



Teaching of gerodontology to dental and dental hygiene therapy students in the UK

Georgina M. Prosser,¹ David R. Radford¹ and Chris Louca¹ review the training in gerodontology currently being provided to undergraduate dental and dental hygiene and therapy students in the UK, particularly in relation to the requirements of an ageing population.

Abstract

Introduction The demographic shift in the age profile of the UK is now well established. Older people have more complex requirements to maintain their oral health and appropriate training is required to provide good-quality oral and dental care. This research aimed to review the training in gerodontology currently being provided to undergraduate dental and dental hygiene therapy (DHT) students in the UK.

Methods Quantitative data were generated through completion of an online questionnaire, emailed to the directors of dental education in each of the UK dental (n = 16) and DHT schools (n = 21). Data were

analysed using IBM SPSS Statistics V26.

Results There was a response rate of 37.5% from dental schools and 61.9% from DHT schools. Although gerodontology was being taught in every school that responded, it was only a standalone course in 16.7% of dental schools and 7.7% of DHT schools that responded. While all respondents reported a theoretical component, only 50% of dental schools and 53.8% of DHT schools reported providing clinical experience. Moreover, 33.3% of dental schools and 15.4% of DHT schools reported closely following the European curriculum guidelines in gerodontology.

Conclusions The current training in gerodontology is not standardised across either dental or DHT schools in the UK and there seems to be a lack of awareness of the recommended European guidelines. The findings from this research demonstrate that future improvements in gerodontology training are still required for this to be achieved.

Introduction

In most developed countries, including the UK, the age profile of the population is shifting, with an increasing percentage of the population aged 65 and over (Fig. 1).¹ This is due to a decrease in birth rates combined with increased life expectancy.² In these developed countries, the proportion of older people is increasing more than any other age group.³ Older people are often categorised as being above a certain age; the Office for National Statistics for example quote data on those aged 65 and over.¹ Although this categorisation based on age can be useful for understanding trends, people biologically age at different rates and so 'significant differences exist in the age people consider to be old and the loss of functional ability typically associated with ageing is only loosely related to chronological age'.⁴

In developed countries, it has been reported that there is a higher prevalence of denture-related conditions (most commonly, denture-related stomatitis), root surface caries, periodontal disease, drug-induced

Author information

¹University of Portsmouth Dental Academy, Portsmouth, PO1 2QG, UK.



Fig. 1 The past and predicted demographic shift in the age profile of the UK in selected years. Adapted from Office for National Statistics¹

xerostomia, oral pre-cancer and oral cancer.⁵ These oral diseases can contribute to reduced chewing ability, constrained food choices, weight loss, impaired communication and low self-esteem, which have all been reported to reduce the quality of life.⁶ Oral health tends to be particularly suboptimal in the medically compromised and functionally dependant older adults and it has been similarly reported that neglected oral hygiene and tooth loss may increase morbidity.⁷

In countries with a higher socioeconomic status there is also increased tooth retention in older adults.³ With a higher number of natural teeth more likely to be involved in the restorative cycle for many years, the complexity of dental treatment increases and extends beyond the management of caries and periodontal disease to tooth wear rehabilitation, treatment of pulpal and periapical pathology and advanced prosthodontics, including implant-retained prostheses.⁸

Suboptimal oral health and complex treatment needs are not the only challenges. Oral diseases remain prevalent and underdiagnosed because older adults often do not receive routine dental care due to numerous barriers and misconceptions. These barriers can be divided into three categories: patient-related, professional-related and policy-related. According to Kossioni *et al.*,⁹ the patient-related barriers include

‘Oral health tends to be particularly suboptimal in the medically compromised and functionally dependant older adults and it has been similarly reported that neglected oral hygiene and tooth loss may increase morbidity.’

health, psychological considerations and sociocultural factors. The lack of support from dental professionals is reported as another barrier and is blamed on the limited training in the dental care of older adults. The barriers related to policies in this expert opinion paper are more varied and include ‘a low priority for oral healthcare, limited dental care coverage, costly treatments, a lack of domiciliary dental care and finally, unsupportive care systems for functionally dependant individuals’. This final barrier specific to functionally dependant older adults is mentioned in various reports, including the Care Quality Commission’s Smiling matters report, which revealed that 73% of care plans in care homes only partly covered or did not cover oral health, 52% had

no policy to promote and protect people’s oral health, 47% of staff were not trained to support daily oral healthcare and that it could be difficult for residents to access dental care.¹⁰

