Dentists' perceptions of smart phone use in the clinical environment

S. Wright,*[1] G. Crofts,[1] T. C. Ucer[1] and S. D. Speechley[1]

Key points

- Suggests smart phones are a useful resource in clinical practice.
- Highlights possible distraction of mobile phones in surgery.
- Proposes better governance of mobile phone usage.

Objective To determine the use of smart phones in clinical practice and to determine the perceived impact on patient safety. **Study design** A closed questionnaire survey with an exploratory open question. **Setting, materials and methods** A questionnaire was sent to a sample of 216 delegates that have attended courses provided by an education provider in the North West of England between 2015–2017. **Results** There was a response rate of 49.5% which represented 107 returned questionnaires. The mean year of qualification is 2008. Of the respondents,105 were general dental practitioners, and two were hospital based dentists. Of the respondents, 82.2% had their smart phone in surgery, and of these 88% had the smart phone on silent, with the respondents on average receiving three texts, four emails and one call each session. Of the respondents, 40.9% were not aware that they received a text, 53.4% an email, and 37.5% a telephone call. Whilst 50.1% responded, in some way, to a text, 46.6% to an email and 62.5% to a telephone call. Of the respondents, 61.7% think that having a phone in the surgery is a distraction. Of the respondents, 20.7% stated that smart phones should not be allowed in the surgery under any circumstance, whilst 24.1% stated that they should be allowed if on silent and out of view, and 16.4% allowed their use but not in front of patients. **Conclusions** Eighty-eight percent of respondents had their smart phone with them in the surgery, with 61.7% reporting it to be a distraction from their clinical duties. It is our recommendation that each clinic has a protocol or policy that governs the use of smart phones focusing on patient safety.

Background

The Institute of Medicine 1999 report *To err is human*[1] highlighted that, as clinicians we will all commit errors. The impact of these errors is usually non-existent, or simply causes a minor inconvenience.[2] Since this report, worldwide research attention has been focused on patient safety leading to the World Health Organisation (WHO) publishing a conceptual framework for the International Classification for Patient Safety (ICPS) in 2009.[3]

This has instigated a body of research to develop strategies for a 'patient safety culture,[4] including the use of clinical audit,[5] safety checklists,[6] reporting of errors,[7,8] a national database of errors,[7,9] the NHS publishing the 'Never Events List' including wrong site surgery and wrong tooth extraction,[10] a call to action to develop a patient safety initiative,[11] the development of a novel trigger tool to detect adverse events in patients' charts,[12] a study on the dangers of dental devices,[13] and studies investigating the aetiology of error.[1]

This study wanted to investigate the attitude and frequency of smart phone usage in the clinical dental setting, to determine if their use could contribute to the aetiology of error and adverse events as defined by ICPS.

To date there are no studies on the use of smart phones in the dental setting, however, there is an emerging body of evidence regarding their usage in medicine and nursing. The validity of comparing medicine and dentistry is well established.[11,14]

The use of smart phones in the clinical setting distracts healthcare professionals[15] and disrupts patient care,[16] leading to errors and threatening patient safety.[15] A recent study in a teaching hospital reported 83.7% of clinic healthcare professionals have witnessed their colleagues using smart phones at work,[15] with 37% of clinicians responding to personal texts.[17]

Recent developments in smart phone and mobile technology, however, has led to these devices being a useful adjunct to the busy clinician. A cross-sectional multicentre study found clinicians have better access to resources at point of care decision-making when using a smart phone in the clinic.[18] Smart phones have also been used as a diagnostic aid, through utilising the camera and video capabilities.[19] As well as these functional aspects of the smart phone, apps also broaden their capability, supporting the application of teaching and learning in clinical practice.[20]

It is apparent that there are numerous benefits to this new mobile technology, particularly within the clinical teaching setting, however, there are also negative effects that

[1]School of Health Sciences, University of Salford
*Correspondence to: Prof Simon Wright
Email: portsunlight@btinternet.com

Refereed Paper. Accepted 23 March 2018
DOI: 10.1038/sj.bdj.2018.642

Official journal of the British Dental Association.

may compromise the safety of our patients.

It is therefore necessary to establish a robust protocol and formal policies governing the appropriate use of smart phones. A concept analysis has been reported, which has attempted to define the 'type of distraction' caused by smart phones, to aid research in developing such a protocol.[16] The first important stage to this process is to establish the usage of these devices.

