

ORIGINAL ARTICLE

Molar incisor hypomineralisation: Teaching and assessment across the undergraduate dental curricula in the UK

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Abstract

Background: No consensus exists on how molar incisor hypomineralisation (MIH) should be covered by the undergraduate dental curricula.

Aim: To assess the current teaching and assessment of MIH in the UK.

Design: A piloted questionnaire regarding the teaching and assessment of MIH was disseminated to paediatric, restorative and orthodontic teaching leads in each UK dental school ($n = 16$). Data were analysed using descriptive statistics, chi-squared and Kruskal–Wallis tests.

Results: Response rates from paediatric, restorative and orthodontic teams were 75% ($n = 12$), 44% ($n = 7$) and 54% ($n = 8$), respectively. Prevention of caries, pre-formed metal crowns, anterior resin composites and vital bleaching were taught significantly more by paediatric teams ($p = .006$). Quality of life and resin infiltration were absent from restorative teaching. Orthodontic teaching focussed on the timing of first permanent molar extractions.

Paediatric teams were mainly responsible for assessment. Risk factors, differential diagnoses for MIH and defining clinical features were more likely to be assessed by paediatric teams than by others ($p = .006$). All specialities reported that students were prepared to manage MIH.

Conclusion: Molar incisor hypomineralisation is primarily taught and assessed by paediatric teams. No evidence of multidisciplinary or transitional teaching/assessment existed between specialities. Developing robust guidance regarding MIH learning in the UK undergraduate curricula may help improve consistency.

KEYWORDS

anomalies, molar incisor hypomineralisation, undergraduate teaching

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1 | INTRODUCTION

Molar incisor hypomineralisation (MIH) is a developmental condition that is observed when a patient has hypomineralised enamel lesions on first permanent molars (FPM), and sometimes incisors.¹ A global prevalence of 13.1% has been noted.² In the UK, a prevalence of 15.9% has been reported.³ Its presentation can vary substantially in the number of teeth affected and the severity of hypomineralisation. Updated guidelines for managing children with this common, but often challenging, condition have been published.⁴

In the UK, dental care for children is predominantly provided in primary care settings by general dental practitioners (GDPs). Although GDPs are likely to observe children with MIH frequently, treatment provision for these patients is acknowledged to be challenging.⁵ In addition, GDPs working in the UK have reported uncertainties around diagnosis and decision-making for some young patients with this enamel condition.⁶ The general view in the UK is that children with mild MIH can be managed wholly in primary care by GDPs, whereas moderate and severe presentations will usually require input from specialists in paediatric dentistry (PD) and/or orthodontics (O).⁷ In cases of affected individuals requiring complex restorative care, including planning for a transition to adult dental services, input from specialists in restorative dentistry (RD) may also be beneficial.⁸ Complex case management may be improved by utilising a multidisciplinary team (MDT) approach comprising PD, O and RD colleagues.^{8,9} Given the significant variation in MIH presentation and treatment options, it is important that dental undergraduate curricula provide adequate learning experiences to allow students to build confidence and competence in managing children with MIH following graduation.

Surveys of specialists in PD and GDPs across Europe, the Middle East, South America, Oceania and Asia have mainly focussed on ascertaining their perceived confidence in the diagnosis and management of MIH.^{6,10–16} Most studies found that only around half of GDPs felt confident in diagnosing MIH. It is paramount, therefore, to appraise what dental undergraduates are currently being taught about MIH. Interestingly, Silva and colleagues found that over half of fourth- and fifth-year dental students at King Saud University, Saudi Arabia, had reportedly not heard of MIH despite it being covered in their lecture programme.¹¹ A similar study of German final-year dental students, from 22 different dental schools, found that although 97% of students were familiar with MIH, only 34% thought they could identify it, and just 16% of those felt confident in doing so.¹² Further surveys of undergraduate students in Syria,¹⁴ Austria,¹⁵ Egypt¹⁶ and Switzerland¹³ have found that few students feel confident