Owing to the clear increase in the number of older people, it is imperative that dental professionals are well-trained and competent in managing this demographic.¹¹ The term ‘dental professional’ encompasses many dental roles; however, for the purpose of this research, it refers to dentists and dental hygiene therapists only. The educational goal of gerodontology, the branch of dentistry concerned with the dental care of older adults, has been defined as ‘to raise awareness of barriers to care and to prepare dental students, in terms of

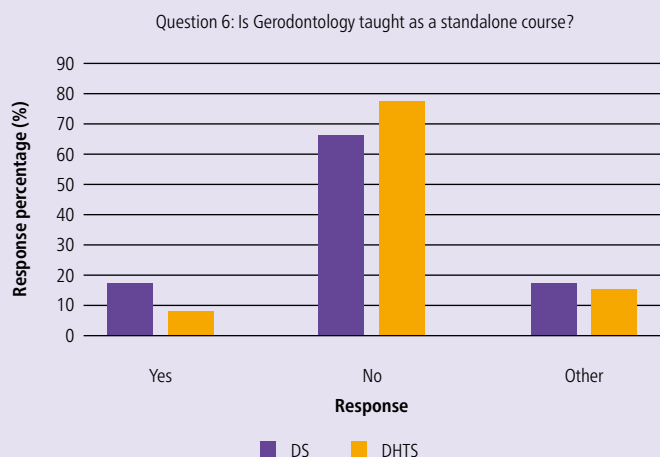


Fig. 2 The responses to question 6 in both questionnaires

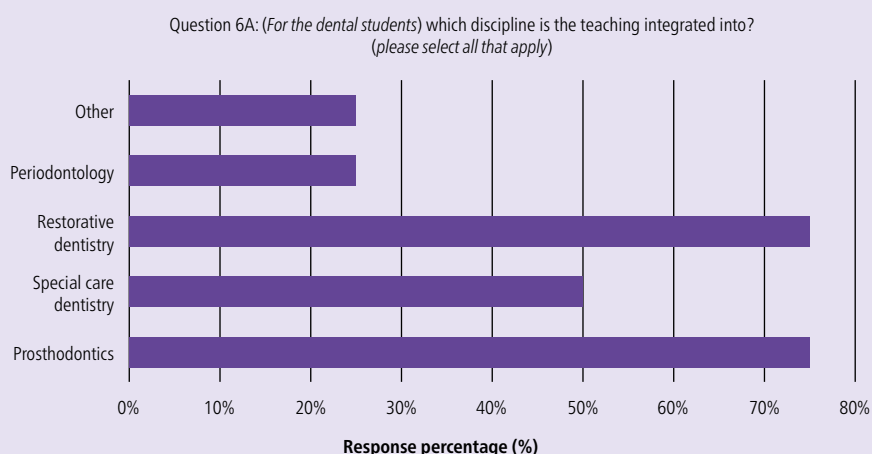


Fig. 3 The responses to question 6A in the questionnaire for dental students

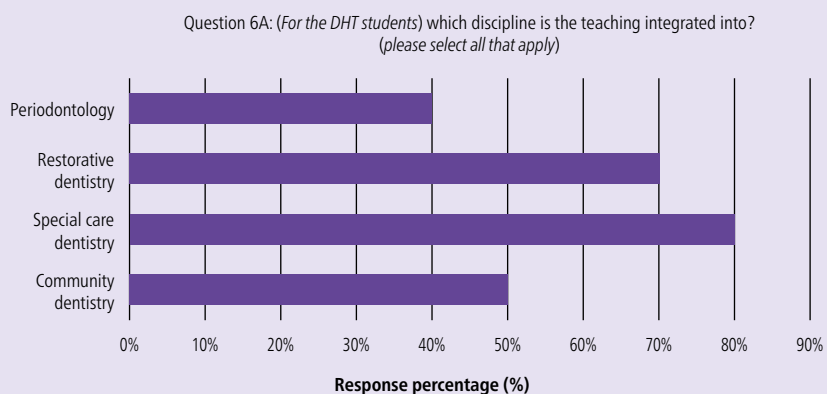


Fig. 4 The responses to question 6A in the questionnaire for DHT students

knowledge, attitudes, ethics and skills, to provide appropriate oral health care for the older adults.⁷

