Introduction

Molar-incisor hypomineralisation (MIH) is defined as "*demarcated, qualitative developmental defects of systemic origin of the enamel of one or more first permanent molars with or without affecting the permanent incisors*" (Beentjes et al., 2002; Weerheijm et al., 2001). The hypomineralisation is characterised by enamel opacities of varying discolouration and size (Americano et al., 2017). Characteristically, the opacities have normal enamel thickness and a defined demarcation between the affected and the sound enamel and they occur most often on the occlusal and buccal surfaces.

The diagnosis and classification of MIH can be difficult given the many classification systems available. The European Academy of Paediatric Dentistry recommended a distinction into ‘‘mild’’ and ‘‘severe’’ categories, omitting the previously used "moderate" category (Lygidakis et al., 2010). These two distinct categories are based on the presence or absence of post-eruptive breakdown: mild when there are demarcated opacities without post-eruptive breakdown, and severe when breakdown occurs (Lygidakis et al., 2010). The prevalence of MIH quoted in the literature ranges from 3.6 to 25% and differs between countries and birth cohorts (Weerheijm, 2003). A 2018 systematic review found the global pooled prevalence to be 14.2% (Zhao et al., 2018).

The management of MIH affected first permanent molars (FPMs) is commonly associated with both short and long-term clinical decisions but, in general, there are three possible treatment options: direct restoration, indirect restoration and/or extraction (with or without subsequent orthodontic treatment).

When one or more FPMs are affected by MIH, several questions become apparent:

1. Should the compromised molar be saved, or would it be better to consider extraction at an early age, especially in patients where the molars require extensive restorative treatment, possibly including endodontic therapy?

2. Should the compromised molar be extracted as soon as possible, especially if it is symptomatic, or should it be temporarily restored and extracted at a later stage?

3. If the prognosis of one affected FPM is poor, is extraction of the other FPMs required?

These questions may be complex and patients with MIH affected molars therefore benefit from the multidisciplinary input of paediatric dentists and orthodontists. It is important to compare treatment opinions in these two specialist groups.

Therefore, this research study aimed to obtain the views and opinions of specialist members of the British Orthodontic Society (BOS) and British Society of Paediatric Dentistry (BSPD) in relation to:

1. Multidisciplinary management of MIH affected patients.

2. Diagnosis and management of MIH affected FPMs in 4 clinical scenarios and compare the responses to those of an expert panel consensus.

Methods

This study was approved by the [redacted] Research Ethics Committee (13931/001). Approval was also obtained from Research and Development (R&D) department at [redacted] NHS Trust, United Kingdom.

The study was undertaken in two parts: (1) formulating an expert panel consensus for the diagnosis and management of MIH affected FPMs. (2) distributing an online questionnaire to obtain the opinions of specialist members of the BOS and BSPD in relation to management strategies for MIH affected FPMs and to compare the responses with those from the expert panel consensus.

Selection of clinical scenarios

Four clinical scenarios were developed based on clinical records of existing patients. Presenting more than four clinical scenarios would have increased the range of clinical situations considered but was deemed too time consuming and onerous to complete for the online questionnaire in Part 2. The patients, whose records were included in the study, met the following inclusion criteria:

- Mixed dentition;
- Class I or Class II division I incisor relationship;
- MIH affecting at least one FPM;
- Orthopantomogram and intraoral photographs available;
- Consent to use photographs and radiographs present as part of existi
  clinical records.

Four clinical scenarios were developed from two suitable patients, identified for inclusion in the study. One had a mild Class II division I incisor relationship with non-crowded arches and the

other had a Class I incisor relationship with severe crowding and a dental centre line discrepancy. The two patients had severe MIH affecting all four FPMs.

Records (orthopantomograms and intra-oral photographs) from these two patients were digitally edited to produce four clinical scenarios (2 from each patient), with different confounding variables which might impact on the treatment decision. All of the photographic images and radiographs were digitally edited, where required, using *Adobe Photoshop CC 2017 Creative Cloud.* The variables which were modified were:

- Presence or absence of MIH on FPMs;
- Severity of the MIH by adjusting the presence/absence of post eruptive breakdown based on the EAPD classification (Lygidakis et al., 2010);
- Presence or absence of restorations on the photographs and radiographs;
- Presence or absence of third molars on the orthopantomogram.