The aim of this study was to determine the use of smart phones in clinical practice and to determine the perceived impact on patient safety.

Materials and methods

Study design

A structured questionnaire with open and closed questions was developed to survey a sample of 216 dentists. The aim of the survey was to determine the use of smart phones in clinical practice and to determine the perceived impact on patient safety.

To determine content validity the questionnaire was piloted on a sample of eight reviewers. Each review independently rated the relevance of each question using the 4-point Likert scale (1 = not relevant, 2 = somewhat relevant, 3 = relevant, 4 = very relevant). To determine internal consistency, reliability was tested using Cronbach's alpha.

Face validity was assessed by the same reviewers for clarity, ability for the target audience to answer the questions, relevance of the question to the study purpose, to measure what the question is intended to measure, layout and style.

Finally an exploratory subjective question was proposed to determine how any disturbance may be minimised.

Setting

A questionnaire was sent to a sample of 216 delegates that have attended courses provided by an education provider in the North West of England 2015–2017. The delegates were contacted by email, along with a PO Box address for the questionnaire to be returned by post anonymously. No ethical approval was required as this was a survey.

Survey

The delegates were asked to complete a questionnaire relating to smart phone usage (Appendix 1). Full instructions on how to complete the questionnaire were given.

The delegates were given the assurance of anonymity and confidentially, as well as confirmation that the questionnaire is totally voluntary. Clear and accurate contact details of who to approach for further information was also given.

No names were recorded, however, the year of qualification and the area of dentistry in which they practice was recorded (general practice, hospital, or specialist practice).

Main outcome measures

The responses from the questionnaire were analysed to determine the average number of disturbances that occur each day. The responses as to whether or not the smart phone is a distraction, and therefore compromises patient safety, were also compiled.

The open question 'What do you think should be included in a policy that governs smart phone use?' was analysed using textual analysis to develop themes, where the frequency of words and phrases was determined to identify dominant themes.

Results

Data collection

There was a response rate of 49.5% which represented 107 returned questionnaires.

The mean year of qualification was 2008, ranging from 1976 until 2017. One-hundred and five of the respondents were general dental practitioners, and two were hospital-based dentists.

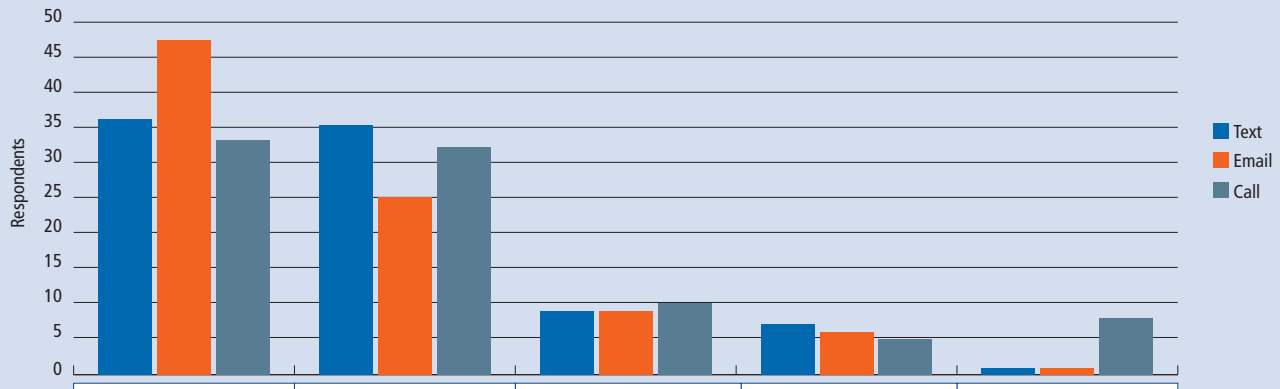
The mean number of sessions (3.5 hours) per week worked was nine, ranging from a minimum of one and maximum of 11. The median was eight.

Eighty-eight respondents (82.2%) had their phone in surgery, and of these, 78 (88%) had the smart phone on silent.

Table 1 shows the perceived number of texts, emails and telephone calls received each day, with the respondents on average receiving three texts, four emails and one call each session.