Gerodontology, therefore, is becoming increasingly important to dental professionals. Although limited, global research has investigated the current standard of training in gerodontology. One key study reported that while 92.8% of dental schools in the USA had a required course in geriatric dentistry, the treatment of frail, functionally dependent adults was limited and the curriculum varied among the schools.¹² A second study found that although 86.2% of European dental schools teach the subject to undergraduates, there still needs to be improvements in ‘care of frail older adults, interdisciplinary and inter-professional training, educational collaborations and use of modern technologies’.¹³ The guidelines which this study benchmarked against were the European College of Gerodontology (ECG) undergraduate curriculum guidelines in gerodontology.⁷ These guidelines have been included in the ‘Profile and competences for the graduating European dentist – update 2009’ published by the Association for Dental Education in Europe.¹⁴

In a more recent study, the training of dental students in India and several other countries were compared against these ECG guidelines and the American Dental Education Association¹⁵ guidelines and it concluded that while gerodontology appears to be relatively well-established in Europe and America, further improvements, especially in India, are required.¹⁶ Similarly, another recent international scoping review of the literature highlighted the need for further national and international guidelines to ensure mandatory inclusion of specific training in gerodontology. The same review reported large variations in the current training,¹⁷ as did Xavier *et al.*, who also concluded that the treatment of geriatric patients by dental students is still very limited.¹⁸

In the UK, dental schools are required to cover specific learning outcomes for each of the professions registered by the General Dental Council (GDC) and these are outlined in the Preparing for practice document.¹⁹ In this document, generic learning outcomes were described for the whole dental team rather than treatment requirements for specific patient groups.

Although the dental schools in the UK responsible for training dental students have been included in these global studies,^{12,13,16,17,18} there is a lack of contemporary research summarising the current standard of

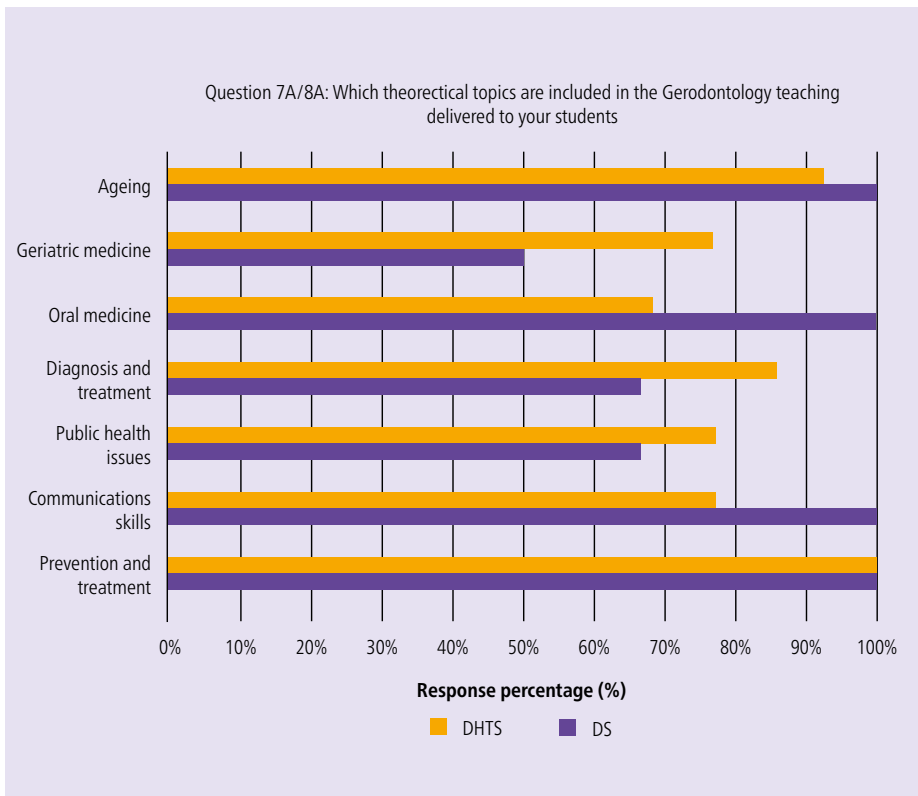


Fig. 5 The responses to question 7A in the questionnaire for dental students and 8A in the questionnaire DHT students

