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Dentists' restorative decision-making and implications for an ‘amalgamless’ profession. Part 5: knowledge factors.

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Abstract: Background

A phase-down of amalgam in Australia is possible given the Australian Government intends to ratify the Minamata Convention. There is little research as to the influence of a dentist's knowledge on decision-making, which may be of use when determining the impact of any change.

Methods

An online survey relating to aspects of and attitudes to use of direct restorative materials was distributed to all dentists who were members of the Australian Dental Association or Members or Fellows of the Royal Australasian College of Dental Surgeons.

Results

There were 408 respondents. Fifty-eight per cent agreed that there was consistency in undergraduate teaching. Fifty-two per cent stated that there was a difference between undergraduate teaching and the 'real world'. Postgraduate education was ranked the most important influence on decision-making. Ninety-six per cent stated that knowledge of the evidence-base is important and 89 per cent believed that they practised evidence-based dentistry.

Conclusions

Dental schools need to maintain teachers' and students' understanding of the evolving technology of direct restorative materials. There is a perceived disconnect between undergraduate teaching and the 'real' world. The evidence-base is viewed as confusing, contradictory and not readily understandable. The creation of clinical guidelines would be useful.

INTRODUCTION

This article is Part 5 of a research series investigating the implications that a phase-down of amalgam[a] as a direct restorative material may have for dentists in Australia. The Minamata Convention agreed to a world-wide reduction in the use of mercury and mercury-containing products and processes.[b] Recently the Australian Government released a Regulatory Impact Statement for comment and confirmed the intention to address the health and environmental risks posed by mercury by ratifying the Minamata Convention and implementing a "national phase-down of mercury releases to the environment."[1]

There appears to be a general consensus that a decrease in the use of amalgam as a direct restorative material is warranted and that the impact, including in Australia, would be minimal.[2, 3] Previous research by the present authors[4] confirmed long-standing findings[5] that the use of amalgam by dentists is reducing. It is established that resin composite is the material of choice for the direct restoration of teeth.[6-11]

There is concern, supported by previous findings of the present authors,[4, 12, 13] that although the consequences of change may be minimal, attention should be given to those dentists who graduated 'earlier'.[14] There are many factors that have influenced this change which have been summarised[10] and reviewed[15] by the present authors, including 'knowledge factors',[12] which are the focus of this paper. The knowledge factors influencing dentists' decision-making processes are reproduced at Table 1. It was surmised that dentists' views of their undergraduate pre-clinical and clinical teachings, along with post-graduation clinical and educational experiences, vary, and is further influenced by their understandings of the evidence-base as it applies to direct restorative materials and procedures. These views are attempted to be quantified by this paper.

METHODS

The methods, including creation, administration and analysis of the survey and data have been described previously.[13] Essentially, the final survey consisted of eight sections and 29 subsections totalling 71 questions related to demographics and seven key themes. This current paper relates to the theme of 'knowledge'. The questions were presented in a Likert

[a] 'amalgam' is intended to include the various terms found in the literature including 'dental amalgam' and 'silver amalgam'.

[b] www.unep.org/newscentre/default.aspx?DocumentID=2702&ArticleID=9373. Accessed September 2013.

format and examined dentists' undergraduate and post-graduation educational and clinical experiences, with an emphasis on aspects of teaching and the evidence-base. The nature of these questions was derived from previous research.[12, 15]

The survey was distributed to all members of the Australian Dental Association state and territory branches (ADA) and Members and Fellows of the Royal Australasian College of Dental Surgeons (RACDS). The survey was web-based utilising 'SurveyMonkey'[c]. It is estimated this constituted 12,557 invitations to dentists, dental specialists, specialists in training and non-practising dentists.

Responses were required to several statements and one question relating to undergraduate education, comparisons of the nature of their education and post-graduation experiences, influences on restorative decision-making and perceptions of the evidence-base as it relates to restorative dentistry. The specific statements and question are identified in the Results.

The study received approval from the Human Research Ethics Committee, The University of Melbourne; reference number 1239020.

RESULTS

There were 408 respondents to the survey. Responses were not complete for all questions and statements. Responses of 'strongly agree' and 'agree' and 'strongly disagree' and 'disagree' are occasionally presented as combined data, worded as (strongly) agree and (strongly) disagree respectively. The percentages expressed in the results exclude any missing values and are rounded to whole numbers.

Results in terms of respondent demographics and amalgam use have been described previously.[13] In summary, respondents comprised 62 per cent males and 38 per cent females, 73 per cent of respondents obtained their primary dental qualification in Australia, 79 per cent of respondents were in private general practice and 71 per cent named a metropolitan city as their principal work location. Responses were received from all Australian states and territories.