Why this paper is important to paediatric dentists

- Highlights lack of multidisciplinary approach to undergraduate teaching of MIH in the UK.
- Identifies paediatric dentistry teams as the main educators regarding MIH in the UK undergraduate curricula.
- Restorative dentistry and orthodontic teams had minimal involvement in MIH teaching and assessment within the undergraduate curricula.

in diagnosing MIH, despite Swiss students unanimously reporting familiarity with MIH.^{13,14} These studies suggest that students are not adequately prepared (or perceive that they are not adequately prepared) with the knowledge or skills to be confident in managing children with MIH upon graduation. This highlights that deficiencies may exist within current curricula in terms of MIH-related learning and assessment. There is, however, no published literature that investigates the content of undergraduate curricula, and how students are assessed with regard to knowledge of MIH. Therefore, the aim of this study was to appraise how and by whom undergraduate MIH learning, including teaching and assessment, takes place in undergraduate dental curricula across UK dental schools.

2 | MATERIALS AND METHODS

This cross-sectional, UK-wide study gained ethics approval from the Newcastle University Ethics Committee (Ref.:25052 /2022; 21/09/22).

A questionnaire was developed to collect information regarding the teaching and assessment of MIH across undergraduate UK dental curricula (Appendix S1). A series of close-ended questions were developed, which were informed by a literature review and expert opinion (following discussion with members of the UK MIH working group; authors GDT, SA, HR, MTH, CS and SP). Separate sections on MIH epidemiology, aetiology, diagnosis, prevention of caries, management of anterior opacities, management of compromised first permanent molars (cFPM), multi-/interdisciplinary working (paediatric/orthodontic/restorative dentistry) and oral health-related quality of life (OHRQoL) were included. In some sections, a list of individual topics, which were specific to that area, were included. Participants were asked to record whether they taught and/or assessed each of these individual items, and what methods they used to do so. Teaching methods available for selection were lecture, tutorial, online course

and/or clinical skill laboratory. Assessment methods available for selection were objective structured clinical examination (OSCE), written paper, clinical case scenarios and/or clinical competencies/targets. Participants were invited to elaborate on their answers, using free text, if they felt the question did not accurately reflect what happened in their dental school. A final question was included to subjectively assess whether participants felt their students were prepared to assess and manage a patient with MIH upon graduation. A 5-point Likert scale response (poorly prepared to well-prepared) was utilised. Item reduction was completed through piloting and pre-testing, to restrict the questionnaire length and to minimise response burden. In total, 41 questions were included, and the survey was expected to take participants 10–15 min to complete.

The questionnaire was disseminated to the university email addresses of each of the academic leads responsible for teaching PD, O and RD, in each of the 16 UK dental schools. Thus, the overall target sample size was 48 participants (3×16). Participants were asked to return their completed questionnaires by email within 4 weeks, and these were checked for completeness by JH, GDT and AG prior to being anonymised for analysis. Any partially completed questionnaires were included in analysis and missing data described. Data collection took place in October 2022.

Data were cleaned and analysed using SPSS version 28 (IBM, Armonk, NY, USA). Descriptive analysis was completed to explore the data. Subgroup analyses between specialities (PD vs. RD, PD vs. O and RD vs. O) for each item were carried out using chi-squared test, with Bonferroni corrections applied to account for multiple hypothesis testing. The Kruskal–Wallis test was used to compare preparedness between the three specialities.

3 | RESULTS

The overall response rate was 56% ($n = 27$) with specialist-specific response rates as follows: PD = 75% ($n = 12$), RD = 44% ($n = 7$) and O = 54% ($n = 8$). One school had combined PD and O teaching, with only one response submitted. In the final analysis, these were included as separate PD and O responses. Earlier analysis with this result considered for PD only demonstrated minimal change in the overall results, and no statistically significant differences using either method were observed. The overall responses by each speciality, relating to teaching and methods of assessment, are shown in [Tables 1 and 2](#).