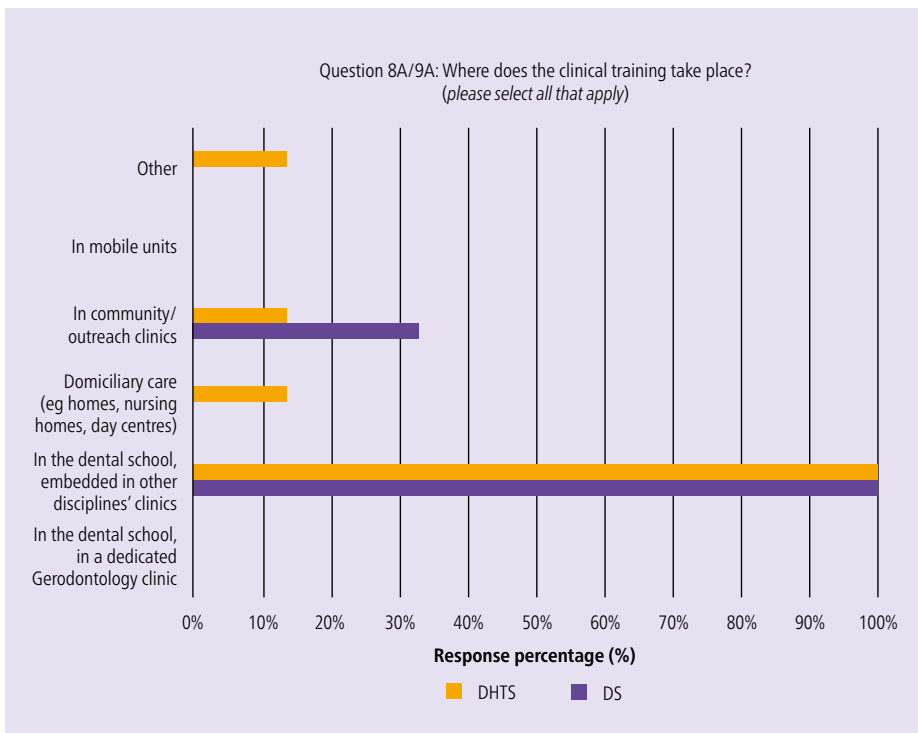


Fig. 6 The responses to question 8A in the questionnaire for dental students and 9A in the questionnaire DHT students

gerodontology training delivered solely by UK dental schools. Research focusing on the training delivered to dental hygiene therapy (DHT) students internationally is very limited and does not appear to have been reported in the UK. This research, therefore, aimed

to investigate the training in gerodontology currently being provided to undergraduate dental and DHT students in the UK and to compare the training against the guidelines published by Kossioni *et al.* in 2009.⁷

Methods

An online questionnaire was devised based on the validated questionnaire used by Kossioni *et al.* (2017)¹³ and piloted with three dental academics. The questionnaire for both the dental and DHT students and the results for each question can be seen in the online supplementary information. Questions one and two are not listed, as question one gained consent for the questionnaire and question two asked for the name of the dental school. The questionnaire investigated the structure of training and available facilities, the teaching methodology and the process and criteria for the assessments. This was to ensure the comparability of results to previous research and current European curriculum guidelines. Ethical approval was gained from the University of Portsmouth (SHFEC 2021-002).

Via Online Surveys (Jisc, Bristol, UK), the questionnaire was sent to the directors of dental education in each of the 16 dental and 21 DHT schools responsible for training these dental professionals. A follow up email was sent two weeks after the original email to all the individuals who had not yet responded. The questionnaire opened in February 2021 and closed a month later in March. The data were analysed descriptively using IBM SPSS Statistics version 26 (IBM Corp, 2019, Armonk, NY).

Results

There was a response rate of 37.5% from schools responsible for training dental students (n = 6) and 61.9% from schools responsible for training DHT students (n = 13) and the results for each of the questions can be seen in the online supplementary information. All responding dental and DHT schools reported that gerodontology was being taught at the undergraduate level to their students. The dental students were predominately taught the subject in the final years of their degree and for half (50%) this was in the fifth year. There were similar findings from the DHT schools where gerodontology was predominately taught in the later years of their three-year degree and for over half, (53.8%) this was in the third year (or at Level 6 of a Bachelor of Science programme).