For each of the four clinical scenarios produced (Table 1), the MIH (mild or severe) was made to affect the contralateral FPMs in the opposing arch, for example - in clinical scenario 2 the UL6 and LR6 presented with mild MIH (Figure 1). It was intended that this pattern of MIH would replicate the challenging clinical scenarios that clinicians are likely to encounter and are often more difficult to manage, as compensating and balancing extractions may need to be considered.

The clinical scenarios were also categorised as low malocclusion complexity (Class II division 1 incisors relationship with no crowding, correct dental centrelines and overjet mildly increased; Patient 1: clinical scenarios 1 and 2) and high malocclusion complexity (Class I incisors relationship with severe crowding, impacted upper left canine and non-coincident dental centrelines; Patient 2: clinical scenarios 3 and 4). By choosing a low and high complexity malocclusion the aim was to capture the multifactorial difficulty in decision making in mixed dentition patients and investigate the respondents' management and treatment strategies for four varied clinical scenarios with different MIH severities and challenges.

Expert panel consensus

The aim of the expert panel was to reach a consensus regarding both the classification and the management of the MIH affected molars in the four clinical scenarios. A group of four experienced clinicians were invited to form the panel (2 consultant orthodontists and 2 consultant paediatric dentists), all with experience of running multidisciplinary team clinics (MDTs) for MIH patients. The panel members were selected based on the level of experience in their respective fields and

their experience in managing MIH patients in particular. The aim of the consensus panel was to replicate the MDT treatment planning situation.

The four clinical scenarios were shown to the panel as a Microsoft Power Point presentation and further details were given verbally, including the factors that were thought to potentially influence treatment decisions: age, type of malocclusion, restoration of FPMs and associated signs/symptoms. This allowed full discussion of the treatment options in a simulation of a multidisciplinary team discussion.

The panel discussed treatment plans until a consensus 'ideal' treatment plan was agreed for each clinical scenario, utilising a multidisciplinary approach to treatment planning.

Online questionnaire

An online questionnaire was developed on the Survey Monkey® platform, to investigate decision making regarding the management of the MIH affected FPMs by orthodontists and paediatric dentists. After piloting the questionnaire, amendments were made until a final version was reached. A final 21-item online questionnaire was developed.

The questionnaire divided into three main sections:

1. Demographics of respondents,
2. Respondents' experience and views on managing patients with MIH affected molars, and
3. Diagnosis of the MIH severity and decision making regarding clinical management for the four clinical scenarios.

The case summaries and clinical details were provided for each of the four clinical scenarios and the factors that were thought to potentially influence treatment decisions were included: age, type of malocclusion, restorations on FPMs and associated signs/symptoms. With regards to management options, there were 6 possible treatment options (Table 2). These options were later converted to a binary format (extraction *vs* maintenance of the FPM) to facilitate statistical analysis.

The questionnaire was pilot tested for ease of completion with orthodontists (n=10) and paediatric dentists (n=3) who provided written feedback on the design and content, prior to finalisation. The British Orthodontic Society (BOS) was contacted to request distribution of the questionnaire via their clinical mailing lists, with approval given by the Clinical Governance Committee of the BOS.

The Consultants' group of the British Society of Paediatric Dentists also agreed to circulate the questionnaire to their 80 members. For all participants, following the initial introduction to take part in the survey, two subsequent reminders were sent at 14-day intervals.

Statistical analysis

Data were analysed using SPSS software (Version 22, New York, USA). The analysis was undertaken in three steps:

1. The consensus opinion of the expert panel for the management of the four clinical scenarios was defined using the criteria for agreement described by Lynn (1986).

2. The demographic and practice characteristics of respondents were described and categorised according to clinical specialty. The Chi-Squared test ($\chi 2$) was used to explore the relationship between variables.