Thirty per cent of respondents indicated they do not use amalgam as a direct restorative material. Of those using amalgam, the mean use for all direct restorative procedures was 18

[c] SurveyMonkey Inc. Main website: www.surveymonkey.com: Palo Alto, California, USA

per cent. Cross tabulation showed no appreciable difference by gender and place of primary dental qualification. Those respondents falling below the mean non-use of 30 per cent included those obtaining their primary dental qualification between 1960 and 1979, practising in a regional, rural or remote location, in public or 'other' practices, 'other' being hospital, postgraduate study and university/teaching/research. There is a pattern of decreasing use of amalgam relative to year of primary dental qualification, the later the year of graduation trending to less use.

Undergraduate experiences

Tables 2 to 4 relate to educational influences on a dentist's approach to practice, particularly undergraduate experiences. Table 2 shows results of responses to the statement, 'When I graduated, I was competent at placing amalgams.' Ninety-one per cent of respondents (strongly) agreed with this statement. Cross-tabulation showed that there was no statistically significant difference ($P<0.001$) across the various groupings with responses of strongly agree and agree ranging from 82 to 100 per cent (not tabled). Those mostly (strongly) disagreeing were those identifying practice type as 'other' (hospital, postgraduate study, and university/teaching/research; 10 per cent). Table 3 shows results of responses to the statement, 'When I graduated, I was competent at placing resin composite.' Fifty-three per cent of respondents (strongly) agreed with this statement. Cross-tabulation showed that there was a statistically significant difference for those dentists obtaining their primary dental qualification between 1960 and 1979 (31 per cent; $P<0.001$). When compared by year of obtaining primary dental qualification there was an increase in respondents (strongly) agreeing (pre 1960, 0%; 1960 to 1979, 31 per cent; 1980 to 2000, 54 per cent; post 2000, 56 per cent).

Table 4 shows results of responses to the statement, 'My pre-clinical and clinical teachers (demonstrators) were consistent in their teaching of restorative dentistry; they were all 'on the same page'.' Fifty-eight per cent of respondents (strongly) agreed with this statement. Cross-tabulation showed that there was a statistically significant difference for those dentists obtaining their primary dental qualification after 2000 (40 per cent; $P<0.001$). Forty-six per cent of this group also (strongly) disagreed the most. There was a statistically significant difference between the groups obtaining their primary dental qualification in Australia and overseas, with those (strongly) agreeing being 53 and 73 per cent respectively.

Post-graduation experiences

Tables 5 and 6 relate to aspects of experiences post-graduation. Table 5 shows results of responses to the statement, 'There was a real difference between that which I was taught at university, and that which I first experienced in the 'real world'.' Fifty-two per cent of respondents (strongly) agreed with this statement and 31 per cent of respondents (strongly) disagreed with the statement. This represents the greatest overall divergence of opinion from respondents. Cross-tabulation showed that there was a statistically significant difference for those dentists obtaining their primary dental qualification after 2000 (65 per cent; $P<0.001$) and those in public practice (43 per cent; $P<0.001$). Those mostly (strongly) disagreeing with the statement were those dentists obtaining their primary dental qualification between 1969 to 1979 and 1980 to 2000 (43 per cent each).

Table 6 shows results of responses to the question, 'A major influence on my restorative decision-making has been …?' ('1' = 'not important'; '5' = 'very important'). The response achieving the highest rank of the five options was 'Postgraduate education including continuing professional development', with 'My reading of various literature' ranked second. 'Information provided by dental material suppliers and manufacturers' ranked last. There was no statistically significant difference between any of the variables when rank was compared for the various groups as defined in Tables 2 to 5 and 7 to 12, being gender, place and year of primary dental qualification, practice location and type, and use of amalgam (data not tabled).