In the majority of responding dental (66%) and DHT (76.9%) schools, gerodontology was not taught as a standalone course (Fig. 2). As seen in Figure 3, for dental students, the most common disciplines that the teaching was integrated into were restorative dentistry (75%) and prosthodontics (75%), followed by special care dentistry (50%). It was also included within the teaching of oral medicine (25%). For DHT students, gerodontology teaching was embedded in special care

dentistry (80%), restorative dentistry (70%) and in approximately half of schools, it was taught within community dentistry (50%) and periodontology (40%) (Fig. 4).

All respondents (100%) reported a theoretical component of gerodontology teaching. Several topics were included within this (Fig. 5), with 100% of responding dental schools reporting the inclusion of ageing, oral medicine, communication skills and prevention and treatment. All responding DHT schools (100%) reported inclusion of prevention and treatment, followed by diagnosis and treatment planning (84.6%), with the fewest reporting oral medicine (69.2%).

For all responding dental schools, the theoretical content was delivered through lectures (100%) accompanied by e-learning (66.7%) and information embedded in other courses (66.7%) and for half of schools, through seminars (50%). One school reported using case-based discussions. For DHT, the theoretical content of gerodontology was delivered through lectures (92.3%) and in 53.8% this was accompanied by seminars and in a smaller number of schools, through information embedded in other courses (38.5%) and e-learning (30.8%). Some schools also reported the use of workshops, clinical placement visits and case-based learning.

Only half (50%) of the responding dental schools reported a clinical component to the gerodontology teaching. As seen in Figure 6, in the dental schools this was embedded in other disciplines' clinics (100%), as well as community and outreach clinics (33%). Similarly, only 53.8% of the responding DHT schools reported a clinical component and again, this was embedded in other disciplines' clinics (100%) and in community, outreach and domiciliary care (14.3%).

While all respondents in both questionnaires reported to closely follow the GDC requirements for dental care professionals before registration, when asked specifically about adherence to the European College of Gerodontology undergraduate curriculum guidelines in gerodontology, only one-third (33.3%) of responding dental schools reported to closely follow them. Another third (33.3%) reported that they did not and some opted for 'other', giving explanations of 'don't know' or 'would not say closely follow'. Adherence was even less for DHT schools, with just 15.4% of respondents reporting to closely follow the European guidelines and 69.2% reported that they did not do so.

Discussion

Although the dental schools in the UK

responsible for training dental students were included in the Preshaw and Mohammad (2005)²⁰ and Kossioni *et al.* (2017)¹³ studies, as they both investigated all dental schools in Europe, they did not report specific information on the standard of training in the UK alone. This was purposefully the case in Kossioni *et al.*,¹³ as they only provided details on countries with a response rate greater than 70%. The UK response rate was only 58.8% (10 out of the 17 invited UK dental schools). Therefore, this research was conducted first to fill this gap and second, to see if any improvements in training and education in gerodontology have been made since the original studies were conducted in Europe (Preshaw and Mohammad 2005),²⁰ (Kossioni *et al.* 2017)¹³ and the USA (Ettinger *et al.* 2018).¹²

gerodontology department responsible for training is desirable; however, none of the responding dental or DHT schools in this current study had a specific gerodontology department. This finding differs from that of Kossioni *et al.* (2017) who found that 17.1% of responding European schools did have a specific department, although they did not specify the schools or countries.¹³ As gerodontology is not a recognised speciality in Europe or the USA, this might explain why it is generally included in various other recognised disciplines, including restorative, prosthodontics and special care dentistry. In a recent editorial piece, the author made the case that it is time for gerodontology to become an 'inclusive interdisciplinary hospital speciality' and for there to be dedicated clinical training in this area.²¹ As the proportion

*'The ECG curriculum guidelines state that the training should be offered throughout undergraduate studies; however, in this study, both the dental students and DHT students were taught the subject predominantly in the last year of their training.'*⁷

In this current study, the response rate of 37.5% from schools responsible for training dental students (6 out of the 16 invited UK dental schools) was disappointing, especially considering the response rate of 85.7% (12 out of 14 invited UK dental schools) in the study by Preshaw and Mohammad (2005)²⁰ and even the 58.8% in the Kossioni *et al.* (2017)¹³ study. The response rate of 61.9% from schools responsible for training DHT students was more satisfactory. All responding dental and DHT schools reported that gerodontology was being taught at the undergraduate level to their students, which is in line with the recommendations from the ECG guidelines that state that it should be mandatory (Kossioni *et al.* 2009).⁷ This finding is encouraging, as some previous European studies have reported the teaching of gerodontology in only 86.2% (Kossioni *et al.* 2017)¹³ and 93% (Preshaw and Mohammad 2005)²⁰ of responding schools. Ettinger *et al.* (2018) reported that all the responding dental schools in the USA taught didactic geriatric dentistry in the pre-doctoral programmes.¹²

The European guidelines advise that a

of older adults within the population continues to increase, it is time that thought is given to developing gerodontology as an inclusive interdisciplinary hospital speciality and providing dedicated clinical training.