Figure 1 shows how these respondents perceived they acted when receiving a text, an email or a call. Thirty-six (40.9%) of the respondents were not aware that they received

Fig. 1 The way the respondents perceived to act when receiving a text, email or telephone call



	Not aware that you have	Ignore your phone and check later	Check your phone, but don't answer/reply	Answer/ reply	Ask a member of staff to answer/reply
Text	40.9%	39.8%	10.2%	8.0%	1.1%
Email	53.4%	28.4%	10.2%	6.8%	1.1%
Call	37.5%	36.4%	11.4%	5.7%	9.1%

Official journal of the British Dental Association.

Table 1 The perceived number of texts, emails and calls received each session

	Text	E-mail	Call
Range	0-20	0 -25	0-11
Average	3	4	1
Median	2	2	1

a text, 47 (53.4%) an email, and 33 (37.5%) a telephone call. Whilst 52 (50.1%) responded, in some way, to a text, 41(46.6%) to an email and 55 (62.5%) to a telephone call.

Sixty-six (61.7%) of the respondents thought that having a phone in the surgery was a distraction. Table 2 shows how frequently the respondents observed their colleagues using smart phones in the surgery. Twenty-eight (26.2%) of the delegates frequently observed dentists using smart phones in the surgery, whilst 26 (24.3%) frequently observed the nursing team.

Table 2 The number of respondents that observed colleagues using smart phones in the surgery

	Dentist using phone	Nurse using phone
Never	22.40%	19.60%
Sometimes	51.40%	56.10%
Frequently	26.20%	24.30%

Open questions

The responses to the question 'What do you think should be included in a policy that controls the use of mobile devices in dental clinics?' were collated and are presented in Table 3.

Twenty-four (20.7%) of the respondents stated that smart phones should not be allowed in the surgery under any circumstance, whilst 28 (24.1%) stated that they should be allowed if on silent and out of view, and 19 (16.4%) allowed their use but not in front of patients.

Table 3 What should be included in a mobile smart phone policy

Theme	Percentage of respondents suggesting theme (%)
Allowed in clinic on silent and not on display	24.1
Not allowed in clinic under any circumstance	20.7
Allowed in clinic but not to be used when patient present	16.4
Only to be used in emergency	9.5
Useful aid to clinical duties – app and camera	6.9
Dentist allowed to have phones in clinic but nurses not	5.2
Allowed in clinic but for work use only	5.2
They are a cross infection risk	2.6
Data protection issues regarding photographs	1.7
Educate the team about human factors	0.9
Details on how emergencies are dealt with if phones not allowed	0.9
Separate line for emergencies at practice if phones not allowed	0.9
Allowed only in extreme circumstances for example, expecting an emergency call	0.9
Use iPad for apps instead of a smart phone	0.9
Special breaks allowed for phone checking	0.9
Allowed – no restrictions	0.9
Not allowed for photographs of patients	0.9
Pt not allowed to use camera in the clinic	0.9

Eight (6.9%) stated that smart phones should be allowed for the use of the apps and camera.

Discussion

The medical and dental practitioner is not considered to be infallible, it is accepted that as human beings we will all make errors. A recent study concluded that dental practitioners make on average two errors per day, and that 1.4% of these errors leads to an adverse event where the patient could potentially be harmed.[21]

Errors are inextricably linked to human behaviour.[22–30] Therefore, the sentiment in medicine and dentistry is to focus on bad or defective systems rather than on the individual practitioner.[31,32] We are starting to accept our vulnerability and design systems and protocols to prevent errors from occurring.[33]

This study applied the principles of this strategy, to investigate if the use of mobile smart phones is a distraction in the clinic and may contribute to the aetiology of error. Then, if appropriate, aid the practitioner to design a system and protocol to control their usage.

This was effectively done by a self-reporting questionnaire. Self-reporting questionnaires have been used previously in dentistry with varying degrees of success.[34] However, all the respondents were given details on how to fill out the questionnaire to improve reliability.