Compared with RD and O, PD curricula were statistically significantly more likely to include teaching on the following topics related to MIH: oral hygiene instruction ($p = .006$); the use of desensitising agents ($p = .006$); preformed metal crowns ($p = .006$); fluoride varnish ($p = .006$); preventive

fissure sealants ($p = .006$); anterior composite restorations ($p = .006$); and vital bleaching techniques ($p = .006$). There were no significant differences in any other topics, including extraction timing of posterior teeth ($p = .125$).

In terms of assessment, compared with both RD and O, PD curricula were statistically significantly more likely to assess the following topics: knowledge of risk factors ($p = .006$); differential diagnoses for enamel defects ($p = .006$); clinical features ($p = .006$); and prescription of 2800 ppm fluoride toothpaste ($p = .006$). There were no significant differences, according to specialty, for teaching in relation to all the remaining topic areas.

Educators' perceptions of their graduates' overall preparedness to manage children with MIH were similar across all three specialities, with a median score of 4 (IQR 3–4.5), 3 (IQR 3–4) and 3 (IQR 3–3) reported for PD, O and RD, respectively ($p = .435$).

4 | DISCUSSION

To the authors' knowledge, this is the first study to investigate how MIH is taught and assessed in the undergraduate curricula across a country (UK). The condition has been widely studied and recognised for over 20 years and should now be well-integrated within undergraduate (and postgraduate) teaching. Whilst it was reassuring that all key learning points included in the survey were being taught and assessed across the UK, some topic areas were taught less frequently, notably multidisciplinary care, resin infiltration and OHRQoL. There is growing evidence of the impact of MIH on children's quality of life in terms of function/symptoms and emotional well-being.^{17,18} Furthermore, several studies have shown the benefit of dental interventions for MIH in improving children's OHRQoL.^{19,20} Recently, Hasmun and colleagues demonstrated that minimally invasive aesthetic treatments for children with incisor opacities (related to MIH) can significantly improve OHRQoL, linking the importance of considering children's overall well-being with the benefit of aesthetic treatments.²¹ Despite this, resin infiltration, an effective aesthetic management technique for many MIH-affected teeth, was not widely taught. Therefore, some students are unlikely to have a full understanding of all available aesthetic approaches. Students should be taught all available treatment options, even if they are deemed to be more relevant to specialist care, to ensure they understand and are aware of how to manage patient/parent expectations and symptoms, and when referral to specialist care is appropriate.

Another important finding was that teaching relating to MIH was variable between units and specialities. This highlights potential inconsistencies in teaching across the UK. It was clear that most of the teaching and assessment

TABLE 1 Topic areas and mode of teaching relating to MIH according to speciality.