The ECG curriculum guidelines state that the training should be offered throughout undergraduate studies; however, in this study, both the dental students and DHT students were taught the subject predominantly in the last year of their training.⁷ Interestingly, this finding differs from that of Ettinger *et al.* (2018) who reported that the majority (59%) of dental students were taught in the third year, followed by the fourth year (19%) and the second year (19%).¹²

Alongside the theory, a well-defined lecture series emphasising the interdisciplinary nature of gerodontology delivered by specialist staff from the different fields was suggested in the ECG guidelines.⁷ In this study, most dental educators responsible for delivering the gerodontology training to the DHT students were dentists (84.6%), followed by dental hygiene therapists (69.2%), then hygienists (30.8%). Only one respondent reported it was

also delivered by general nursing colleagues and another by external sources, although exact details were not specified. As oral diseases share common risk factors with other chronic diseases, an interdisciplinary management approach between dental and other healthcare professionals has been stated to yield better outcomes for oral and general health.²²

An element of clinical training is also recommended by the ECG guidelines, which state that a gerodontology clinic is desirable to effectively meet patients' needs. Clinical training in community settings, nursing homes, private homes and geriatric hospitals are also recommended.⁷ In this current study, however, only half of the responding dental and DHT schools reported a clinical component and this was mostly within the dental school setting within other disciplines' clinics. Although Preshaw and Mohammad (2005) also reported a clinical component in only 61% of schools, 18% had a specific gerodontology clinic and 29% provided additional clinical training outside of the dental school.²⁰ Similarly, Kossioni *et al.* (2017) reported clinical teaching in 64.2% of respondents, with 26.8% reporting training in outreach facilities including nursing homes, geriatric hospitals, patients' homes and geriatric day centres.¹³ Ettinger *et al.* (2018) also reported a similar level of clinical education in gerodontology in only 57.1% of schools.¹² Although the study by Preshaw and Mohammad (2005) was conducted more than 15 years ago, the findings from the current study are very similar, if not worse in this area, indicating that even with the introduction of a thorough set of guidelines, training in gerodontology is still not at the required standard and not satisfactory for future needs.²⁰ Similarly, although both the Kossioni *et al.* (2017)¹³ and Ettinger *et al.* (2018)¹² studies were conducted only a few years ago, there have not been many changes following their recommendations; specifically in the care of frail and functionally dependant older people, older adults in the community setting, domiciliary care and interdisciplinary and inter-professional training. This may be due to an overcrowded curriculum that has been previously reported in UK dental schools.²³

As this appears to be the first study of its kind, there is no existing research to compare the findings from the DHT study. There does not appear to be separate guidelines for the education and training of DHTs, and while most of the guidelines can be interpreted as relevant to both student types, issues such as polypharmacy and prescribing, prosthodontic evaluation and management of tooth surface

loss are beyond the GDC-specified DHT scope of practice. The fact that the ECG guidelines do not mention DHT students could explain the slightly lower adherence to them, reported by DHT schools (15.4%), in comparison to dental schools (33.3%). As previously mentioned, the GDC guidelines are generic to dental care across all patient groups.¹⁹ While all respondents in both questionnaires reported to closely follow the GDC requirements before registration, the interpretation of these learning outcomes could explain the variations seen in the teaching of the subject and so, the addition of further detail on the curriculum requirements for older adults, based on the ECG curriculum,⁷ in this GDC document could standardise and improve the quality of gerodontology teaching in the UK.¹⁹

however, there appeared to be greater innovation in the DHT schools, with some schools reporting additional workshops: in one case, an inter-professional workshop with the school of pharmacy, clinical placement visits and for another school, engagement with the Caring for smiles programme.²⁴ One DHT school also reported case-based learning, as did one dental school, which the former reported as inter-professional as it was shared with pharmacy and DHT students. The ECG guidelines appear to favour this type of innovation as they suggested that suitable teaching methods and assessments included 'patient management problems, presentation of clinical cases, electronic portfolios and audio-visual recordings'.⁷

'DHT schools also included geriatric medicine as a theoretical topic more commonly than dental schools, which perhaps again indicates a greater focus on frailer older adults with comorbidities in DHT schools than in dental schools.'

