore, where a prognostic factor was recorded a score of 1 was given. If this factor was absent, a score of 0 was given. Table 1 shows what prognostic factors were expected to be recorded for each station. The number of factors recorded was divided by the maximum score possible for each station and calculated as a percentage.

Table 1. What and how many important prognostic factors should have been recorded at each OSCE station

Important prognostic factors to record	OSCE station number											
	1	2	3	4	5	6	7	8	9	10	11	12
Where	*	*	*	*	*	*	*	*	*	*	*	*
When	*	*	*	*	*	*	*	*	*	*	*	*
How	*	*	*	*	*	*	*	*	*	*	*	*
Knocked out	*	*	*	*	*	*	*	*	*	*	*	*
Medical history	*	*	*	*	*	*	*	*	*	*	*	*
Other injuries	*	*	*	*	*	*	*	*	*	*	*	*
Fragments			*	*		*			*		*	
Occlusion		*			*		*	*	*	*		*
Mobility tooth A			*	*	*	*	*		*	*		
Mobility tooth B			*		*					*		
ttp A			*	*	*	*			*			
ttp B					*							
Root development tooth A	*	*	*	*	*	*	*	*	*	*	*	*
Root development tooth B			*		*	*		*	*	*		
Displacement tooth A	*	*						*				*
Displacement tooth B								*	*			
Diagnosis tooth A	*	*	*	*	*	*	*	*	*	*	*	*
Diagnosis tooth B			*		*	*		*	*	*		
Diagnosis C					*							
PDL diagnosis tooth A			*		*	*	*		*			*
PDL diagnosis tooth B			*		*							
Extent of fracture A					*							
Extent of fracture B					*							
Extra alveolar time						*						
Extra alveolar medium						*						
Dry time						*						
Surface debris						*						
Site of fracture							*					*
Displacement at site of fracture							*					*
Number of prognostic factors to be recorded	9	10	16	11	20	18	13	13	16	13	9	13

Diagnosis seen at each OSCE are recorded in Table 4.

Data analysis

The data were entered onto SPSS 10.1. Chi-squared and Fisher's exact tests were used to study differences between the two groups for nominal data. For continuous data, ANOVA was used to compare the three groups. If a significant difference was found, a posthoc Tukey's test was carried out to identify which groups were significantly different. Pearson correlations were used to correlate data rather than deciding on a nominal cutoff point and using a Student's independent t test. Intra-examiner reliability was calculated using a kappa coefficient.

Results

Description of the SH, USH and CD groups

Twelve VTs, seven postgraduates and 24 GDPs were randomly assigned to using SH, USH and CD. Table 2 shows how the randomization worked out for each group of dentists.

Table 2. How the different groups of dentists were randomized to each of the unstructured history, structured history and computer database groups

Group of dentists	Computer database	Structured history	Unstructured history
VDPs	4	4	4
Post-graduates	3	2	2
GDPs	8	8	8
Total	15	14	14

The dentists randomized to SH, USH and CD were similar in their year of qualification, where they studied to obtain their undergraduate dental degree and the number of OSCE stations completed.

Overall mean percentage scores per OSCE related to USH, SH and CD

The mean overall percentage score was calculated for each dentist by adding together the percentage scores achieved at each OSCE station and then dividing by the number of OSCE stations they visited. This gave an overall mean percentage score for each dentist. Each dentist was then identified by his/her method of recording (e.g. USH, SH and CD). The effect of method of recording on mean overall percentage scores is shown in Table 3. It should be noted that the higher the score the better the method of recording important prognostic factors.

Average scores per OSCE station against method of recording

The performance of each recording method at individual OSCE stations can be seen, in Fig. 2.

Only in stations 4 and 5 did the USH have a higher average score than the CD, however, at both these stations, one of the dentists using the CD failed to record any of the prognostic factors. In 10 out of the 12 stations, the SH was the most successful at recording the most prognostic factors.