Topic area taught N (%)	Method of teaching/specialty														
	Lecture			Tutorial			Online course			Clinical skill laboratory			Any method		
	PD	O	RD	PD	O	RD	PD	O	RD	PD	O	RD	PD	O	RD
Prevalence of MIH	11 (92)	3 (38)	1 (14)	9 (75)	3 (38)	0	2 (17)	0	0	0	0	0	12 (100)	3 (38)	1 (14)
Risk factors	11 (92)	2 (25)	0	10 (84)	4 (50)	0	2 (17)	0	0	0	0	0	12 (100)	3 (38)	0
Differential diagnoses	11 (92)	2 (25)	2 (29)	11 (92)	4 (50)	0	2 (17)	0	1 (14)	0	0	0	12 (100)	4 (50)	2 (29)
Clinical features	11 (92)	3 (38)	1 (14)	11 (92)	3 (38)	0	3 (25)	1 (13)	1 (14)	0	1 (13)	0	12 (100)	5 (63)	2 (29)
Oral hygiene	11 (92)	2 (25)	4 (57)	9 (75)	2 (25)	1 (14)	1 (8)	0	0	2 (17)	0	0	11 (92)	2 (25)	4 (57)
Fluoride varnish	11 (92)	1 (13)	4 (57)	9 (75)	1 (13)	1 (14)	2 (17)	1 (13)	0	3 (25)	0	0	11 (92)	1 (13)	4 (57)
2800-ppm fluoride toothpaste	10 (84)	1 (13)	4 (57)	7 (58)	1 (13)	1 (14)	1 (8)	0	0	0	0	0	10 (84)	1 (13)	4 (57)
Preventive sealants	11 (92)	1 (13)	4 (57)	7 (58)	1 (13)	2 (29)	2 (17)	1 (13)	0	4 (33)	1 (13)	1 (14)	11 (92)	1 (13)	4 (57)
Desensitising agents	11 (92)	2 (25)	3 (43)	7 (58)	1 (13)	0	2 (17)	1 (13)	0	2 (17)	1 (13)	0	11 (92)	2 (25)	3 (43)
Microabrasion	9 (75)	1 (13)	3 (43)	7 (58)	1 (13)	0	1 (8)	0	0	2 (17)	1 (13)	0	10 (84)	1 (13)	3 (43)
ICON	7 (58)	1 (13)	0	6 (50)	1 (13)	0	1 (8)	0	0	1 (8)	1 (13)	0	9 (75)	1 (13)	0
Anterior composite resin restorations/veneers	10 (84)	1 (13)	5 (71)	9 (75)	1 (13)	2 (29)	2 (17)	1 (13)	1 (14)	0	0	2 (29)	11 (92)	1 (13)	5 (71)
Bleaching	10 (84)	1 (13)	3 (43)	9 (75)	1 (13)	1 (14)	1 (8)	0	0	0	0	0	11 (92)	1 (13)	3 (43)
Caries management sealants	11 (92)	1 (13)	3 (43)	11 (92)	1 (13)	2 (29)	1 (8)	0	1 (14)	5 (42)	1 (13)	3 (43)	12 (100)	1 (13)	3 (43)
Posterior composite resin restorations	11 (92)	1 (13)	4 (57)	11 (92)	1 (13)	1 (14)	1 (8)	0	1 (14)	4 (33)	1 (13)	3 (43)	12 (100)	1 (13)	4 (57)
Timed extractions of FPM	11 (92)	6 (75)	1 (14)	11 (92)	7 (88)	0	2 (17)	2 (25)	0	0	0	0	12 (100)	8 (100)	1 (14)
Preformed metal crowns	10 (84)	2 (25)	1 (14)	8 (67)	1 (13)	0	1 (8)	0	0	4 (33)	1 (13)	1 (14)	11 (92)	2 (25)	1 (14)
Orthodontic MDT	8 (67)	3 (38)	3 (43)	7 (58)	6 (75)	1 (14)	3 (25)	2 (29)	0	0	0	0	9 (75)	7 (88)	3 (43)
Restorative MDT	5 (42)	3 (38)	4 (57)	5 (42)	3 (38)	2 (29)	0	0	0	0	0	0	5 (42)	4 (50)	4 (57)
OHRQoL	7 (58)	1 (13)	0	5 (42)	1 (13)	0	1 (8)	0	0	0	0	0	7 (58)	1 (13)	0

Abbreviations: FPM, first permanent molars; ICON, resin infiltration incisors; MDT, multidisciplinary team; MIH, molar incisor hypomineralisation; O, orthodontics; OHRQoL, oral health-related quality of life; PD, paediatric dentistry; RD, restorative dentistry.

TABLE 2 Method used to assess MIH-related learning items according to specialty.