While there were no significant differences in the training of dental students in comparison to DHT students in this study, there were subtle variations. Where there was not a standalone course, the theoretical component of gerodontology training for the DHT students was integrated into special care dentistry in 80% of the schools, compared to 50% of dental schools. This might indicate a difference in attitude in relation to older adults between educators from a dental and a DHT background and whether they fit into the special care patient category or an adult group requiring restorative treatment. DHT schools also included geriatric medicine as a theoretical topic more commonly than dental schools, which perhaps again indicates a greater focus on frailer older adults with comorbidities in DHT schools in comparison to dental schools. Conversely, this topic may have already been addressed in the more comprehensive education in human diseases that is delivered to dental students.

The theoretical component in both dental and DHT schools was delivered mostly by lecture, followed by e-learning and seminars;

An online questionnaire was utilised in this study, as the participant sample was widely distributed geographically and they can be disseminated in high quantities concurrently. Other advantages include the absence of interviewer effects resulting in reduced social desirability bias and convenience for the participants.²⁵ There was, however, a response rate of only 37.5% from the dental schools and 61.9% from the DHT schools; therefore, selection bias is likely to be present. There was also some difficulty in identifying the directors of dental education and their contact details as many of the school websites were not up-to-date. We did ask for the email to be forwarded on to the appropriate person and in a few cases this did happen. This might also account for the low response rates in this study, especially from the dental schools. Kossioni *et al.* (2017) shared a similar methodology and participant recruitment; however, they utilised a multi-mode approach to increase the response rate including the use of repeated email reminders, telephone calls and exploitation of personal networks to identify potential contact persons.¹³ This intensive and personalised follow-up

approach is likely to be responsible for the 20% higher response rate (58.8%) in their study, as we in comparison only sent one follow-up email two weeks after the first. We also requested participants to self-report the structure and content of training and so the answers may be subject to recall bias.

Conclusion

Within the limitations of the study, the findings from this research demonstrate that the current training in gerodontology is not standardised across dental schools in the UK in either dental or DHT education. Although it is encouraging that all responding schools reported the inclusion of gerodontology in the curriculum, only half reported a clinical component and this was usually in the dental schools embedded in other clinical disciplines, as opposed to within a community or domiciliary care setting or mobile units. This means that opportunities in the management of frail, dependant older adults will be limited. There also appears to be poor awareness of and adherence to the ECG curriculum guidelines, especially within DHT schools and minimal changes following the recommendations from previous recent studies conducted by Kossioni *et al.* (2017)¹³ and Ettinger *et al.* (2018).¹²

It is clear that there is a growing need for enhanced training and education in gerodontology, particularly in the care of frail, dependant older adults in settings other than the dental hospital and more inter-professional and intra-professional training in order to achieve the multidisciplinary care required by this demographic. An improved awareness of the ECG curriculum guidelines published by Kossioni *et al.* (2009)⁷ alongside a more detailed, specific learning outcome in the GDC's Preparing for practice document,¹⁹ especially for older adults, may help to achieve this important, time-sensitive objective.

Ethics declaration

The authors declare that there are no conflicts of interest.

Author contributions

Georgina M. Prosser, David R. Radford and Chris Louca all contributed to the design of the research, to the analysis of the results and to the writing of the manuscript.

This article was originally published in the *BDJ* on 10 June 2022 in Volume 232 pages 813 to 818.