Year of qualification against method of recording

Fig. 3a–c show how the overall mean percentage score was affected by the year of qualification. With all three groups, overall average mean scores deteri-

Table 3. The overall mean percentage scores, standard deviation, minimum and maximum scores and confidence intervals for the different methods of recording; unstructured history, structured history and computer database

Method of recording	Number of dentists in each group	Mean overall percentage score (%)	Standard deviation	Minimum percentage score (%)	Maximum percentage score (%)	95% Confidence interval for mean	
						Lower bound	Upper bound
Computer database	15	58.6	18.3	23.7	79.4	48.5	68.7
Structured history	14	75.3	5.6	66.9	84.6	72.0	78.5
Unstructured history	14	52.6	11.8	34.1	69.7	45.8	59.4

Using ANOVA to compare means, the SH group was significantly better ($P < 0.001$) at recording the important prognostic factors for dento-alveolar trauma than the other two methods. Using a post hoc Tukey's test there was no significant difference between the computer database and unstructured history groups.

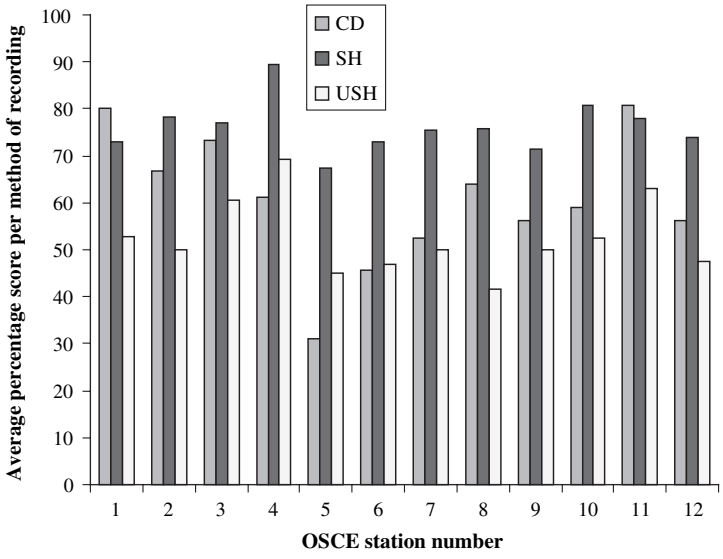

Fig. 2. Average percentage scores per observed structured clinical examination (OSCE) station against method of recording.