Of the respondents, 82.2% had their phone in the dental surgery, although 88% of these had the phone on silent. This is consistent with other areas of medicine where 85% of resident doctors had their smart phones with them during ward rounds,[17] and 83.7% of third year nursing students witnessed nurses using smart phones in the clinic, at least sometimes, during the working day.[15]

The literature suggests a number of reasons why, as medical professions, we need to have access to the smart phone. A cross-sectional multi-centre study in Saudi Arabia concluded that 64.4% (65/101) of the respondents to their investigation used the smart phone as a primary form of medical communication, 82.2% (83/101) utilised the smart phone as an essential aid to drug and medical references, and 60.4% (61/101) for medical calculations.[18]

Specifically in dentistry, the camera on the smart phone has been shown to be a valuable aid for communicating with the technician and taking the shade of a tooth,[35] as well as for diagnosing traumatic injuries.[36] Smart phones have also been found to be useful resource for education and evaluating clinic skills.[37]

Official journal of the British Dental Association.

Having received an alert from the smart phone, 50.1% of respondents responded 'in some way' to a text, 46.6% to an email and 62.5% to a telephone call, meaning that they were distracted from their clinical duties. This occurred on average three times per session for a text, four for emails and once a session for a telephone call. The impact of this distraction was not recorded in this study.

To our knowledge there are no previous studies within dentistry, however, smart phones causing a distraction in medicine is well documented, with 24.7% of 312 nurses admitting being distracted by their phone during clinical practice,[15] and 58% of 92 doctors citing distraction as a major problem of having smart phones in the medical practice.[18] A further study of paediatric doctors reported 19% of resident doctors believed that they had missed important information due to the distraction of a smart phone.[17]

This study reported that 61.7% of the respondents thought that smart phones are a distraction to clinical duties. Despite this, 82.2% of respondents still had the smart phone present in the surgery. This may be related to the fact that there are no studies or case reports directly linking smart phones, or smart phone distractions to an adverse event. There are studies that show 69% of complications in medicine were caused by avoidable (cognitive) human factor error.[38]

A policy or protocol is therefore required in dentistry to allow clinicians, and our patients, to benefit from the technology of mobile smart phones, whilst not compromising patient safety.

This protocol needs to conform with regulation and the recommendations of the Defence Organisations.[39,40] The GDCs *Standards for dental professionals* guidance state a 'duty to keep information confidential'[41]and 'images must not be taken in absence of consent.'.[41] The Data Protection Act 1998 states that data needs to be secure.[42] Interpretation of this guidance advises against personal devices, including smart phones, to record and store patient data, and it advises against a 'work' smart phone being connected to sharing services for example, iCloud. Furthermore, if sending information to a colleague or a patient, a secure method needs to be utilised.

The final question asked the respondents to recommend the key inclusions of a policy relating to the use of smart phones in the clinic. The results are summarised in Table 3, however, 20.7% of the respondents stated that smart phones should not be allowed under any circumstances, perhaps suggesting that use of the camera and the apps is not essential. This is reinforced by only 6.9% of the respondents stating that smart phones should be allowed for this purpose.

The majority of respondents suggest a smart phone should be allowed if on silent and out of view, and not to be used when the patient is present.

This respects the dignity of our patients and mitigates against distraction, whilst allowing the smart phone to be used, if appropriate, for apps and the camera.

Conclusions

Implications for practice

This study demonstrated that 88% of respondents have their smart phone with them in the surgery, with 61.7% reporting it to be a distraction from their clinical duties.

This has major implications for primary care practice.

Colleagues are reminded that the use of mobile phones in the surgery should be restricted in compliance with the GDC standards regarding confidentiality, consent and the Data Protection Act 1988.

Appendix 1 Questionnaire

Table 1 Questionnaire

1/ Year of Qualification: _____

2/ Area of Practice:

General Practice ☐ Hospital ☐ Specialist Practice ☐

3/ Sessions (am, pm or evening) worked per week: _____

4/ Do you have your mobile phone with you during surgery hours?

Yes ☐ No ☐

IF YES:

A/ Is it on silent? Yes ☐ No ☐

B/ On average, how many notifications (ring, beep, vibration etc) do you think you get per session?

Text ☐

Email ☐

Calls ☐

C/ Typically when you receive a notification during surgery hours (Text, email, call) do you?

	Text	Email	Call
Not aware that you have.			
Ignore your phone and check later.			
Check your phone, but don't answer/reply.			
Answer/Reply			
Ask a member of staff to answer/reply.			

5/ Do you think that having a mobile phone in the surgery can be a distraction to clinical duties?

Yes ☐ No ☐

6/ Have you observed your clinical colleagues using mobile devices on the clinic?