3. To determine the predictors of agreement between the two groups and the consensus opinion, in terms of treatment decisions for the MIH affected molars, a logistic regression analysis was utilised, where agreement with the panel consensus was the outcome and 3 dependent variables were the predictors: specialty, malocclusion complexity and overall MIH severity (Figure 2). The overall MIH severity referred to the severity of MIH on a patient level as opposed to an individual tooth/ molar level (clinical scenarios 1 and 3: severe MIH and clinical scenarios 2 and 4: mild MIH). For each of the predictors, an Odds ratio [Exp(B)] was determined as well as the statistical significance level ($P<0.05$) and 95% Confidence Intervals (95% CI). This logistic regression model was applied at both a clinical scenario level and tooth (FPM) level. For the clinical scenario level, the level of agreement was dichotomised in two ways:

    a. Agreement with the consensus panel regarding the management of all four first molars

    b. Agreement with the consensus panel regarding the management of 2 or more first molars (as there were 2 teeth affected by MIH in each scenario)

Results

A total of 200 orthodontists responded to the questionnaire, giving a response of approximately 20% and 36 paediatric dentists, giving a response rate of 45%. The overall response was 21.9%; however, this is an approximate percentage as it cannot be assumed that all members received the emails sent (Table 3). The number of respondents who completed all four clinical scenarios was reduced, with an overall response of 14.3% (154 out of an estimated 1080).

There was a significant difference between the two specialist groups for access to MDT clinics (Table 4), with paediatric dentists being significantly more likely to have access to an MDT than orthodontists (P=0.042). The majority of both orthodontists (60.5%, n=121) and paediatric dentists (75.0%, n=27), indicated that they found it challenging to manage patients with MIH, with no statistical difference between the two groups (P=0.408).

Using the maximum level of agreement, where respondents agreed with the consensus panel for the management of all four molars in all four scenarios, there was a relatively low overall level of agreement (Table 5). Only 40.3% of the orthodontists and 35.0% of the paediatric dentists agreed completely with the panel consensus on all management options. When assessing overall agreement on all four teeth (FPMs) for all scenarios, agreement was predicted by severity of MIH (P<0.001) and complexity of malocclusion (P<0.001) where more complex malocclusions resulted in poorer agreement and the more severe MIH resulted in poorer agreement, but specialty was not a significant predictor (P=0.21).

However, when agreement with the consensus panel was defined as 2 or more teeth (FPMs), agreement was predicted by severity of MIH (P=0.01) and specialty (P=0.001) but not complexity of malocclusion (P=0.12). Orthodontists were 2.3 times more likely to agree with the consensus opinion on management than paediatric dentists (P=0.001) (Table 5).

For the 16 FPMs combined (four per clinical scenario), the consensus panel directed maintenance of 10 FPMs and extraction of 6 FPMs. Table 6 highlights the level of agreement at individual tooth level and the difference between specialty groups in terms of treatment decisions; the paediatric dentists were more likely to agree with the consensus panel where the decision was to extract rather than maintain FPMs compared with the orthodontists. In contrast, the orthodontists agreed almost equally well on maintenance of the FPMs (8 out of 10 agreement) and on extraction (5 out of 6 agreement).

When measuring agreement on management at individual molar level, specialty was a significant predictor of agreement for management of only one tooth (LL6), with orthodontists more likely to

agree with the panel consensus than paediatric dentists (P<0.001). No significant association existed between specialty and the management of the other FPMs. The overall severity of MIH was a significant predictor of agreement for the management of three of the FPMs (UR6, UL6 and LR6), but not the fourth (LL6).

Complexity of malocclusion was also a significant predictor of agreement for three FPMs (UR6, LR6 and LL6) but not the fourth (UL6).

Discussion

Although MIH is a common condition (Bandeira et al., 2021), with an overall worldwide pooled prevalence of 11.8%-15.8% (Schwendicke et al., 2018), this study indicates that the condition is still a challenging clinical problem. The findings are also in keeping with the dental literature, showing that dentists find the diagnosis and management of MIH affected molars challenging (Humphreys et al., 2021; Kalkani et al., 2016; Hussein et al., 2014).