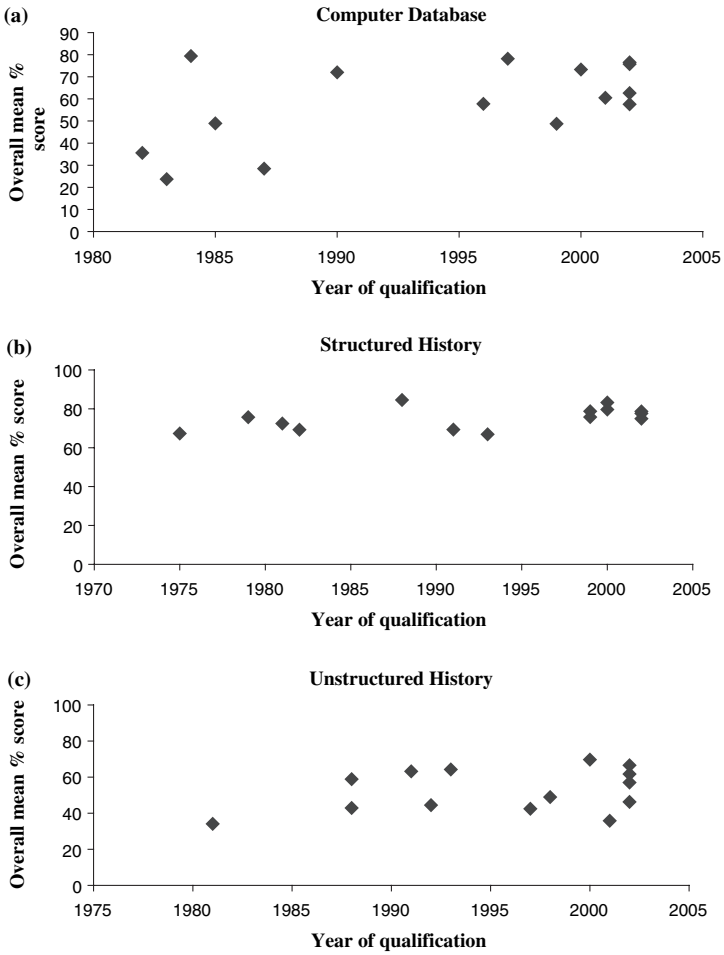

Fig. 3. The effect of different methods of recording against the year of qualification on the overall mean percentage scores for OSCE stations visited by dentists. (a) Computer database, (b) structured history and (c) unstructured history.

orated with increased length of time since qualification. When the Pearson correlations are calculated, only the CD group was significantly ($r = 0.54$, $P < 0.05$) affected by year of qualification.

A comparison of different methods (SH, CD and USH) for recording the correct diagnosis

One of the main aims of any method of recording is to ensure that the correct diagnosis is reached. Table 4 shows the effect of different methods of recording on the accuracy of the diagnosis reached. As can be seen often, there was more than one diagnosis to record. Overall, the CD method recorded 24.9% of diagnoses possible, the SH method 50.5% and the USH method 45.8%. Using the Chi-squared test, there was no significant difference between the USH and SH groups, but both of these methods of recording were significantly better than the CD group ($P < 0.01$).

Reproducibility

A 10% ($n = 25$) of the sample was randomly selected to assess intra-examiner reliability. This exercise was carried out 3 months after the initial data collection. Kappa intra-examiner reliability score was 0.91 with a confidence interval of 0.87–0.95. Where kappa scores are >0.8, this indicates an excellent level of agreement.

Discussion

The random allocation of dentists to the three experimental groups (USH, SH, CD) resulted in a reasonably even spread, though there was an unavoidable uneven numbers of PGs between the experimental groups. The other types of dentist, VTs and GDPs, were split evenly because of the method of randomization. The range of experience since qualifying was from several months (VTs) to 27 years (GDPs). The study did not consider what experience or training the dentists had in dento-alveolar trauma since qualifying or at the nature of their undergraduate teaching or the extent of their experience prior to the course.

The number of OSCE stations completed differed with different groups of dentists. This was mainly related to the time it took to complete each station, and the perception that some were more

Table 4. The effectiveness of different methods of recording dento-alveolar trauma against the diagnoses at each OSCE stations

		CD		SH		USH	
OSCE Station	Diagnosis	Recorded	Not recorded	Recorded	Not recorded	Recorded	Not recorded
1	Intrusion	3	5	7	0	7	1
2	Extrusion	2	4	6	0	7	4
3 (UR1)	E/D/P#	5	2	6	0	9	1
3 (UR1)	Subluxation	3	4	1	5	3	7
3 (UL1)	E/D/P#	4	3	5	1	8	2
3 (UL1)	Concussion	0	7	0	6	0	10
4	E/D#	2	5	6	0	8	2
4	Foreign body in lip	6	1	2	4	4	6
5	# L condyle	0	5	6	0	4	1
5 (UR1)	E/D/C#	1	4	2	1	1	4
5 (UR1)	Subalveolar	0	5	0	6	0	5
5 (UR1)	Concussion	1	4	0	6	0	5
5 (UL1)	E/D/C#	0	5	1	5	1	4
5 (UL1)	Supra alveolar	0	5	0	6	0	5
5 (UL1)	Concussion	0	5	0	6	0	5
6 (UR1)	E/D#	3	6	7	0	6	1
6 (UR1)	Concussion	2	7	1	6	0	7
6 (UL1)	Avulsion	4	5	7	0	6	1
7 (UL1)	Root#	2	4	7	0	3	0
7 (UL1)	Subluxation	0	6	0	7	1	2
8 (UR1)	Alveolar#	2	8	5	3	4	1
8 (UL1)	Alveolar#	2	8	6	2	4	1
9 (UR1)	E/D/P#	1	6	4	3	1	1
9 (UR1)	Concussion	0	7	0	7	0	2
9 (UL1)	Palatal luxation	2	5	5	2	1	1
10 (UR1)	Subluxation	3	6	3	5	1	5
10 (UL1)	Subluxation	3	6	3	5	1	5
11	E#	2	2	1	3	1	2
12 (UL1)	Root#	2	6	3	3	3	6
12 (UL1)	Palatal luxation of coronal portion	2	6	3	3	3	6
Total		57	152	97	95	87	103