DENTISTS:

Frequently ☐ Sometimes ☐ Never ☐

DENTAL NURSES:

Frequently ☐ Sometimes ☐ Never ☐

7/ What do you think should be included in a policy that controls the use of mobile devices in dental clinics?

Official journal of the British Dental Association.

Mobile phone use in the surgery by patients and members of the dental team can also be restricted by a locally-developed policy, deemed suitable for that environment. This may include 'smart phones, if allowed on the clinic, need to be on silent and not on view', and 'smart phones are not to be used whilst the patient is present'.

Implications for research

There is a benefit of mobile technology to aid our clinical decision making, education and evaluation of our peers, and communication. However, we cannot allow this technology to cause a distraction to clinical duties and decrease the safety of our patients.

We need to investigate the human factors role as to the reason why, when 61.7% of respondents think that the smart phone is a distraction, 88% had the phone with them in the surgery.

We need further research to understand how we can both integrate this technology whilst conforming with current guidance and human factors principles. A further prospective study investigating the use of 'work tablet computers' rather than smart phones may address the concerns of mobile devices, whilst allowing the technological benefits.

1. Kohn L T, Corrigan J M, Donaldson M S. To Err is Human – Building a safer health system'. Institute of Medicine US: National Academies Press, 2000.
2. Reason J. Human Error: Models and Management. *West J Med* 2000; **172:** 393–396.
3. World Health Organisation. Conceptual Framework for the International Classification of Patient Safety. 2009.
4. Pemberton M N. Developing patient safety in dentistry. *Br Dent J* 2014; **217:** 335–337.
5. Ashley M P, Pemberton M N, Saksena A, Shaw A, Dickson S. Improving patient safety in a UK dental hospital: long-term use of clinical audit. *Br Dent J* 2014; **217:** 369–373.
6. Saksena A, Pemberton N M, Shaw A, Dickson S, Ashley M P. Preventing wrong tooth extraction; experience in development and implementation of an outpatient safety checklist. *Br Dent J* 2014; **217:** 357–362.
7. Thusu S, Panesar S, Bedi R. Patient Safety in dentistry – state of play as revealed by a national database of errors. *Br Dent J* 2012; **213:** 669.
8. Obadan E, Ramoni R B, Kalenderian E. Lessons Learned from Dental Patient Safety Case Reports. *J Am Dent Assoc* 2015; **146:** 318–326.
9. Walji M F, Kalenderian E, Stark P C *et al.* BigMouth: a multi-institutional dental data repository. *J Am Med Inform Assoc* 2014; **21:** 1136–1140.
10. NHS England. Never Events List 2015/16. 2015. Available at https://www.england.nhs.uk/wp-content/uploads/2015/03/never-evnts-list-15-16.pdf (accessed May 2018).
11. Ramoni R, Walji M F, Tavares A *et al.* Open wide: looking into the safety culture of dental school clinics. *J Dent Educ* 2014; **78:** 745–756.
12. Kalenderian E, Walji M F, Tavares A, Ramoni R B. An adverse event trigger tool in dentistry: a new methodology for measuring harm in the dental office. *J Am Dent Assoc* 2013; **144:** 808–814.
13. Hebballi N B, Ramoni R, Kalenderian E *et al.* The dangers of dental devices as reported in the Food and Drug Administration Manufacturer and User Facility Device Experience Database. *J Am Dent Assoc* 2015; **146:** 102–110.
14. Ramoni R B, Walji M F, White J *et al.* From good to better: toward a patient safety initiative in dentistry. *J Am Dent Assoc* 2012; **143:** 956–960.
15. Cho S, Lee E. Distraction by smartphone use during clinical practice and opinions about smartphone restriction policies: A cross-sectional descriptive study of nursing students. *Nurse Educ Today* 2016; **40:** 128–133.
16. McBride D L. Distraction of clinicians by smartphones in hospitals: a concept analysis. *J Adv Nurs* 2015; **71:** 2020–2030.