The evidence-base

Tables 7 to 12 relate to the practise of evidence-based dentistry with respect to restorative decision-making. Table 7 shows results of responses to the statement, 'Knowing the evidence-base is important.' Ninety-six per cent of respondents (strongly) agreed with the statement. Cross-tabulation showed no statistically significant differences between the groups, with strongly agree and agree responses ranging from 92 to 100 per cent. Table 8 shows results of responses to the statement, 'I practise evidence-based dentistry (where the evidence exists).' Eighty-nine per cent of respondents (strongly) agreed with the statement. Compared to the previous statement the rate of neutral/undecided responses was higher, being 11 per cent compared to 3 per cent. Responses to the statement, 'I am confused as to what 'depth' of evidence-base I should know', shown at Table 9, resulted in 27 per cent

(strongly) agreeing, 43 per cent (strongly) disagreeing and 30 per cent neutral/undecided. Cross-tabulation showed no statistically significant differences of responses from the groups. Table 10 shows results of responses to the statement, 'The evidence-base is often conflicting and contradictory.' Forty per cent of respondents (strongly) agreed with this statement and 35 per cent responded neutral/undecided. Cross-tabulation showed a statistically significant response of strongly agree and agree from those who obtained their primary dental qualification between 1960 and 1979 (26 per cent; P<0.001). Table 11 shows results of responses to the statement, 'Literature discussing the evidence-base is too scientific, and not readily understood by the 'general clinician'.' Twenty-six per cent of respondents (strongly) agreed with this statement. Cross-tabulation showed a statistically significant difference between those identifying practice type as 'other' (hospital, postgraduate study, and university/teaching/research; 17 per cent; P<0.001) and those who obtained their primary dental qualification between 1960 and 1979 (18 per cent; P<0.001). Results of 32 per cent were received from those whose practice location was rural/regional/remote and those obtaining their primary dental qualification post 2000. The neutral/undecided result was 23 per cent.

Table 12 shows results of responses to the statement, 'Information regarding the evidence-base is easily accessed.' Forty-two per cent of respondents (strongly) agreed with the statement, with cross-tabulation showing a statistically significant result from those in public practice (59 per cent; P<0.001) and those identifying practice type as 'other' (hospital, postgraduate study, and university/teaching/research; 71 per cent; P<0.001). Thirty per cent responded neutral/undecided.

Postgraduate education

The mean use of amalgam by those possessing a postgraduate qualification was 24 per cent (n=88). Responses to those questions described at Tables 6 to 12 were tabulated for those possessing a postgraduate qualification and cross-tabulation of this data with responses from those who only possessed a primary dental qualification showed no statistically significant difference (data not tabled).

DISCUSSION

In the 2009 World Health Organisation (WHO) report Future Use of Materials for Dental Restoration[10] a number of recommendations was made relating to a possible phasing down

of the use of amalgam, including a recognition that training in use of materials alternative to dental amalgam is desirable, especially the need for dental schools to maintain teachers' and students' understanding of ever-evolving technology. It recognised that variations in teaching, techniques and technologies used exist and the subsequent challenges are significant.

Knowledge

The themes and factors identified by the present authors[12] and reproduced at Table 1 were accompanied by a concern of dentists that some colleagues lacked a breadth of philosophical approach to their decision-making and this was "grounded on a lack of understanding of the materials". This was particularly so of those dentists who engage in 'non-amalgam' practises and the rigid mindset of so-called 'dinosaurs' in the profession. The present authors found that such decision-making appeared to be based less on the available evidence and more on what the dentist perceived as 'working well'. The need to keep abreast of change was identified. Confusion over the evidence-base in general, but especially that relating to direct restorative materials, was identified, including confusion as to what constituted the evidence-base, appropriate sources of information, what depth or breadth of evidence was required to be known by the general dentist, how was the information best accessed and how to analyse and synthesise conflicting recommendations. In relation to amalgam and resin composite it has been suggested that much of the existing evidence is deficient[16-18] and there is a need for randomised, controlled trials or systematic reviews based on such trials.[16] These barriers to implementation of an evidence-based approach have been examined and the potential outcome described as 'practice inertia'.[19]

Evidence-based decision-making

Evidence-based decision-making may be described as "the integration of the best research evidence with clinical expertise and patient values."[20] The provision of adequate care by dentists is reliant, to a great degree, on decision-making processes being based on the available evidence. Dentists access this evidence[21] but how they do so is poorly understood. It has been shown that the utilisation of an evidence-based approach to decision-making varies according to years since graduation.[19] It has been suggested that lack of implementation of an evidence-based approach is a mixture of awareness and familiarity with the evidence[19] and decision-making based on 'opinion' and 'observations'.[22, 23] Fox et al.,[24]

recognising this issue, identified the need for better attention to development of skills in the evaluation and synthesis of the evidence-base in undergraduate education, increasing the ability of dentists entering the workforce to apply an evidence-based approach. Others emphasise the importance of postgraduate education in ensuring the uptake and implementation of 'translational' research which "engages practitioners in a way that promotes implementation of contemporary research findings."[25] Carrasco-Labra et al[26] agree with and expand upon these ideas, emphasising a need for clinical guidelines based on the evidence-base but also suggesting that dentists be able to assess such guidelines and recommendations, as the quality of these varies widely. They recognise that guidelines "cannot cover all types of patients and clinical scenarios" and therefore dentists relying on their own clinical judgement remains an important factor.