difficult than others. No dentist visited all 12 OSCE stations. Each station varied with the number of prognostic factors to be recorded, the number of injuries to diagnoses and the diagnosis required.

A comparison of the effectiveness of the three methods for the recording of history, examination and diagnosis of different OSCE stations showed that overall SH was significantly better than the other two methods. Although the CD had a higher mean overall percentage score compared with USH, there was no significant difference between the two. When the comparisons were made for individual OSCE stations again SH was found to be the most effective method for recording prognostic details in 10 out of the 12 OSCE stations. The CD was the more effective method than the USH in all but two stations. It was very interesting to note that the dentists using a SH or CD showed more of a structure to the process of recording history and examination as compared to a more random nature with the USH. The USH allows dentists to follow their normal practice with regard to the history taking, examination and diagnosis. They obviously felt comfortable with this method. The overall mean percentage scores, however, show that the method is not that effective at identifying and recording the important prognostic factors. It has been reported that even at an undergraduate level some students at first resented being forced to complete a thorough history before moving onto the examination and then the diagnosis (14). Because of its rigid design, the CD method may have had similar problems and was obviously frustrating for some dentists. Dento-alveolar trauma, however, requires a relatively rigid method to document the history and examination in order to ensure all injuries are identified and fully investigated.

This study shows that as yet the current CD is not as effective as a SH. The possible reasons include, technical problems with the CD, unfamiliarity with where to place the data and drop-down list, computer literacy, keyboard skills and interest and duration of time required to fill in the CD.

Stephens et al. (12) showed that testing the CD prior to its implementation is essential. This study has brought to light a number of significant problems in the software developed. In addition, it is very easy for a designer to see only one way

through which an operator will work through the programme. By testing the program on 15 different dentists of varying levels of dental and computer experience, this proved invaluable to all those involved with the development of the CD.

The CD and SH were both unfamiliar to the dentists involved in the study. Even the postgraduates would only have used the SH a maximum of two or three times as the first term of the postgraduate programme has a limited clinical input. Despite the unfamiliarity, the SH proved to be the most effective method of recording prognostic information. The SH differs from the CD in that it allows the clinician to work through it in an order that they choose and answers the questions posed with replies of their own, e.g. free text. The CD method was designed with less flexibility and would only operate by working through one screen to the next. In addition, by having a drop down list the dentist had to look at the answers available and choose the most appropriate. The questions asked are more specific to ensure that a drop down list of answers covers all potential answers. This process requires more familiarity with the programme because the dentist needs to know where to write the details of the history and examination and what answers are available on each of the drop-down lists.

The design of the CD was to allow clinicians with minimal computing skills to be able to use the program. Because of the random allocation of dentists to experimental groups, a whole range of computer skills were encountered in the CD group, including some dentists who had little or no experience of computers. Although the CD group got half an hour of training with the software for some this was not enough. In addition, those who were not experienced with a keyboard often find it frustratingly slow in comparison to writing by hand.

The evidence shows that there is a small group, approximately 10%, even at undergraduate level who 'remain reluctant to become familiar with computers and leave dental school without basic computing skills'. They believe, that they can continue to ignore information technology and yet practice successfully. An estimated 70%, in 1998, of dentists in the UK were using computers to some extent but it was obvious that some of the dentists were struggling and unfamiliar with basic computer skills (15). Fig. 3a–c shows the effect of the year of qualification against the mean overall percentage score. Only in the CD group was there a significant effect of year of qualification against the score achieved. In the CD group with increasing time since qualification generally there was an increasing lack of computing skills.

