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# Inaccurate Dental Charting in an Audit of 1128 General Dental Practice Records

**Abstract:** Fourteen dentists at different practices in the UK assessed the dental charts of 1128 patients who were new to the dentist but not new to the practice; 44% of the dental charts were found to be inaccurate. Inaccuracy of the individual practice-based charts ranged between 16% for the best performing practices to 83% for the worst: 5% of dental charts had too many teeth charted and 5% had too few teeth charted; 13% of charts had missed amalgam restorations and 18% had missed tooth-coloured restorations; 5% of charts had amalgam restorations recorded but with the surfaces incorrect (eg an MO restoration charted but a DO restoration actually present); 9% of charts had tooth-coloured restoration surfaces incorrectly recorded. For 7.5% of charts, amalgams were charted but not actually present. Other inaccuracies were also noted. The authors reinforce the requirements of the GDC, the advice of defence organizations, and the forensic importance of accurate dental charts.

**CPD/Clinical Relevance:** Dental charting forms part of the patient's dental records, and the GDC requires dentists to maintain complete and accurate dental records.

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It is in the interest of the general dental practitioner to maintain good dental records in order, not only to best serve their patients, but also to protect themselves. A raft of recommendations and legislation

exists reinforcing the need for good dental records.

In the UK, the General Dental Council (GDC) requires dental professionals to make and keep accurate and complete patient records. Principle 4 of the standards for the dental team document<sup>1</sup> which covers maintaining and protecting patients' information says registrants must make and keep contemporaneous, complete and accurate patient records each time a patient is treated, and this is compulsory. Dental records include not only dental notes and charts, but also radiographs, consent forms, photographs, models, audio and visual recordings of consultations, laboratory prescriptions, statements of conformity and referral letters. The GDC also states that registrants must ensure that all documentation that records a dental practitioner's work is clear, legible, accurate, and can be readily understood by others. Other legislation covering dental

records includes the Data Protection Act, 1998.<sup>2</sup> Principle 4 states that '*personal data (such as name, date of birth and address) shall be accurate, and where necessary kept up to date*'. The Care Quality Commission (CQC) in England expects records to be accurate and fit for purpose in accordance with regulation 17 of the Health and Social Care Act 2008 (regulated activities) 2014.<sup>3</sup> Other legislation relating to record-keeping includes The Consumer Protection Act 1987, the *Medical Devices Directive (Directive 93/42/EEC)*, the *Medicines Act 1968* and the *Misuse of Drugs Regulations 2001*. Also, the NHS has its own guidance in the NHS Code of Practice.<sup>4</sup>

Furthermore, the defence organizations advocate contemporaneous, clear, concise and complete dental records that fully document the progress of a patient's care. They are integral to effective healthcare, documenting continuity of treatment and outcomes, and they can

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also provide evidence if the standard of care by a dentist is called into question. They should demonstrate professional integrity and justify courses of action adopted in the treatment process.<sup>5,6</sup> When defending allegations, a dentist will be disadvantaged if he/she is not able to refer to good quality and contemporaneous records of treatment. These can make the difference between robustly defending or needing to settle a case.<sup>7</sup> Inaccuracies and incompleteness of dental records in general, and lack of compliance to meet expected standards have been reported on a number of occasions in a number of countries.<sup>8-16</sup> Dental charting is one of the key parts of any dental record, and forms a fundamental part of each dental examination. It is a diagrammatic representation of the patient's mouth that enables the practitioner to see, at a glance, the teeth present, the type and location of any restorations present in the natural dentition, the number and type of prostheses, bridges and implants replacing missing teeth, as well as detailing any treatment that is planned for the future. It may be completed by hand or computerized, and there are a number of different software systems available to dentists. Regardless of the system used to record the chart, there is a need for it to be accurate. Dental records are seldom scrutinized for accuracy of the dental chart. In the UK, Dental Reference Officers (DROs) used to conduct inspections of dental practices on behalf of the NHS, and they would examine patients and check the quality of care provided and the quality of records kept, including the dental chart. Nowadays, the CQC takes the main role of practice inspectors, but does not examine patients. Unless there is a complaint by a patient, the likelihood is that the only person, other than the patient's regular GDP, who will see the dental chart whilst the patient is having an examination is another colleague in the same practice. As patients may often continue to attend the same dentist, there is limited scope for external audit of the dental chart. At a time when the DROs were conducting examinations, accuracy of charting was questioned when they observed that less than half

(48%) of GDPs' charts were the same as the DROs', and 14% did not have a dental chart at all.<sup>17</sup> Other studies have paid particular attention to the charts and they too have been shown to be inadequate. In the UK, Morgan found that only 70% of records had full tooth charts, and NHS records were significantly worse than private records.<sup>18</sup>