The series of statements relating to the evidence-base resulted in various findings. When responses to the statement 'Knowing the evidence-base is important' (Table 7) are compared to those for 'I practise evidence-based dentistry (where the evidence exists)' (Table 8) the rate of neutral/undecided responses is greater for the latter statement, which suggests that while most practitioners agree they 'should' have knowledge of the evidence-base, they have concerns as to whether they actually employ it. This may be a reflection of a lack of understanding of what the evidence-base actually is or merely a lack of its implementation. It may therefore be assumed that some dentists practice what they 'believe' to be evidence-based dentistry without being sure. This is reinforced by responses to the statements contained at Tables 9 to 11, which relate to the 'depth' of evidence-base required and the conflicting or contradictory nature and understandability of the available evidence. The overall inference from the responses is that the need for knowledge of the evidence exists. Dentists 'think' they are practising it but many are uncertain as to whether their understanding is at the required depth (57 per cent (strongly) agreeing or neutral/undecided as to whether they are 'confused'). Dentists also find the evidence conflicted or contradictory (75 per cent (strongly) agreeing or neutral/undecided) and feel the evidence-base is too scientific and not readily understood by the 'general clinician' (61 per cent (strongly) agreeing or neutral/undecided).

Of note with all of the statements relating to evidence-base was, at times, the statistically significant difference of responses from those identifying practice type as 'other' (hospital, postgraduate study, and university/teaching/research). As identified in earlier Parts of this

research series,[4, 13] this may reflect a better understanding of the evidence-base of those in academic and teaching environments compared to those in general practice. This finding is mirrored by those who obtained their primary dental qualification 'earlier'. The reason for this finding is unknown but possibly a reflection of an ability to better identify, analyse and synthesise the available information, borne from years of experience.

As to ability to access such information, 58 per cent (strongly) disagreed and were neutral/undecided that such information is easily accessed. A statistically significant difference was again identified for respondents naming their practice type as 'other' (hospital, postgraduate study, and university/teaching/research) which may, in part, explain why those in academic and teaching environments have greater confidence in their understanding of the evidence-base. This finding is also apparent with those identifying practice type as 'public' and this may be due to greater support to attend and exposure to continuing professional development available to those in the public sector along with provision of periodically updated clinical guidelines based on the available evidence-base.[d]

Education

It is established that there exists a 'divide' between the teaching practices of dental schools and practises of dentists.[27] It is also recognised that the teaching of alternatives to amalgam has implications for undergraduate curricula and continuing professional development.[28-30] A 2003 survey of Australian dentists found that 'lecturers' suggestions' was a major influence on dentists' choice of materials.[31] Educational organisations' approaches to the teaching of direct restorative materials vary,[32-35] with some not teaching use of amalgam and others planning its removal from the curriculum.[36, 37]

Ben-Gal and Weiss[30] identified clinical teachers who employ "convenience and long experience in using amalgam [which] biases the choice." They similarly identified that the teaching of resin composite was influenced by the 'prevailing trend' and was not always evidence-based. Another finding was that more experienced dentists were "inclined towards established methods and materials, reflecting longer clinical experience in validating their choices." The authors concluded that curricula should not be influenced solely by

[d] For example, Dental Health Services Victoria provide online access to their own clinical guidelines for use by employees and associates of the Organisation. See https://extranet.dhsv.org.au/agency-governance/dhsv-clinical-guidelines. Accessed December 2014.

'professional environment and trends' and that attention should be given to the differences in philosophy between older and younger clinical teachers.

Various studies by Lynch, McConnell and Wilson throughout the 2000s[28, 34, 38-41] identified that curricula were not incorporating modern, accepted techniques and therefore graduates were entering the workforce with a level of incompetence regarding direct restorative treatment of posterior teeth. These issues have been well-discussed in the past, with commentary by Lynch et al[37] describing the "disconnect between clinical practice and expert opinion ... custom and practice being perpetuated" and the "long lag time between changes in teaching and impact on clinical practice."

More recently Rey et al[42] in a study of United States dental schools found a need for curriculum alignment which reflected the evolving body of knowledge relating to direct restorative materials.