At most OSCE stations it was the CD that took the most time to complete. This certainly resulted in some frustration and may well explain the poor performance of the CD in recording the diagnoses as this is at the end of the CD. Consequently, some dentists may not have reached this page before moving on to the next station.

It was also clear that the SH and USH were significantly better ($P < 0.001$) at recording a diagnosis. This is a major flaw in the CD method as the data collected are of little value if no diagnosis is entered. It is alarming to note that even with the most effective method, SH, dentists only managed to record 50% of the diagnoses. When the types of diagnoses that were missed were analysed it was found that these were mainly the minor periodontal ligament injuries, e.g. subluxation and concussion. Another reason for failure to record these particular diagnoses may be related to the dentists not remembering the definition of these injuries.

The other poorly diagnosed injury was the crown root fracture and the need to identify the extent of the fracture, e.g. sub- or supra-alveolar. These injuries are rare and frequently require multidisciplinary care (16), which is rarely provided in the primary care sector.

There was no significant effect of different dentists (GDPs, VTs, PGs) on the mean overall percentage score. Both VTs and PGs had a higher overall mean percentage score. Both these groups, on average, have qualified from their undergraduate courses more recently and possibly retained more of their undergraduate knowledge. With increasing time since qualification and the fact that severe dento-alveolar trauma rarely presents in general dental practice may have lead to their undergraduate knowledge on dento-alveolar trauma being replaced by something more relevant to their clinical practice.

In a study we reported previously (17), the differences between various SH in use in the UK and Ireland in comparison to a gold standard (18) was presented. It showed that there was considerable variation in what questions were asked. The full results of this study (19,20) have shown the fact that when a question was not specifically asked there was very little chance of the information being recorded. This is important because although there is there is a desire to make the SH as simple as possible, where it is important to record a prognostic information the specific question needs to be asked while taking the history. One of the difficulties of designing a CD is to try to work through all the possible questions and answers a clinician may want to ask and record, in order to prevent them resorting to paper to write down the answer.

The CD has the potential advantage of asking particular questions for the relevant diagnoses. For example, if a diagnosis of avulsion is recorded then the dentist can be automatically prompted to ask questions about storage and time elapsing prior to replantation.

The OSCE style methodology to trial the CD method was used because it allows different interventions (USH, SH and CD) to be tested on the same clinical scenario. Dento-alveolar trauma presents randomly to a dental hospital and therefore is difficult to investigate. In addition, child patients are often distressed and it may require a significant effort to maintain their cooperation for treatment, let alone studying methods for recording the history and examination. Consequently, although it entails significant organization to recruit actors and set up realistic dento-alveolar trauma OSCE, this required considerably less effort than recruiting patients and maintaining their cooperation. In addition, this methodology allowed results to be collected rapidly without having to wait for the random nature of dento-alveolar trauma to appear.

Gordon et al. (21) noted that it was very difficult to blind the participants as to what experimental group they have been assigned to. In this study, both the actor at the OSCE station and the dentist could see what their randomization was. In addition, a limited explanation about the experiment was required in order to acquire the dentists' cooperation. By not using a cross-over design, where each dentist used all methods of recording (SH, USH and CD), the study managed to prevent bias of the participants taking the knowledge and questions learnt from one method of recording to the next.

This study has shown that the paper-based SH was the most effective method. The CD in its current form was statistically no better than the USH. Wyatt (22) has shown that one-third of trials looking at paper-based reminders made no improvement in clinical practice. The importance of this trial was to test out the CD method. As Wyatt (22) has noted, no system is perfect and often staff who input the clinical information do not see the benefits of their labour. If CD is to be used in multicentre trials, it requires the inclusion of these centres in the design of the database to enhance ownership and compliance. Our CD method needs further building, testing and refining.

Conclusions

- SH was significantly more effective at recording prognostic factors for a variety of dento-alveolar scenarios.
- The year of qualification significantly influenced the recording of prognostic factors for the CD group only.
- The CD was significantly worse at recording the diagnosis of dento-alveolar trauma compared with the SH and USH groups.

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