Given that MIH affected patients often benefit from multidisciplinary input (Elhussein and Jamal 2020; Humphreys and Albadri 2020; Commissioning Guide for Dental Specialties 2018; Lygidakis et al., 2010), it was important to explore current MDT care provision. Approximately half of the respondents in both groups agreed that these patients should be managed through an MDT type clinic. The challenge in managing MIH affected FPMs is reflected in the fact that almost half of the paediatric dentists and half of the orthodontists said that they agreed these patients should be managed through a MDT type clinic and the majority from both groups felt that managing MIH affected molars is challenging. Notwithstanding this, the opinions of the respondents from both groups indicate that not all MIH affected patients need to be seen on MDT clinics (orthodontists; 49%, paediatric dentists; 47.2%), and a case selection is required, with more severe cases perhaps benefiting more from MDT specialist opinion input.

Managing patients with more complex presentations (MIH severity and orthodontic considerations) requires meticulous multidisciplinary planning and treatment (Elhussein and Jamal 2020) and it is recommended that decisions regarding maintenance or removal of the affected FPMs should be made jointly. FPMs with more severe MIH are more likely to have repeated restoration when compared with sound FPMs, and the repeated restorations are more likely to fail (Leppaniemi et al., 2001). Despite some recent literature aiming to aid clinicians with decision making regarding compromised FPMs (Taylor et al., 2019; Ashley and Noar 2019), this situation (severely affected by MIH in this context) continues to be challenging. Therefore, close

collaboration between the relevant specialists and utilisation of MDT planning should be considered.

One of the major problem clinicians encounter when managing MIH affected FPMs is the diagnosis/classification of MIH severity. This could be attributed to the many classification systems adopted. Mathu-Muju and Wright (2006) classified MIH into three severity levels: mild, moderate and severe, with the moderate severity level often causing disagreement during diagnosis and management. The European Academy of Paediatric Dentistry (EAPD) recommended a classification of ‘‘mild’’ and ‘‘severe’’, omitting the “moderate” severity (Ghanim et al., 2015; Hussein et al., 2014), and the latter classification was utilised in this study for clarity.

For agreement on the management of all FPMs in all four clinical scenarios, overall severity of MIH (P<0.001) and complexity of malocclusion (P<0.001) were statistically significant predictors, although the prediction was in reverse to that anticipated; as the severity [Exp(B)=0.22] and complexity [Exp(B)=0.13] increased, the agreement reduced. Specialty was not a significant predictor of agreement (P=0.21). This was an unexpected finding as it was originally anticipated that treatment planning FPMs affected by severe MIH, would be associated with higher agreement (i.e., involving extraction of FPMs with poor prognosis). This may be explained by the multifactorial nature of treatment planning, although MIH severity is an important factor, there are other factors that clinicians consider, not least other occlusal factors.

However, when agreement was categorised as being for 2 or more FPMs in each clinical scenario, specialty was a significant predictor (P<0.001). Orthodontists were 2.3 times more likely than paediatric dentists to agree with the consensus opinion. The paediatric dentists were more likely than the orthodontists to agree with the consensus panel on extractions of FPMs than for maintenance (Table 6). One explanation is that paediatric dentists have more expertise in restoring MIH affected FPMs over longer time frames and are therefore aware of the difficulties in predicting prognosis/outcome of restorations. In contrast, the orthodontists were more likely to agree with the consensus panel regarding both extraction and maintenance of FPMs, a reflection on the similarity of their views to maintain FPMs with mild MIH as opposed to extraction.

The results must be interpreted with some caution as the responses in both groups were relatively low and may not be wholly representative of the orthodontists and paediatric dentists practicing in the UK. Indeed, there is a marked difference in response rates between orthodontists and paediatric dentists, with the latter being higher at 45%, but a smaller group being surveyed (n= 80). Due to some difficulties accessing all members of the BSPD, the questionnaire was only sent out to the Consultants group, in contrast to the orthodontists surveyed who worked across primary and

secondary care settings. Although low responses are an identified impediment in health care surveys (Funkhouser et al., 2017), the overall response in this survey was similar to the average response of 22% reported in a randomised controlled trial by Sebo et al. (2017). A Cochrane review in 2009 concluded that some of the strategies to increase response rates include shorter questionnaires and sending one or more reminders (Edwards et al., 2009). Reminders were utilised in this research but shortening the questionnaire further would have limited the impact of the research.