MIH-related topic N (%)	Assessment approach																			
	Written paper				Clinical case scenario				OSCE				Clinical competencies/target				Any method			
	PD	O	RD	O	PD	O	RD	O	PD	O	RD	O	PD	O	RD	O	PD	O	RD	
Prevalence of MIH	9 (75)	1 (13)	0	5 (42)	2 (25)	0	0	0	0	0	0	0	0	0	0	0	10 (84)	2 (25)	0	
Risk factors	11 (92)	3 (38)	1 (14)	6 (50)	3 (38)	0	0	0	0	0	0	0	0	0	0	0	11 (92)	3 (38)	1 (14)	
Differential diagnoses	10 (84)	3 (38)	3 (43)	8 (67)	3 (38)	0	1 (8)	1 (13)	0	0	0	0	0	0	0	0	11 (92)	3 (38)	3 (43)	
Clinical features	11 (92)	3 (38)	2 (29)	8 (67)	3 (38)	0	1 (8)	0	0	0	0	0	0	0	0	0	11 (92)	3 (38)	2 (29)	
Oral hygiene	9 (75)	2 (25)	2 (29)	11 (92)	2 (25)	2 (29)	6 (50)	0	1 (14)	5 (42)	0	3 (43)	12 (100)	2 (25)	3 (43)	0	12 (100)	2 (25)	3 (43)	
Fluoride varnish	9 (75)	2 (25)	2 (29)	9 (75)	2 (25)	3 (43)	6 (50)	1 (13)	2 (29)	7 (58)	1 (13)	3 (43)	12 (100)	2 (25)	3 (43)	0	12 (100)	2 (25)	3 (43)	
2800-ppm fluoride toothpaste	9 (75)	2 (25)	2 (29)	7 (58)	3 (38)	3 (43)	6 (50)	1 (13)	2 (29)	3 (25)	1 (13)	3 (43)	11 (92)	3 (38)	3 (43)	0	11 (92)	3 (38)	3 (43)	
Preventive sealants	10 (84)	2 (25)	4 (57)	6 (50)	2 (25)	1 (14)	7 (58)	1 (13)	1 (14)	8 (67)	1 (13)	2 (29)	11 (92)	2 (25)	4 (57)	0	11 (92)	2 (25)	4 (57)	
Desensitising agents	6 (50)	2 (25)	2 (29)	6 (50)	2 (25)	2 (29)	2 (17)	1 (13)	1 (14)	2 (17)	1 (13)	1 (14)	10 (84)	2 (25)	2 (29)	0	10 (84)	2 (25)	2 (29)	
Microabrasion	5 (42)	2 (25)	0	5 (42)	2 (25)	0	1 (8)	1 (13)	0	0	0	0	6 (50)	2 (25)	0	0	6 (50)	2 (25)	0	
ICON	4 (33)	2 (25)	1 (14)	5 (42)	2 (25)	0	1 (8)	1 (13)	0	0	0	0	5 (42)	2 (25)	1 (14)	0	5 (42)	2 (25)	1 (14)	
Anterior composite resin restorations/veneers	8 (67)	3 (38)	2 (29)	7 (58)	2 (25)	2 (29)	0	0	1 (14)	2 (17)	0	3 (43)	9 (75)	3 (38)	3 (43)	0	9 (75)	3 (38)	3 (43)	
Bleaching	7 (58)	2 (25)	1 (14)	6 (50)	2 (25)	1 (14)	0	0	0	0	0	0	8 (67)	2 (25)	2 (29)	0	8 (67)	2 (25)	2 (29)	
Caries management sealants	9 (75)	2 (25)	2 (29)	8 (67)	2 (25)	2 (29)	3 (25)	0	1 (14)	5 (42)	0	1 (14)	10 (84)	2 (25)	2 (29)	0	10 (84)	2 (25)	2 (29)	
Posterior composite resin restorations	9 (75)	2 (25)	4 (57)	8 (67)	2 (25)	2 (29)	2 (17)	0	2 (29)	3 (25)	0	3 (43)	10 (84)	2 (25)	4 (57)	0	10 (84)	2 (25)	4 (57)	
Timed extractions of FPM	9 (75)	8 (100)	1 (14)	9 (75)	6 (75)	1 (14)	2 (17)	3 (38)	1 (14)	0	1 (13)	0	10 (84)	1 (14)	1 (14)	0	10 (84)	1 (14)	1 (14)	
Preformed metal crowns	9 (75)	1 (13)	2 (29)	7 (58)	1 (13)	1 (14)	2 (17)	0	1 (14)	2 (17)	0	3 (43)	10 (84)	1 (13)	3 (43)	0	10 (84)	1 (13)	3 (43)	
Orthodontic MDT	7 (58)	6 (75)	2 (29)	6 (50)	5 (63)	2 (29)	2 (17)	3 (38)	1 (14)	0	0	1 (14)	8 (67)	7 (88)	2 (29)	0	8 (67)	7 (88)	2 (29)	
Restorative MDT	6 (50)	4 (50)	2 (29)	4 (33)	4 (50)	2 (29)	1 (8)	1 (13)	1 (14)	0	0	1 (14)	6 (50)	4 (50)	2 (29)	0	6 (50)	4 (50)	2 (29)	
OHRQoL	6 (50)	1 (13)	0	3 (25)	1 (13)	1 (14)	0	0	1 (14)	0	0	0	6 (50)	1 (13)	1 (14)	0	6 (50)	1 (13)	1 (14)	