Undergraduate experiences

The findings of this study regarding dentists' perceptions of competence on graduation in placement of amalgam and resin composite suggest that while the majority of respondents felt competent, this varied with year of graduation, with those graduating more recently feeling less competent. This could be due to a number of factors, including older respondents' difficulty of recall alongside a greater degree of technical proficiency gained throughout years of practice. Also possible is that the current teaching of amalgam is less intensive than in previous years and this may be further influenced by the experience and training of the clinical teachers, as previously described.[30]

There was a finding of more uncertainty with competence regarding the placement of resin composite compared to amalgam with more respondents (strongly) disagreeing that they felt competent on graduation. As with amalgam, this may reflect a lack of training in the use of the material or the perception that resin composite is a technically more difficult material to place. As identified by the present authors in an earlier study,[12] this may be a reflection of some not fully appreciating the technical requirements of amalgam placement, a further symptom of lack of training. Irrespective of reasons, it highlights the importance of undergraduate education on clinical competence to placement of direct restorative materials.

Responses to the statement regarding pre-clinical and clinical teachers' consistency of teaching revealed that those graduating more recently experience greater inconsistency of 'message', perhaps reflecting the increased range of materials and techniques available and hence increased and varied philosophical approaches. In this respect it may be stated that there are seldom 'right' or 'wrong' ways, merely 'preferred' ways, and each case must be approached according to its merits,[26] but that undergraduate level teaching should aim for a fundamental calibration of teachers so that everyone is 'on the same page'. It may be appropriate for clinical teachers, and more broadly educational institutions, to better convey these principles to undergraduate students so that they appreciate that different messages from their teachers are not necessarily 'wrong' but merely a reflection that many potential approaches to direct restorative treatment exist. This is where the use of clinical guidelines, even if used as a reference to 'preferred' techniques, may be of value.

Of note is the finding that those respondents who gained their primary dental qualification overseas found greater consistency of message from clinical teachers, the significance of which is unknown and difficult to draw conclusions from given the breadth of places overseas from which the respondents graduated but which may warrant further investigation.

Post-graduation experiences

Tables 5 and 6 relate to aspects of experiences post-graduation and examine dentists' perceptions of aspects of 'vocational' training, the premise being that undergraduates are not adequately prepared for the 'real world' by virtue of inappropriate undergraduate teaching and that this has a significant influence on restorative decision-making.[12] This potential disconnect was reflected in the findings of this study, with a significant divergence of opinion from all respondents, 52 per cent (strongly) agreeing and 31 per cent (strongly) disagreeing that a disconnect exists. The cause of this may lie in the type of practice that a dentist finds her/himself in immediately after graduation and merely be a reflection of the diversity of philosophical approaches that exist in modern general dental practice. This finding is reinforced by the comparison of responses from those in public and private practises, with those dentists practicing privately experiencing more of a disconnect. Those practising privately who obtained their primary dental qualification earlier experienced less of a disconnect, which may be an illustration of the lesser range of treatment techniques available in years past. As to dentists in the public sector, it is assumed this is due to the lesser range of techniques and procedures many in this field experience and hence less of a possibility that

differences will occur. It may also be because many undergraduate students receive clinical training in the public sector. Overall it emphasises the need for these issues to be recognised and discussed at undergraduate level so as to best prepare graduates for their future experience.

The two highest ranked influences on restorative decision-making post-graduation were found to be 'Continuing professional development' and 'My reading of various literature' with 'Information provided by dental material suppliers and manufacturers' ranked last. This reflects a reliance on postgraduate education in the face of an ever-evolving field and the perceived importance of evidence-based information compared to less 'scientific' or potentially biased sources of information such as that from colleagues and/or suppliers and manufacturers. Caution must be had when defining continuing professional development as it is the present authors' experience that some such events contain much material influenced by commercial interests. The comments of Carrasco-Labra et al,[26] as discussed above, serve as a warning in this respect and are echoed by the present authors with the suggestion that continuing professional development events sanctioned by organisations of influence contain appropriate content.

The present authors previously described the pattern of declining use of amalgam relative to year of primary dental qualification and found the mean use of amalgam to be 18 per cent. Commentary suggested influences included undergraduate training and clinical environment post-graduation but no analysis was conducted regarding the possible influence of postgraduate education.[4] Given the educational focus of this paper comparisons were made between those respondents who possessed postgraduate qualifications, such as Members and Fellows of the Royal Australasian College of Dental Surgeons, postgraduate diplomas and certificates in clinical dentistry and various specialities such as Prosthodontics, and those only possessing a primary dental degree. The mean use of amalgam was found to be higher (24 per cent; n=88) but not of statistical significance. When comparisons were made to responses given to those questions described at Tables 6 to 12 there was also no statistically significant difference although responses to the question "A major influence on my restorative decision-making has been …?" (Table 6) showed a greater weighting to 'post-graduate education including continuing professional development' and 'my reading of various literature'. It may be surmised that postgraduate education moderately influences restorative decision-making.