17. Katz-Sidlow R J, Ludwog A, Miller S, Sidlow R. Smartphone use during inpatient attending rounds: prevalence, patterns, and potential for distraction. *J Hosp Med* 2012; **7:** 595–599.
18. Jamal A, Temsah M H, Khan Sa, Al-Eyadhy A, Koppel C, Chiang M F. Mobile Phone Use Among Medical Residents: A Cross-Sectional Multicentre Survey in Saudi Arabia. *JMIR Mhealth Uhealth* 2016; **19:** 4.
19. Esenther B, Ko R. Smartphones in the operating room: Distraction or Diagnostic Aid? A Case of Newly Diagnosed Wolff-Parkinson White in a Pediatric Patient Having Bronchoscopy Under General Anesthetic. *A A Case Rep* 2015; **5:** 40–42.
20. O'Connor S, Andrews T. Nursing Students' Opinion on the Use of Smartphone Applications (Apps) in Clinical Education and Training: A Study Protocol. *Stud Health Tehnol Inform* 2016; **225:** 1024–1025.
21. Wright S, Ucer T C, Speechley S D. The perceived frequency and impact of adverse events in dentistry: The need for further training in human factors. *Faculty Dent J* 2018; **9:** 14–19.
22. Leape L L. Error in medicine. *JAMA* 1994; **272:** 1851–1857.
23. Leape L L. Out of the darkness: hospitals begin to take mistakes seriously. *Health Syst Rev* 1996; **29:** 21–24.
24. Leape L L. Physician self-examination. *Int J Qual Health Care* 1998; **10:** 289–290.
25. Berwick D M, Leape L L. Reducing errors in medicine. *Qual Health Care* 1999; **8:** 145–146.
26. Leape L. Lucian Leape on the causes and prevention of errors and adverse events in health care. Interview by Peter I. Buerhaus. *Image J Nurs Sch* 1999; **31:** 281–286.
27. Cullen D J, Bates D W, Leape L L. Prevention of adverse drug events: a decade of progress in patient safety. *J Clin Anesth* 2000; **12:** 600–614.
28. Leape L L. Reporting of medical errors: time for a reality check. *Qual Health Care* 2000; **9:** 144–145.
29. Bates D W, Cohen M, Leape L L. Reducing the frequency of errors in medicine using information technology. *J Am Med Inform Assoc* 2001; **8:** 299–308.
30. Leape L L. The godfather of patient safety sees progress. Interview by Mark Crane. *Med Econ* 2003; **80:** 29–30, 33–34.
31. Leape L L. Errors in medicine. *Clin Chim Acta* 2009; **404:** 2–5.
32. Weingart S N, Morway L, Brouillard D *et al.* Rating recommendations for consumers about patient safety: sense, common sense, or nonsense? *Jt Comm J Qual Patient Saf* 2009; **35:** 206–215.
33. Wright S, Crofts G, Ucer T C, Speechley S D. Errors and Adverse Events in Dentistry – A Review. *Dent Update* 2017; **44:** 979–982.
34. Gilbert A D, Nuttall N M. Self-reporting of periodontal health status. *Br Dent J* 1999; **186:** 241–244.
35. Tam W K, Lee H J. Accurate shade imaging matching by using the smart phone camera. *J Prosthodont Res* 2017; **61:** 168–176.
36. Almeida Geladino R, Rezende L V M L, da-Silva C Q, Almeida J C F. Remote diagnosis of traumatic dental injuries using digital capture via a mobile phone. *Dent Tramatol* 2017; **33:** 350–357.
37. Kaban L B, Cappette A, George B C, Lahey E T, Bohnen J D, Troulis M J. Evaluation of Oral and Maxillofacial Surgery Residents Operative Skills: Feasability and Engagement Study using SIMPL Software for a mobile phone. *J Oral Maxilloac Surg* **75:** 2041–2047.
38. Swaminat G, Raguram R. Medical Errors – The problem. *Indian J Psychiatry* 2010; **52:** 110–112.
39. Lauder D. Clinical photos on mobile phones. DDU Journal. Available at https://ddujournal.theddu.com/issue-archive/summer-2017/clinical-photos-on-mobile-phones (accessed May 2018).
40. Dental Protection. Principle 4: Maintain and protect patients' information. Available at https://www.dentalprotection.org/uk/publications-resources/updates/gdc-standards-faqs/principle-4-maintain-and-protect-patients%27-information (accessed May 2018).
41. General Dental Council. Standards and guidance. Available at https://www.gdc-uk.org/professionals/standards (accessed May 2018).
42. The Stationery Office. Data Protection Act 1998. 1998. Available at http://www.legislation.gov.uk/ukpga/1998/29/contents (accessed May 2018).

Official journal of the British Dental Association.