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PERSPECTIVE

Teaching of magnification in the undergraduate curriculum: A position statement from the British Endodontic Society Teachers of Endodontology Group

on behalf of the British Endodontic Society Teachers of Endodontology Group | W. McLean¹ A. J. E. Qualtrough²

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BACKGROUND

The British Endodontic Society (BES) aims to promote and advance the subject of endodontology with the goal of maintaining and improving the dental and overall health of the general population. The society is cognizant of the importance of undergraduate and postgraduate education in achieving this aim. The BES Teachers of Endodontology Group is affiliated to the BES and comprised of teachers with an interest in teaching endodontics to undergraduate dental students in the United Kingdom and Ireland. The use of magnification in undergraduate endodontics in the United Kingdom and Ireland was considered and

in the United Kingdom and Ireland was considered and the preparation of this position statement agreed, at a BES Teachers of Endodontology Group meeting, with representatives from 17 dental schools from the United

Abstract

This position statement on undergraduate teaching on the use of magnification in endodontics represents the consensus of the British Endodontic Society Teachers of Endodontology Group. Current clinical and scientific evidence, as well as the expertise of the committee, has been used to develop this statement. The contributors to this position statement consider, as a minimum requirement, the use of dental loupes in non-surgical endodontics at undergraduate level. It is recommended that the use of dental loupes should be integrated into endodontic clinical skills training and the performance of endodontic treatment in the undergraduate curriculum.

K E Y W O R D S

dental operating microscope, loupes, magnification, undergraduate teaching

Kingdom and Ireland on 25 February 2022. The position statement was ratified on 3 March 2023, prior to submission for publication.

Magnification is now considered an essential component of not just specialist endodontic practice (AAE, 2012) but also general dental practice. The BES Teachers of Endodontology Group recognizes the benefits of the dental operating microscope (DOM) in providing magnification and improved illumination when carrying out endodontic procedures given emerging evidence on its impact on outcomes. However, there are practical, economic and ergonomic issues associated with incorporating DOMs into undergraduate endodontic education and general dental practice. Therefore, in this position statement it is recommended, as a minimum standard, the use of dental loupes with

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This position statement was prepared on behalf of the British Endodontic Society Teachers of Endodontology Group.

illumination when performing non-surgical endodontics at undergraduate level.

As outlined in several peer reviewed articles (below), the use of dental loupes has been shown to be advantageous in helping to identify root canal anatomy, detect caries as well as facilitating conservative cavity preparation:

- Better identification of second mesio-buccal canals in maxillary molars (Buhrley et al., 2002).
- Improved detection of caries (Forgie et al., 1997).
- Reduced change in cavity size upon restoration removal (Forgie et al., 2001).

Magnification, such as the use of dental loupes has the potential to enhance the quality of dental and endodontic care. Despite this, dental loupes have not been universally adopted in general dental practice (Farook et al., 2013; Forgie et al., 1999). It has been suggested that a lack of exposure to the use of magnification devices, such as dental loupes, during undergraduate training may have hampered subsequent adoption in practice (Farook et al., 2013).

Endodontic teaching in the United Kingdom has been transformed over the past few decades. In a previous survey of dental schools, it was reported that a number of topics specified by the European Society of Endodontology (ESE) Undergraduate Curriculum Guidelines for Endodontology were not covered and that there was a wide variance in the endodontic techniques taught (Qualtrough & Dummer, 1997). However, and more recently, it was reported that there was greater agreement between dental schools on the undergraduate teaching of root canal cleaning, shaping and filling techniques and that students were being exposed to use of newer calcium silicate cements (AL Raisi et al., 2019); in general, there was greater alignment in the teaching of endodontology in accordance with the recommendations of the ESE Undergraduate Curriculum Guidelines for Endodontology.

'Preparing for Practice' (General Dental Council, 2015) details the outcomes that a UK student must be able to demonstrate by the end of their undergraduate training. Although, this document provides a comprehensive framework for the delivery of undergraduate education including in endodontics, there is no reference to the use of magnification. Likewise, the newly agreed curriculum, The Safe Practitioner: A framework of behaviours and outcomes for dental professional education, which will take effect from September 2025, is similarly devoid of any reference to the use of magnification (General Dental Council, 2023). In comparison, the ESE Undergraduate Curriculum Guidelines for Endodontology stated that magnification should be included in undergraduate dental education (Moor et al., 2013). In the most recent iteration of the ESE Undergraduate Curriculum Guidelines for Endodontology, this remains intact, stating INTERNATIONAL ENDODONTIC JOURNAL WILEY 13652591, 2025, 1, Downloaded from https://onlinelibrary.wikey.com/doi/10.1111/iej.14153 by NHS Education for Scotland NES, Edinburgh Central Office, Wiley Online Library on [14/01/2025]. See the Terms and Conditions (https://onlinelibrary.wikey. ms) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License

again, that students should 'have knowledge of the benefits and use of magnification and enhanced illumination in endodontic practice' (Baaij et al., 2024). In the United States, the American Association of Endodontists (AAE) has been a strong advocate for the integration of DOM training into endodontic specialist training programmes. Consequently, this has had a significant impact upon the implementation and utilization of the DOM in endodontic practice; its use in specialist practice rose from 52% to 90% over a period of less than 10 years (Kersten et al., 2008; Mines et al., 1999). However, in the United States, there is no requirement for pre-doctoral (undergraduate) programmes to teach the use of magnification in endodontics; so, there is significant variation in the teaching on the use of magnification. It has been shown, that by using a DOM during endodontic treatment, the performance of undergraduate students improved significantly in access cavity preparation and in their accuracy of identifying root canals (Rampado et al., 2004).