References

- Office for National Statistics. Living longer: how our population is changing and why it matters. 2018. Available at <https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/ageing/articles/livinglongerhowourpopulationischangingandwhyitmatters/2018-08-13> (accessed November 2020)
- Thomson W M, Ma S. An ageing population poses dental challenges. *Singapore Dent J* 2014; DOI: 10.1016/j.sdj.2014.10.001.
- Petersen P E, Yamamoto T. Improving the oral health of older people: the approach of the WHO Global Oral Health Programme. *Community Dent Oral Epidemiol* 2005; **33**: 81–92.
- British Medical Association. Growing older in the UK: A series of expert-authored briefing papers on ageing and health. 2016. Available at <https://www.bma.org.uk/media/2105/supporting-healthy-ageing-briefings-final.pdf> (accessed July 2021).
- Petersen P E, Ogawa H. Promoting Oral Health and Quality of Life of Older People – The Need for Public Health Action. *Oral Health Prev Dent* 2018; **16**: 113–124.
- Petersen P E, Kandelman D, Arpin S, Ogawa H. Global oral health of older people – call for public health action. *Community Dent Health* 2010; **27**: 257–267.
- Kossioni A, Vanobbergen J, Newton J, Muller F, Heath R. European College of Gerodontology: undergraduate curriculum guidelines in gerodontology. *Gerodontology* 2009; **26**: 165–171.
- Burke F M, Mckenna G. Gerodontology: Now and the Future. *Dent Update* 2010; **37**: 448–450.
- Kossioni A, Hajto-Bryk J, Maggi S *et al.* An expert opinion from the European College of Gerodontology and the European Geriatric Medicine Society: European policy Recommendations on Oral Health in Older Adults. *J Am Geriatr Soc* 2018; **66**: 609–613.
- Care Quality Commission. Smiling matters: Oral health care in care homes. 2019. Available at https://www.cqc.org.uk/sites/default/files/20190624_smiling_matters_full_report.pdf (accessed December 2021).
- Levy N, Goldblatt R S, Reisine S. Geriatrics education in U.S. dental schools: where do we stand, and what improvements should be made? *J Dent Educ* 2013; **77**: 1270–1285.
- Ettinger R L, Goettsche Z S, Qian F. Curriculum content in geriatric dentistry in USA dental schools. *Gerodontology* 2018; **35**: 11–17.
- Kossioni A, Mckenna G, Muller F, Schimmel M, Vanobbergen J. Higher education in Gerodontology in European universities. *BMC Oral Health* 2017; DOI: 10.1186/s12903-017-0362-9.
- Cowpe J, Plasschaert A, Harzer W, Vinkka-Puhakka H, Walmsley AD. Profile and competences for the graduating European dentist - update 2009. *Eur J Dent Educ* 2010; **14**: 193–20
- American Dental Education Association. Oral Health for Independent Older Adults: ADEA/GSK Predoctoral Curriculum Resource. Available at <https://www.adea.org/publications/Documents/CurriculumResourceGuide.pdf> (accessed December 2021).
- Shigli K, Nayak S S, Jirge V, Srinagesh J, Murthy V, Gali S. Current status of gerodontology curriculum in India and other parts of the world: A narrative review. *Gerodontology* 2020; **37**: 110–131.
- Nilsson A, Young L, Glass B, Lee A. Gerodontology in the dental school curriculum: A scoping review. *Gerodontology* 2021; **38**: 325–337.
- Xavier I, Ettinger R L, Proença L *et al.* Geriatric Dentistry Curriculum in Six Continents. *Int J Environ Res Public Health* 2020; DOI: 10.3390/ijerph17134682.
- General Dental Council. Preparing for practice: Dental team learning outcomes for registration. 2015. Available at <https://www.gdc-uk.org/docs/default-source/quality-assurance/preparing-for-practice-%28revised-2015%29.pdf> (accessed August 2021).
- Preshaw P M, Mohammad A R. Geriatric dentistry education in European dental schools. *Eur J Dent Educ* 2005; **9**: 73–77.
- McKenna G. Gerodontology: Time to Think Again. *Prim Dent J* 2020; **9**: 2–3.
- Meurman J H, Mckenna G, Murtomaa H *et al.* Managing Our Older Population: The Challenges Ahead. *J Dent Res* 2018; **97**: 1077–1078.
- Hong B, Plugge E. Critical appraisal skills teaching in UK dental schools. *Br Dent J* 2017; **222**: 209–213.
- Public Health Scotland. Caring for Smiles: Guide for care homes. 2020. Available at <https://www.scottishdental.org/wp-content/uploads/2021/08/Caring-for-smiles-Guide-for-Care-Homes-2020.pdf> (accessed May 2022).
- Bryman A. *Social Research Methods*. 4th ed. Oxford: Oxford University Press, 2012.

<https://doi.org/10.1038/s41407-022-1604-5>