It was intended to investigate the respondents' management and treatment strategies of four varied clinical scenarios of different MIH severities and clinical challenges. However, one limitation is the generalisability of the clinical scenarios utilised, as the four clinical scenarios cannot reflect the complexity of all cases seen by clinicians. The research methodology and scenarios were developed in such a way to capture the clinical experience and opinions of the two specialist groups and to make statistical analysis more feasible. It is still possible that the respondents did not make decisions in the same way as in clinical situations, such as interaction with other colleagues and the patient/parents, adopting a shared decision-making strategy, - the "*process of making decisions 'with' rather than 'about' patients"* (Barber et al., 2020; Barber 2019).

The relatively small number of experts that formed the consensus panel is also a potential limitation to this study. For practical reasons, only four "experts" were invited to form the panel, two from each specialty. It is possible that when there are more experts, the reliability of the composite judgment increases and is presumed to be more accurate (Lynn, 1986; Murphy et al., 1998). It is also important to emphasise that the main aim of the consensus panel was to replicate the MDT treatment planning process where a limited number of experts consider each patient.

The lack of true independence of observations could have been a potential limitation. Given the nature of treatment planning, it is unlikely that the decision for each tooth (FPM) was truly independent. One way of overcoming this would have been a design where each respondent only rates one clinical scenario to eliminate contamination of responses. However, in reality, the numbers of respondents for a significant effect to be seen would be much greater, and this would not have been feasible given the relatively small number of respondents.

Finally, it may be argued that with regards to the options for treatment (Table 2), a 7th option could have been considered, 'referral for second opinion'. Although this is valid and is what respondents would do in reality if faced with severe MIH/complex malocclusion with no access to MDT clinics, the aim of the study was to explore the opinions and views of both specialists' groups in relation

to the management of these complex clinical cases. This, however, may explain the attrition rate throughout the questionnaire, i.e., due to the uncertainty regarding the responses.

Conclusions

Accepting the limitations of this study, it can be concluded;

- Managing patients with MIH affected FPMs is clinically challenging for both specialties.
- MIH affected patients should be managed through a multidisciplinary clinic, where feasible.
- Compared with the panel consensus, absolute agreement for the management of all four FPMs in all four scenarios showed that the severity of MIH and complexity of malocclusion were statistically significant predictors of agreement: where the more severe the MIH and more complex the malocclusion, the lower the agreement.
- Consequently, managing more severe cases on multidisciplinary clinics is still indicated, to incorporate specialist input into decision making.

Acknowledgements

The authors would like to thank all of the orthodontists and the paediatric dentists who took the time to complete the questionnaire. Special thanks to Professor [redacted] for taking part in forming the consensus panel. The authors would also like to thank Professor [redacted], for the invaluable assistance in formatting the results and discussion and for the help with the statistical analysis and interpretation of results. The authors received no financial support and declare no potential conflicts of interest with respect to the authorship and/or publication of this article.

Declarations:

Ethics approval and consent to participate: This study was approved by the [redacted] Research Ethics Committee (13931/001). Approval was also obtained from Research and Development (R&D) department at [redacted] Hospital.
Declaration of Conflicting Interests: The Author(s) declare(s) that there is no conflict of interest.
Availability of data and material: Available upon reasonable request.
Competing interests: The authors declare there are no competing interests.
Funding: Not applicable.

References

Americano GC, Jacobsen PE, Soviero VM, et al. (2017) A systematic review on the association between molar incisor hypomineralization and dental caries. *International Journal of Paediatric Dentistry* 27(1): 11-21.

Ashley P., Noar J. (2019) Interceptive extractions for first permanent molars: A clinical protocol. *Br. Dent. J.* 227:192–195.

Bandeira Lopes L, Machado V, Botelho J, Haubek D. (2021) Molar-incisor hypomineralization: an umbrella review. *Acta Odontol Scand* 1:1-11.

Barber SK, Ryan F, Cunningham SJ. (2020) Knowledge of, and attitudes to, shared decision-making in orthodontics in the UK. *J Orthod* 47(4):294-302.

Barber S. (2019) Shared decision-making in orthodontics: Are we there yet? *J Orthod* 46(1_suppl) : 21-25.

Beentjes VE, Weerheijm KL and Groen HJ (2002) Factors involved in the aetiology of molar-incisor hypomineralisation (MIH). *European Journal of Paediatric Dentistry* 3(1): 9-13.