A need for 'clinical guidelines'?

The WHO has recognised that, in the context of any phase-down of amalgam, the "development and dissemination of clinical guidelines for making dental restorations" is critical.[10] Various guidelines exist but the clinical usefulness of these has been questioned.[43, 44] The consistency of quality of such guidelines has been questioned with the recommendation that dentists be able to identify this when looking to apply an evidence-based approach.[26] Carrasco-Labra et al[26] identify recent examples of such guidelines, and for a specific example of relevance to this study the reader is referred to guidelines for the use of resin composite produced by the British Association of Teachers of Conservative Dentistry.[33] Given concerns regarding the utilisation of such information, and in the light of the previous discussion regarding the reliability of the available evidence-base, approaches to dissemination of any such material must be managed carefully.[22, 23]

LIMITATIONS

The limitations and potential sources of error have been described previously.[13] Essentially they include: generalizability and sampling error, given the survey was made available to members of the ADA and Members or Fellows of the RACDS and not to all registered dentists in Australia; survey design and measurement error, given the predominantly 'closed' question and self-administration nature of the survey; self-selection bias due to participation in the survey being voluntary; and non-response error. Consideration should be given to 'recall error', whereby the greater the length of the period being recalled may result in the greater the expected bias.[45]

CONCLUSIONS

It is imperative that any phase-down of amalgam be accompanied by an approach to under- and post-graduate training that is clearly based on the evidence and not on professional trends. The clinical training in the use of materials alternative to dental amalgam is considerable, and there is a need for dental schools to maintain teachers' and students' understanding of ever evolving technology. This, combined with a 'calibration' of clinical teachers will best address the perceived disconnect between the undergraduate and the 'real' world; what may be described as an emphasis on vocational training.

It is suggested that the creation of evidence-based clinical guidelines by educational and professional organisations relating to direct restorative materials which are accessible, where possible unequivocal, and understandable, would be timely and of value. This is not to deny the need for dentists to be able to rely on their own clinical judgement.

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TABLES

Table 1. Knowledge sub-themes and factors (reproduced from Alexander G, Hopcraft M, Tyas MJ, Wong R. Dentists' restorative decision-making and implications for an 'amalgamless' profession. Part 2: a qualitative study. Aust Dent J 2014;59:420-431)

Sub-theme	**Factor**	**Sub-factor**
Experience	Clinical environment	Non-amalgam practice
	Undergraduate teaching experiences	Lecturers
		(pre)clinical teachers
		Educational policy
		Curriculum design
Education	Literature	Evidence-base
Access	Continuing professional development	Policy-makers
Manufacturers & retailers		

Table 2. Responses to the statement: "When I graduated, I was competent at placing amalgams"

				Primary dental qualification												
	All	Gender (n=332)		Year (n=317)				Place (n=327)		Amalgam Use (n=327)		Practice Location (n=327)		Practice Type (n =316)		
		Female	Male	<1960	1960-1979	1980-2000	>2000	Australia	Overseas	Yes	No	Metro	R/R/R	Private	Public	Other
	(n=347)	(n=125)	(n=207)	(n=2)	(n=62)	(n=140)	(n=113)	(n=243)	(n=84)	(n=235)	(n=92)	(n=237)	(n=90)	(n=266)	(n=29)	(n=21)
(Strongly) disagree	5	2	6	0	5	4	6	6	0	4	4	4	6	4	3	10
Neutral/Undecided	4	6	2	0	3	1	8	4	4	4	3	4	3	3	6	9
(Strongly) agree	91	92	91	100	92	94	87	90	96	91	93	91	91	92	91	82
%	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Table 3. Responses to the statement: "When I graduated, I was competent at placing resin composite"

				Primary dental qualification												
	All	Gender (n=329)		Year (n=328)				Place (n=322)		Amalgam Use (n=327)		Practice Location (n=326)		Practice Type (n =321)		
		Female	Male	<1960	1960-1979	1980-2000	>2000	Australia	Overseas	Yes	No	Metro	R/R/R	Private	Public	Other
	(n=347)	(n=124)	(n=205)	(n=2)	(n=62)	(n=146)	(n=118)	(n=238)	(n=84)	(n=235)	(n=92)	(n=236)	(n=90)	(n=271)	(n=29)	(n=21)
(Strongly) disagree	28	18	34	100	50	29	28	30	26	27	32	28	28	29	26	14
Neutral/Undecided	18	18	18	0	19	17	16	19	15	21	11	18	18	18	10	27
(Strongly) agree	53	64	47	0	31	54	56	52	59	53	56	53	55	52	65	59
%	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Table 4. Responses to the statement: "My pre-clinical and clinical teachers (demonstrators) were consistent in their teaching of restorative dentistry; they were all 'on the same page'"