Abbreviations: FPM, first permanent molars; ICON, resin infiltration incisors; MDT, multidisciplinary team; MIH, molar incisor hypomineralisation; O, orthodontics; OHRQoL, oral health-related quality of life; PD, paediatric dentistry; RD, restorative dentistry.

responsibilities relating to MIH were completed in the paediatric dental curricula. This is not surprising, as MIH is often described as a developmental condition observed in children, particularly in the early mixed dentition stage.¹ Recent guidelines both within the UK^{8,9} and internationally,⁴ however, have recommended a multidisciplinary approach to management. Furthermore, it is recognised that patients could present to any speciality with problems associated with MIH throughout their life, with this being most likely for orthodontic planning of cFPM alongside malocclusion, and restorative care for the management of retained FPM or aesthetic management of affected incisors in adulthood. Multidisciplinary and transitional care of patients with MIH was not widely considered in the UK undergraduate curricula, which may lead new graduates to think of MIH as a condition solely affecting their younger patients. Clearly, the structural, mechanical and chemical make-up of MIH-affected teeth will influence clinical management throughout life.²² Therefore, if undergraduate students are not taught that patients with MIH may present in adulthood, treatment failures could be more likely, notably in terms of compromised resin bonding to hypomineralised enamel. Regarding the transition of patients with MIH into adulthood, MIH sits somewhere between the likes of amelogenesis imperfecta in which there may be a continuous need for specialist care as some treatments such as full mouth rehabilitation and implants may take place in late adolescence or early adulthood and caries, in which treatment may take place in multiple specialities as stand-alone episodes of care based on the extent of caries experience and patient age. Therefore, as transition is more difficult to define in MIH, it does not yet belong in the undergraduate curriculum.

In terms of assessment of undergraduate MIH-related knowledge and understanding, this was most commonly undertaken within PD, with minimal assessment being undertaken by O and RD teams. The exception to this was in relation to timed extractions of FPM, a topic that was also assessed in all units by O teams. The main learning outcomes that were assessed related to the overall aetiology and diagnosis of MIH, as well as prevention of caries, and management of FPMs with MIH. Knowledge about aesthetic treatment options, in particular resin infiltration, vital bleaching and microabrasion, was not commonly assessed, despite apparently being taught. In the UK and European Union, current legislation makes tooth whitening illegal in children under 18²³; thus, some units may not have felt that assessment was necessary for this topic. Resin infiltration for the management of enamel opacities has a developing evidence base^{21,24} and therefore may not yet be routinely used at all schools. Alternatively, these treatment regimens may be more relevant for specialist training programmes, as management could be out of the scope of

practice of a general dentist. Despite this, if an area of a curriculum is taught, it is necessary to assess this information, even at a low level of comprehension,²⁵ in order to ensure that students are at least aware of these options.

Regarding perceptions of preparedness, all specialities felt their students were prepared to manage children with MIH as new graduate dentists. Paediatric dentistry respondents, however, felt more confident than those from O and RD, and this is likely due to them being most involved in the teaching and assessment of MIH. Interestingly, the greatest spread in confidence scores was reported by PD teams (IQR 3–4.5). This could be due to the larger sample of this group, or there could be genuine variation in individual confidence of PD teams between schools. If the latter is the case, then attempts need to be made to reduce this apparent variability. Development and implementation of standardised teaching resources and a UK-wide consensus document on teaching and assessment of MIH would certainly help. It is also essential that students are given the opportunity to see patients with MIH in a clinical setting, to consolidate their learning. Previous studies conducted in Germany and Egypt have identified that dental undergraduates lacked sufficient clinical exposure to children with MIH.^{12,16} Although findings from the present study did not suggest that UK students lacked clinical exposure to children with MIH, it is unlikely that they would have seen the full range of presentations, in terms of severities and treatment needs. As such, the development and implementation of virtual simulation using haptic technology could be a useful way to overcome concerns in which clinical exposure cannot be guaranteed.²⁶