Edwards PJ, Roberts I, Clarke MJ, Diguiseppi C, Wentz R, Kwan I, Cooper R, Felix LM, Pratap S. Methods to increase response to postal and electronic questionnaires. *Cochrane Database Syst Rev*. 2009 Jul 8;(3):MR000008.

Elhussein M, Jamal H. (2020) Molar Incisor Hypomineralisation-To Extract or to Restore beyond the Optimal Age? *Children (Basel)*. 6;7(8):91.

Elfrink ME, Ghanim A, Manton DJ, et al. (2015) Standardised studies on Molar Incisor Hypomineralisation (MIH) and Hypomineralised Second Primary Molars (HSPM): a need. *European Archives of Paediatric Dentistry: Official Journal of the European Academy of Paediatric Dentistry* 16(3): 247-255.

Funkhouser E, Vellala K, Baltuck C, et al. (2017) Survey Methods to Optimize Response Rate in the National Dental Practice-Based Research Network. *Eval Health Prof* 40(3): 332-358.

Ghanim A, Elfrink M, Weerheijm K, et al. (2015) A practical method for use in epidemiological studies on enamel hypomineralisation. *European Archives of Paediatric Dentistry: Official Journal of the European Academy of Paediatric Dentistry* 16(3): 235-246.

Humphreys J, Jarad F, Albadri S. (2021) Management of molar-incisor hypomineralisation by general dental practitioners - part one: diagnosis. *Br Dent J*. Mar 24. doi: 10.1038/s41415-021-2735-3. Epub ahead of print.

Humphreys J, Albadri S (2020). Management of Molar Incisor Hypomineralisation (MIH): A 1-Year Retrospective Study in a Specialist Secondary Care Centre in the UK. *Children (Basel)*. 24;7(12):252.

Hunter ML, Harrhy LE and Morgan MZ (2010) The United Kingdom's specialist workforce in paediatric dentistry: current and future trends. *British Dental Journal* 208(12): 559-562.

Hussein AS, Ghanim AM, Abu-Hassan MI, et al. (2014) Knowledge, management and perceived barriers to treatment of molar-incisor hypomineralisation in general dental practitioners and dental nurses in Malaysia. *European Archives of Paediatric Dentistry: Official Journal of the European Academy of Paediatric Dentistry* 15(5): 301-307.

Kalkani M, Balmer RC, Homer RM, et al. (2016) Molar incisor hypomineralisation: experience and perceived challenges among dentists specialising in paediatric dentistry and a group of general dental practitioners in the UK. *European Archives of Paediatric Dentistry: Official Journal of the European Academy of Paediatric Dentistry* 17(2): 81-88.

Leppaniemi A., Lukinmaa P., Alaluusua S. (2001) Nonfluoride hypomineralizations in the permanent first molars and their impact on the treatment need. *Caries Res* 35:36–40.

Lygidakis NA, Wong F, Jalevik B, et al. (2010) Best Clinical Practice Guidance for clinicians dealing with children presenting with Molar-Incisor-Hypomineralisation (MIH): An EAPD Policy Document. *European Archives of Paediatric Dentistry: Official Journal of the European Academy of Paediatric Dentistry* 11(2): 75-81.

Lynn MR (1986) Determination and Quantification Of Content Validity. *Nursing Research* 35(6): 382-386.

Mathu-Muju K and Wright JT (2006) Diagnosis and treatment of molar incisor hypomineralization. *Compend Contin Educ Dent* 27(11): 604-610; quiz 611.

McLeod CC, Klabunde CN, Willis GB, et al. (2013) Health care provider surveys in the United States, 2000-2010: a review. *Eval Health Prof* 36(1): 106-126.

Murphy MK, Black NA, Lamping DL, et al. (1998) Consensus development methods, and their use in clinical guideline development. *Health Technol Assess* 2(3): i-iv, 1-88.

Office of the Chief Dental Officer England. *Commissioning Guide for Dental Specialities—Paediatric Dentistry*. Office of the Chief Dental Officer England; London, UK: 2018.

Schwendicke F, Elhennawy K, Reda S, et al. (2018) Global burden of molar incisor hypomineralization. *Journal of Dentistry* 68: 10-18.