Studies from dentists treating military patients have also identified inaccuracies of dental charting, and raised concerns for forensic dental identification.<sup>19,20</sup> Forensic odontology has been defined as the branch of dentistry which, in the interests of justice, deals with the proper handling and examination of dental evidence and with the proper evaluation and presentation of dental findings.<sup>21</sup> Forensic odontologists have a vested interest in the quality of dental records, as one of the most important functions of patients' dental records may well be to help with identification of a patient after death.<sup>22-25</sup> The ante-mortem dental records are fundamental for identification using forensic odontology. If they are of poor quality, a forensic odontologist may struggle to confirm an identification, or worse, have to cite insufficient information to the coroner as a reason not to be able to identify a body. Forensic odontologists too have reported poor dental records in the UK and abroad.<sup>16,25-28</sup> In one 10-year study of all forensic odontology cases referred to the Department of Forensic Medicine in Göteborg, it was found that information in ante-mortem dental records on dental characteristics, normal anatomical findings and restorative treatment was incomplete in 27% and missing in 5% of cases, and registration of previous therapy was missing in about 94% of the records.<sup>16</sup> Similar studies in South Africa found that dentists did not comply with requirements.<sup>27</sup> An American study asked dentists to self assess their dental chartings and written records, and only 56% of dentists felt that their records would be extremely useful in dental identifications. It was concluded that the quality of ante-mortem dental records available for comparison with post-mortem remains varies from extremely useful to inadequate.<sup>28</sup>

At the time of writing, it has

been 15 years since Morgan's UK study reporting poor records,<sup>15</sup> and 20 years since the DRO's publication questioning the accuracy of charting.<sup>17</sup> A lot has happened in the UK to dentistry in the last 20 years. Dental litigation has increased, GDC conduct caseload has increased, the CQC has emerged and we are now in a time where quality assurance and record-keeping should be paramount to the dental practitioner. Also in that time, both at home and abroad, disasters have demonstrated the importance of dental records for use in forensic dental identification.<sup>22-25</sup> The purpose of this study was to evaluate dental records for the accuracy of dental charting.

## Methods

Fourteen general dental practitioners from a study group, each in a different practice, were invited to take part in the study. Over a 2-month period, during the course of their normal working day, the dentists were asked to consider the dental chart of any adult patients attending for routine examination that were new to the dentist, but not new to the practice. The dentists conducted their examinations in the usual way, and were asked to review the base chart and record whether or not they had to make changes to the base chart and, if so, what those changes were. A data capture sheet was used to assist with the process. To ensure confidentiality, no patient details or dental charts were captured during the data collection. At the end of the 2-month period, the data were collected from individual dentists and, to maintain anonymity, no record was made of which practice the data came from.

## Results

Fourteen general dental practitioners, all working at different practices, took part in the study. In total, across the 14 practices, 1128 adult patients were seen that were new to the dentist but not new to the practice. No changes were made to the base charts of 631 patients, however, 497 base charts (44%) did need correcting. When each practice was considered

Practice	Were changes needed to the base chart?		Type of changes needed to the base chart										
	No	Yes	Number of teeth incorrect?		Tooth type incorrect?	Amalgams			Tooth-coloured restorations			Crowns	
		n (%)	Missed on chart n	Extra on chart n	n	Missed on chart n	Incorrect surface(s) charted n	Charted but not present n	Missed on chart n	Incorrect surface(s) charted n	Charted but not present n	Missed on chart n	Charted but not present n
1	27	48 (64%)	9	11		17	4	3	10	2	1	2	3
2	43	47 (52%)	4	2		7	16		14	10			1
3	33	51 (61%)	3	6	4	47	17	1	43	3		6	1
4	92	20 (18%)		3	3	1	3		6	1			1
5	7	34 (83%)		7	2	12	6	6	24	4			
6	36	26 (42%)		3	5	2	2		7	1			
7	26	5 (16%)			1		3		1	2			
8	62	76 (55%)	14		10	3		30	32	30	2	10	
9	23	5 (18%)	1	1	2	1							
10	74	34 (31%)	1	2		6		8	9	8			
11	10	5 (33%)		1		2		1	2				
12	43	29 (40%)	3	6		6	10		15			1	
13	49	71 (59%)	20	13	2	45		26	41	26			
14	106	46 (30%)			15	2		10	2	11		1	
Total	631	497 (44%)	55	55	44	151	61	85	206	98	3	20	6

**Table 1.** Accuracy of dental charting. The number of inaccurate base charts and the changes needed to correct them. n represents the number of charts that needed amending, not the number of teeth. A box left blank represents n = 0.

separately, some were better than others. Inaccuracy of the individual practice base charts ranged between 16% for the best performing practice to 83% for the worst. When considering the reasons for charts requiring correction, there were similarities (Table 1). Many base charts had the number of teeth charted incorrectly: 55 charts had teeth charted as present, when in fact they were missing in the patient. Also, there were 55 charts where teeth were charted as missing, but the tooth was present: 44 patients had the correct number of teeth charted, but an incorrect tooth type was recorded (eg second permanent molar charted as a first permanent molar). Overall, the most common inaccuracy was the (mis) charting of amalgam and tooth-coloured restorations. Frequently, they were missed and also, when they were not missed, the surfaces were sometimes incorrect: 151 charts of the 1128 charts had amalgams missing from the chart, and 206 had tooth-coloured fillings missing; 98 charts had tooth-coloured restoration (TCR) surfaces incorrectly recorded. Also, charts had restorations recorded but with the surfaces incorrect (eg an MO charted but a DO is actually present). Interestingly, for 85 charts, amalgams were charted but not actually present. Similar errors were recorded for crowns, with 20 charts failing to record a crown when they were actually present, and 6 charts detailed the presence of a crown, when in fact there wasn't one. Other inaccuracies were also noted, and these included bridges and prostheses either not being charted at all or charted incorrectly, root fillings not being charted or charted but actually not present, inlay surfaces charted incorrectly, fissure sealants not being charted, gaps not charted as being closed, and retained roots not being charted.