				Primary dental qualification												
	All	Gender (n=329)		Year (n=336)				Place (n=326)		Amalgam Use (n=327)		Practice Location (n=326)		Practice Type (n =321)		
		Female	Male	<1960	1960-1979	1980-2000	>2000	Australia	Overseas	Yes	No	Metro	R/R/R	Private	Public	Other
	(n=347)	(n=124)	(n=205)	(n=2)	(n=64)	(n=150)	(n=120)	(n=243)	(n=83)	(n=235)	(n=92)	(n=237)	(n=89)	(n=270)	(n=30)	(n=21)
(Strongly) disagree	23	29	18	0	13	18	46	26	13	23	22	24	21	23	22	23
Neutral/Undecided	19	17	20	50	19	21	15	20	14	19	19	17	24	18	22	23
(Strongly) agree	58	54	61	50	68	61	40	53	73	57	60	59	55	60	57	54
%	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Table 5. Responses to the statement: "There was a real difference between that which I was taught at university, and that which I first experienced in the 'real world'"

				Primary dental qualification												
	All	Gender (n=330)		Year (n=331)				Place (n=337)		Amalgam Use (n=328)		Practice Location (n=334)		Practice Type (n =322)		
		Female	Male	<1960	1960-1979	1980-2000	>2000	Australia	Overseas	Yes	No	Metro	R/R/R	Private	Public	Other
	(n=347)	(n=125)	(n=205)	(n=2)	(n=64)	(n=148)	(n=117)	(n=248)	(n=89)	(n=235)	(n=93)	(n=244)	(n=90)	(n=270)	(n=31)	(n=21)
(Strongly) disagree	31	30	32	0	43	43	16	29	35	34	26	31	29	31	37	32
Neutral/Undecided	17	22	14	0	15	10	18	17	16	18	14	14	20	16	19	23
(Strongly) agree	52	48	54	100	43	47	65	55	50	48	60	55	51	53	43	46
%	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Table 6. Responses to the question: "A major influence on my restorative decision-making has been …?" 1= 'not important'; 5 = 'very important'.

Factor	1	2	3	4	5	%	n=	Rank*
Post-graduate education including continuing professional development	2	3	10	40	45	100	332	1
My reading of various literature	1	4	19	45	31	100	332	2
Undergraduate teachers e.g., lecturers and demonstrators	9	21	23	28	19	100	330	3
Colleagues	7	19	28	33	13	100	332	4
Information provided by dental material suppliers and manufacturers	19	32	32	14	2	100	330	5

* Rank by percentage of total responses being 4 and 5

Table 7. Responses to the statement: "Knowing the evidence base is important"

			Primary dental qualification					
	All	Gender (n=333)	Year (n=319)	Place (n=330)	Amalgam Use (n=331)	Practice Location (n=330)	Practice Type (n =325)	

		Female	Male	<1960	1960-1979	1980-2000	>2000	Australia	Overseas	Yes	No	Metro	R/R/R	Private	Public	Other
	(n=347)	(n=126)	(n=207)	(n=2)	(n=62)	(n=142)	(n=113)	(n=246)	(n=84)	(n=239)	(n=92)	(n=240)	(n=90)	(n=272)	(n=32)	(n=21)
(Strongly) disagree	0	1	0	0	0	1	1	0	0	0	1	0	1	0	0	0
Neutral/Undecided	3	3	3	0	2	3	4	2	8	3	5	3	5	1	1	0
(Strongly) agree	96	96	96	100	99	97	95	97	92	97	94	97	94	98	99	100
%	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Table 8. Responses to the statement: "I practise evidence-based dentistry (where the evidence exists)"