Sebo P, Maisonneuve H, Cerutti B, et al. (2017) Rates, Delays, and Completeness of General Practitioners' Responses to a Postal Versus Web-Based Survey: A Randomized Trial. *J Med Internet Res* 19(3): e83.

Taylor G.D., Pearce K.F., Vernazza C.R. (2019) Management of compromised first permanent molars in children: Cross-Sectional analysis of attitudes of UK general dental practitioners and specialists in paediatric dentistry. *Int. J. Paediatr. Dent.* 29:267–280.

Weerheijm KL (2003) Molar incisor hypomineralisation (MIH). *European Journal of Paediatric Dentistry* 4(3): 114-120.

Weerheijm KL, Jalevik B and Alaluusua S (2001) Molar-incisor hypomineralisation. *Caries Research* 35(5): 390-391.

Zhao D, Dong B, Yu D, et al. (2018) The prevalence of molar incisor hypomineralization: evidence from 70 studies. *International Journal of Paediatric Dentistry* 28(2): 170-179.

Figure and Table legends:

Figure 1. Clinical scenario 2 (overall mild MIH and low complexity malocclusion).

Figure 2. Statistical model to test for agreement between the two specialist groups and the consensus panel.

Table 1. Digital editing of the photographs and orthopantomograms to produce the four clinical scenarios.

Table 2. Grouping of the 6 possible treatment options into two treatment options.

Table 3. Demographic and practice characteristics of participants, distributed by specialty (Chi-Squared independence test, $\chi 2$, was carried out to calculate the *P*-values).

Table 4. Views on management of patients with MIH affected FPMs by specialty (Chi-Squared independence test, $\chi 2$, was carried out to calculate the *P*-values). * Statistically significant.

Table 5. Predictors of agreement on the treatment options with the consensus panel. Cox and Snell R^2: Coefficient of determination, Sig.: significance level, Exp(B): exponentiation of the B coefficient (to measure Odds ratio), 95% CI: 95% Confidence Interval. * Statistically significant predictors.

Table 6. Level of agreement between the two specialist groups and the consensus panel across all four clinical scenarios.

Patient	Clinical scenario	Patient's age and Incisor relationship	Overall MIH severity	Malocclusion complexity	Digital editing of intraoral images		Digital editing of radiographs		Presence of lower third molars
1	1	10 years Class II Division 1	Severe	Low	**UR6:** Non	**UL6**: MIH + Caries	**UR6:** Non	**UL6**: Caries	No
					LR6: MIH + Restoration	**LL6:** Non	**LR6:** Restoration	**LL6:** Non	
	2		Mild		**UR6:** Non	**UL6**: MIH	**UR6:** Non	**UL6**: Non	
					LR6: MIH	**LL6:** Non	**LR6:** Non	**LL6:** Non	
2	3	9 years 6 months Class I	Severe	High	**UR6:** MIH + Caries	**UL6**: Non	**UR6:** Caries	**UL6**: Non	Yes
					LR6: Non	**LL6:** MIH + Restoration	**LR6:** Non	**LL6:** Restoration+ Caries	
	4		Mild		**UR6:** MIH	**UL6**: Non	**UR6:** Non	**UL6**: Non	
					LR6: Non	**LL6:** MIH	**LR6:** Non	**LL6:** Non	

Table 1. Digital editing of the photographs and orthopantomograms to produce the four clinical scenarios.

Treatment options	Grouped treatment options
None	Maintain the FPM
Preventative (e.g., fissure seal, fluoride varnish etc.)	
Restorative	
Endodontic+Restorative	
Extraction	Extract the FPM
Maintain for now and extract in the future	

Table 2. Grouping of the 6 possible treatment options into two treatment options.