## Discussion

A dental chart forms part of the dental records for each patient and it is one of the first things all dental professionals are taught. GDPs are expected to record or update patients' dental charts every working day and, as dental professionals, we have a clear obligation to maintain accurate dental records. The results in this study show

that a significant number of dental charts are inaccurate, with 44% needing correction. Five per cent of dental charts had too many teeth charted, and 5% had too few teeth charted. Thirteen per cent of charts had missed amalgam restorations and 18% had missed tooth-coloured restorations.

Errors in dental charting could come about for a number of reasons. Information is usually passed from the dentist to the dental nurse, and then the chart is made. The dentist may make errors, or the dental nurse may make errors. It has been suggested that records made at the first visit of a course of treatment are not kept up-to-date,<sup>17</sup> and this study would imply agreement with that statement. Another reason for a discrepancy may be that the patient has sought treatment at a different practice since they last attended, such as emergency treatment out of hours. With good written paper-based dental records, the charting is updated or repeated regularly, at least with each new card insert. Computerized records are more common nowadays and, at the time of installation of the software into a practice, or at the first visit of a patient after conversion, a base chart should be done. However, in the authors' experience, this may be overlooked and the only charting done is the treatment required. Also, for some software it is difficult to change the base chart. An example of this is if a dentist in the practice has done a restoration on a tooth, but it is charted on the wrong tooth; in future it is very difficult to remove the inaccurate charting and therefore it may be left on the chart. Also, if a dentist plans to do a restoration in a certain material but changes materials whilst doing the procedure, the planned treatment could get ticked on the chart in error without changing the material used. Ultimately, regardless as to the reason for the error, it is the dental professionals who are responsible and may be held accountable for those errors. Inaccuracy is not new but, unfortunately, the increase in legislation and regulation changes that have come about in the last 20 years appear to have done little to improve the accuracy of dental charts.

The implications of incorrect charting are numerous. Although this

study did not assess any treatment planned for a patient, if an error is made with charting the planned treatment, a dentist could end up restoring (or extracting) the wrong tooth, which certainly isn't in the patient's best interests and may lead to litigation. Other implications of charting errors may not be apparent quite so immediately. As part of its role, NHS Business Services Authority (NHSBSA) Dental Services is required to monitor dental claim submission data and take appropriate actions, where necessary, to enable assurance about the quality and probity of treatments provided under NHS arrangements. These further actions may involve NHSBSA Dental Services (Clinical services department) examining patients and reviewing patient records, including the dental charting, and the associated NHS dental claim forms. In the present study, 85 base charts (7.5%) had amalgam restorations charted as present, when in fact they were not. There was a similar but lesser finding for crowns (six records, 0.5%). This may be down to human error, but these sorts of findings might interest the BSA. If a dentist is claiming inappropriately, there may well be discrepancies either between the dental chart and the claim made, or between the dental chart and the patient's mouth. Also, if a practice is monitored or investigated regarding quality of care by the Local Area Teams or by the GDC, the standard of record-keeping may be brought into question. Good quality records will reflect well on a dentist and his/her practice, poor ones will not. Finally, and perhaps seldom considered by general dental practitioners, the dental chart and records can be used for forensic human identification. Errors in dental charts can lead to difficulties in establishing the identity of an unknown body. Forensic odontologists will try to use all the available information held in dental records, however, sometimes they are asked to help where there is little dental information available. The corresponding author to this study has, on one occasion, been asked to help identify a decomposed body where fingerprints and DNA were not appropriate for identification, but teeth and dental records were available. Unfortunately, the coroner had to be informed that insufficient dental information was

available in the dental records of the person who they thought the body to be. A recent dental examination had been claimed, yet a full dental chart had not been completed, the written records were scant, and no radiographs were available. This was an unsatisfactory outcome and identification was prolonged unnecessarily. Unfortunately, it is not unusual for forensic odontologists to experience errors with dental charting but, fortunately, they can usually establish an identity by examining the full records, and radiographs can be very useful.<sup>16</sup> This does not however make inaccurate dental charting acceptable.

### Conclusion

Dental charting is a basic part of every dental examination and there is a requirement for it to be recorded accurately. In comparison to earlier studies, this study shows that the accuracy of dental charting has not improved significantly, despite increased legislation and litigation, with 44% of dental charts that were studied being incorrect. The results of this study give recommendations that should already be ingrained into the daily routine of every general dental practitioner, and has been advised before, and that is to reinforce that dental base charts are checked and updated at every examination, and that treatment that is planned and completed be recorded on the chart contemporaneously, completely, concisely and clearly.

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