Brown et al. (2020) explored the use of magnification in undergraduate endodontic education in the United Kingdom and Ireland; factors relating to teaching staff, students and institutions that were potentially important in determining uptake were considered. The study showed that despite teaching leads in endodontics using magnification in their own clinical practice, this did not translate into the design and delivery of training and an expectation that undergraduate students will use magnification (Brown et al., 2020). The discrepancy between a tutor's own usage of magnification in practice and yet not being part of undergraduate training is illogical, at variance with, and not in accordance with best clinical practice.

BES TEACHERS OF ENDODONTOLOGY GROUP RECOMMENDATIONS

The following are the recommendations agreed by the BES Teachers of Endodontology Group in relation to the undergraduate teaching on the use of magnification:

- The minimum expected standard would be the use of 2.5× magnification loupes with a light source by all undergraduate students for all endodontic procedures including indirect/direct pulp capping, vital pulp treatment, non-surgical root canal treatment and retreatment.
- It is the expectation that the use of loupes would be introduced early in clinical skills/simulation sessions.
- Undergraduate students should have theoretical knowledge and, where possible, some experience of the use of the DOM.

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The BES Teachers of Endodontology Group recognizes potential challenges associated with implementation of these recommendations both at an individual and institutional level. One of the key challenges relates to funding to support implementation and to ensure equity of access. It will be necessary to engage stakeholders early in the process and identify funding streams or industrial partnerships to facilitate implementation of these recommendations.

It is the hope of the BES Teachers of Endodontology Group that the integration of magnification use in undergraduate education will provide the necessary training and if carried forward beyond graduation, to being adopted in everyday clinical practice, helping to improve the quality of endodontic care.

CONCLUSION

The use of magnification, such as dental loupes, is an important addition to clinical practice when providing endodontic care. However, a significant proportion of practitioners have not integrated the use of magnification, such as dental loupes, into their everyday clinical practice. Given the successful and widespread adoption of magnification in the form of the DOM in specialist practice in the United States, modifying education and training can have a striking impact on practice behaviour after graduation.

Recognizing that the benefits of magnification usage in the delivery of endodontic care has not been incorporated into undergraduate endodontic training, the BES Teachers of Endodontology Group proposes that the use of dental loupes should be a minimum curriculum requirement. It is anticipated that integrating the use of magnification in the undergraduate curriculum will yield positive results and improve the delivery of endodontic care during, and beyond undergraduate training, leading to its adoption into everyday clinical practice.

It is the position of the BES Teachers of Endodontology Group that, as a minimum requirement, dental loupes should be an integral part of endodontic clinical skills training and the performance of endodontic treatment in the undergraduate curriculum.

AUTHOR CONTRIBUTIONS

Both authors contributed equally in preparation of this manuscript.

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The authors have no conflict of interest to disclose.

ETHICS STATEMENT

Not applicable.

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APPENDIX A

British Endodontic Society Teachers of Endodontology Group dental school representatives—25 February 2022.

- The University of Aberdeen—Dr Ian Jones
- Queens University of Belfast—Dr Conor McLister
- University of Birmingham—Dr Vikesh Mody and Dr Phil Tomson
- University of Bristol—Dr Erlind Pepla
- Cardiff University—Dr Edward Longbottom and Dr Joshua Scaife
- University of Central Lancashire—Dr Sue Groves, Dr Shalini Kanagasingam and Dr Nargis Sonde

- University College Cork—Dr Graham Quilligan
- Trinity College Dublin—Dr Mary Freda-Howley and Dr Sile Lennon

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- King's College London—Dr Garrit Koller and Dr Sadia Niazi
- University of Leeds—Dr Paul Frankin and Dr Alyn Morgan
- University of Liverpool—Dr Mustafa Al Agha, Dr Kate Blundell, Dr Obyda Essam, Dr Tauseef Haq, Dr Nick Longridge and Dr Emad Moawad
- The University of Manchester—Dr Damian O'Conner and Professor Alison Qualtrough
- Newcastle University—Dr Iad Gharib and Dr Simon Stone
- University of Plymouth—Dr Gillian Boswell and Dr Ewen McColl
- Queen Mary University of London—Dr Aylin Baysan
- The University of Sheffield—Dr Mark Barber and Dr Alexandra Coleman

Additional representatives—3 March 2023:

- Queens University of Belfast—Dr Jill Butler and Dr Jenny Good
- University of Birmingham—Dr Damian Kavanagh
- Cardiff University—Dr James Hyde
- University of Dundee—Dr Thibault Colloc and Dr Carol Tait
- University of Glasgow—Dr James Donn and Professor William McLean
- University of Liverpool—Dr Shakil Umerji
- The University of Manchester—Dr Wafa Kashbour