Demographic information	Orthodontists N=200 (84.7%)	Paediatric dentists N= 36 (15.3%)	*P*-value
Gender			*P*=0.007*
Male	93 (46.5%)	8 (22.2%)	
Female	107 (53.5%)	28 (77.8%)	
Age			*P*=0.007*
25-44	66 (33.0%)	19 (52.7%)	
45-54	73 (36.5%)	10 (27.8%)	
55+	61 (30.5%)	7 (19.5%)	
Position held			*P*<0.001*
Specialist practitioner	111 (55.5%)	0 (0.0%)	
Consultant	89 (45.5%)	36 (100%)	
Clinical setting (merged)			*P*<0.001*
Primary care	104 (52.0%)	8 (22.2%)	
Secondary care	96 (48.0%)	28 (77.8%)	
Clinical setting (expanded)			
District General Hospital: Consultant	56 (28.0%)	1 (2.8%)	
Mixed Specialist Practice	55 (27.5%)	0 (0.0%)	
Teaching hospital: Consultant	32 (16.0%)	27 (75%)	
NHS only Specialist Practice	29 (14.5%)	3 (8.3%)	
Private only Specialist Practice	13 (6.5%)	0 (0.0%)	
Community Services	7 (3.5%)	5 (13.9%)	
District General Hospital: Non-Consultant	6 (3.0%)	0 (0.0%)	
Teaching hospital: Non-Consultant	2 (1.0%)	0 (0.0%)	

Table 3. Demographic and practice characteristics of participants, distributed by specialty (Chi-Squared independence test, $\chi 2$, was carried out to calculate the *P*-values). * Statistically significant.

Experience and views on management of patients with MIH affected molars	Orthodontists N=200 (84.7%)	Paediatric dentists N= 36 (15.3%)	*P*-value
Attend, or have access to a MDT			*P*=0.042*
Yes	115 (57.5%)	27 (75.0%)	
No	85 (42.5%)	9 (25.0%)	
Need for MDT to plan			*P*=0.323
Yes	98 (49.0%)	17 (47.2%)	
No	34 (17.0%)	10 (27.8%)	
Neither	68 (34.0%)	9 (25.0%)	
Managing MIH affected molars is challenging			*P*=0.408
Yes	121 (60.5%)	27 (75.0%)	
No	26 (13.2%)	1 (2.8%)	
Neither	53 (26.3%)	8 (22.2%)	

Table 4. Views on management of patients with MIH affected FPMs by specialty (Chi-Squared independence test, $\chi 2$, was carried out to calculate the *P*-values). * Statistically significant.

Agreement	Specialty Orthodontist=1 Paediatric dentist=0			Overall severity of MIH Severe=1 Mild=0			Complexity of malocclusion High=1 Low=0		
Clinical scenarios	**Sig.**	**Exp(B)**	**95% CI**	**Sig.**	**Exp(B)**	**95% CI**	**Sig.**	**Exp(B)**	**95% CI**
Agreed on all 4 FPMs R^2= 0.24	0.21	1.36	0.84-2.20	<0.001*	0.22	0.14-0.32	<0.001*	0.13	0.09-0.02
Agreed on 2 or more FPMs R^2= 0.032	0.001*	2.30	1.43-3.11	0.01*	1.78	1.15-2.15	0.12	1.40	0.91-2.16
FPM									
UR6 R^2= 0.28	0.13	1.45	0.92-2.23	0.009*	0.60	0.41-0.88	<0.001*	0.08	0.05-0.12
UL6 R^2= 0.02	0.07	1.49	0.93-2.23	<0.001*	2.36	1.66-3.37	0.80	0.96	0.67-1.36
LR6 R^2= 0.21	0.17	0.32	0.45-1.15	<0.001*	0.18	0.12-0.26	<0.001*	0.24	0.16-0.34
LL6 R^2= 0.24	<0.001*	2.23	1.47-3.52	0.93	0.73	0.50-1.06	<0.001*	2.31	1.57-3.40

Table 5. Predictors of agreement on the treatment options with the consensus panel. Cox and Snell R^2: Coefficient of determination, Sig.: significance level, Exp(B): exponentiation of the B coefficient (to measure Odds ratio), 95% CI: 95% Confidence Interval. * Statistically significant predictors.

Consensus panel decisions on numbers of teeth	Orthodontists		Paediatric dentists	
	Disagree (0)	**Agree (1)**	**Disagree (0)**	**Agree (1)**
Treatment decisions				
Maintain (10 FPMs)	2	8	4	6
Extract (6 FPMs)	1	5	0	6

Table 6. Level of agreement between the two specialist groups and the consensus panel across all four clinical scenarios.