					Primary dental qualification											
	All	Gender (n=333)			Year (n=312)			Place (n=328)		Amalgam Use (n=331)		Practice Location (n=330)		Practice Type (n =324)		
		Female	Male	<1960	1960-1979	1980-2000	>2000	Australia	Overseas	Yes	No	Metro	R/R/R	Private	Public	Other
	(n=347)	(n=125)	(n=208)	(n=2)	(n=62)	(n=140)	(n=108)	(n=244)	(n=84)	(n=239)	(n=92)	(n=240)	(n=90)	(n=274)	(n=29)	(n=21)
(Strongly) disagree	1	1	0	0	0	1	0	0	3	1	1	1	1	1	0	0
Neutral/Undecided	11	9	12	0	14	13	6	10	14	9	13	10	14	11	9	14
(Strongly) agree	89	90	88	100	86	86	94	90	83	90	85	89	85	88	91	86
%	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Table 9. Responses to the statement: "I am confused as to what 'depth' of evidence base I should know"

					Primary dental qualification											
	All	Gender (n=330)			Year (n=318)			Place (n=327)		Amalgam Use (n=328)		Practice Location (n=327)		Practice Type (n =322)		
		Female	Male	<1960	1960-1979	1980-2000	>2000	Australia	Overseas	Yes	No	Metro	R/R/R	Private	Public	Other
	(n=347)	(n=125)	(n=205)	(n=2)	(n=62)	(n=141)	(n=113)	(n=243)	(n=84)	(n=236)	(n=92)	(n=237)	(n=90)	(n=270)	(n=31)	(n=21)

(Strongly) disagree	43	42	43	50	49	46	39	44	36	40	48	47	31	42	37	55
Neutral/Undecided	30	28	31	0	26	30	31	29	32	32	24	28	33	30	34	18
(S)trongly agree	27	30	26	50	24	23	31	27	32	27	28	24	35	27	28	27
%	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Table 10. Responses to the statement: "The evidence base is often conflicting and contradictory"

							Primary dental qualification									
	All	Gender (n=332)		Year (n=317)				Place (n=329)		Amalgam Use (n=330)		Practice Location (n=329)		Practice Type (n =324)		
		Female	Male	<1960	1960-1979	1980-2000	>2000	Australia	Overseas	Yes	No	Metro	R/R/R	Private	Public	Other
	(n=347)	(n=125)	(n=207)	(n=2)	(n=62)	(n=140)	(n=113)	(n=245)	(n=84)	(n=238)	(n=92)	(n=239)	(n=90)	(n=272)	(n=31)	(n=21)
(Strongly) disagree	25	22	25	50	31	23	23	23	27	26	20	27	17	24	28	32
Neutral/Undecided	35	40	32	0	44	34	32	35	36	37	31	33	40	35	38	32
(Strongly) agree	40	38	42	50	26	44	44	42	37	37	49	40	43	42	34	37
%	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Table 11. Responses to the statement: "Literature discussing the evidence base is too scientific and not readily understood by the 'general clinician'"

							Primary dental qualification									
	All	Gender (n=332)		Year (n=318)				Place (n=329)		Amalgam Use (n=330)		Practice Location (n=329)		Practice Type (n =324)		
		Female	Male	<1960	1960-1979	1980-2000	>2000	Australia	Overseas	Yes	No	Metro	R/R/R	Private	Public	Other
	(n=347)	(n=125)	(n=207)	(n=2)	(n=62)	(n=141)	(n=113)	(n=245)	(n=84)	(n=238)	(n=92)	(n=239)	(n=90)	(n=272)	(n=31)	(n=21)
(Strongly) disagree	50	50	51	50	58	50	49	51	48	55	43	54	43	48	55	60
Neutral/Undecided	23	24	23	50	24	23	19	22	28	21	29	22	25	25	16	22

(Strongly) agree	26	26	27	0	18	27	32	28	24	24	28	24	32	27	29	17
%	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Table 12. Responses to the statement: "Information regarding the evidence base is easily accessed"

				Primary dental qualification											
	All	Gender (n=329)		Year (n=328)			Place (n=326)		Amalgam Use (n=327)		Practice Location (n=326)		Practice Type (n =321)		
		Female	Male	<1960	1960-1979	1980-2000	>2000	Australia	Overseas	Yes	No	Metro	R/R/R	Private	Public	Other
	(n=347)	(n=124)	(n=205)	(n=2)	(n=64)	(n=148)	(n=114)	(n=242)	(n=84)	(n=235)	(n=92)	(n=236)	(n=90)	(n=270)	(n=30)	(n=21)
(Strongly) disagree	28	21	32	0	24	25	41	30	23	27	28	26	32	29	28	14
Neutral/Undecided	30	35	28	0	29	33	24	29	37	30	32	31	29	34	13	14
(Strongly) agree	42	45	40	100	47	41	35	42	41	43	40	42	38	37	59	71
%	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100