Overall, a variety of teaching and assessment methods were used, but these tended to be more traditional methods of teaching and assessment such as lectures, tutorials, written papers and clinical case discussions. No participants commented on the use of more innovative ways of teaching MIH or curriculum design. Integrated cross-speciality and interdisciplinary curriculum design, using novel methods such as the 'context café',²⁷ may be helpful to allow students to integrate basic science knowledge, such as the structure of the MIH tooth, with management strategies taking into account patient needs and quality of life. Modern learning formats that encourage students to link basic science learning with the clinical application of knowledge may be helpful in the context of MIH. Regarding assessment, the OSCE has shown to be a highly valid and reliable measure of student performance by permitting students to demonstrate skills, which are hard to assess through written methods of assessment.²⁸ Objective structured clinical examinations could therefore offer the opportunity to assess students' competencies in the patient–parent discussion regarding treatment options for cFPM or affected incisors, allowing the student to demonstrate empathy, communication, treatment planning and consideration of patient wishes.

In one unit, all PD and O teaching was carried out jointly; this may, however, still lead students to view MIH as a condition seen in children and not adults. Multidisciplinary teaching between specialities can help reinforce that skills and knowledge are transferrable for a range of dental conditions and that dental anomalies, including MIH, occur in adults and children.

This study is the first to consider teaching and assessment methods regarding MIH and has explored the wider input of the dental team beyond PD; there are, however, also some acknowledged limitations. As the survey only included the UK teaching institutes, findings may not be generalisable to the rest of the world. Although it could be argued that the teaching and assessment of MIH should be similar as MIH is a worldwide condition, other variables may need to be considered in the curricula. For example, graduates from different countries will be employed in different healthcare settings (private or publicly funded) and be subject to different scopes of practice or patient/parent preferences, all of which may influence their wider learning needs relating to MIH. Whilst countries in the European Economic Area have similar curricula in order that qualifications can be mutually transferrable across the continent,²⁹ individual regulation by local governing bodies will vary. Indeed, as demonstrated in this survey, the interpretation and delivery of curricula vary across institutions, even within the same country. An international consensus regarding how MIH should be taught to undergraduate dental students would be of benefit, similar to consensus statements already available in other areas.³⁰ Another perceived limitation is the relatively low response rates for RD and O, representing less than half of the UK dental schools. It is possible that those who did not reply may have had greater involvement in teaching, which would have changed the overall results for these specialities. In contrast, the response rate from PD was very good, reflecting the greater 'ownership' this specialty may have felt towards MIH teaching, and the wish to support colleagues who were leading the investigation.

Going forwards, further research is indicated to explore how MIH is taught and assessed elsewhere in the world to allow comparison and identify good practice. Importantly, the training programmes for other dental health professionals, such as dental hygienists, therapists and dental nurses, should also be reviewed to ensure that their training also prepares them to provide appropriate care or referral for patients with MIH. These insights could lead to an international consensus being reached on how best to teach and assess undergraduate knowledge and skills relating to the management of patients with this common, but often challenging, developmental enamel condition.

The present study identified that, in the UK, undergraduate dental teaching and assessment regarding MIH is delivered largely by teams in PD, with a variety of formats

utilised. Clinical educators in PD, O and RD all reported that their students would be appropriately prepared to manage MIH as new graduate dentists. There did not appear to be a multidisciplinary or transitional approach to teaching, despite MIH being a life-long condition requiring input from several dental specialities.

AUTHOR CONTRIBUTIONS

JH, GDT, AG, HDR, SA, SP, CS and MTH conceived the ideas; JH, GDT and AG collected the data; JH analysed the data; and JH, HDR and GDT led the writing.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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