

IN BRIEF

- It is possible for primary care dentists to agree referral criteria following school dental screening.
- This study reinforces earlier research which suggests that caries in the primary dentition is not perceived as an important trigger for referral following school dental screening.
- Standardisation of the referral criteria used in school dental screening is likely to enhance the quality of this dental public health activity.
- School dental screening is not seen by the profession as a vehicle to increase dental registration.

VERIFIABLE
CPD PAPER

The development of a consensus among primary care dentists of referral criteria for school dental screening

P. I. Kearney-Mitchell,¹ K. M. Milsom,² A. S. Blinkhorn³ and M. Tickle⁴

Objective To obtain consensus amongst a sample of primary care dentists in the North West of England on a set of clinical criteria that should trigger referral following school dental screening.

Design Delphi process.

Setting Primary dental care, England 2002.

Method Primary care dentists in the North West of England were randomly selected to complete a two round 'Delphi exercise' that included 10 potential referral criteria. The dentists were invited to express their level of support for the inclusion of each referral criterion.

Main outcome measures Level of agreement for each referral criterion. Acceptance of any criterion was that the interquartile range should be no more than 3 scale points with the lower value being no less than 7.

Results Eighty-eight dentists, (72.7%), completed the Delphi exercise. Six referral criteria met with the groups' approval:

- Child with caries in permanent dentition
- Child with darkened/discoloured permanent incisors
- Child aged 9-10 years with overjet greater than 10 mm
- Child over six years with either gross plaque, calculus or swollen gums
- Child with evidence of sepsis
- Child registered with a GDP with caries in permanent dentition.

Conclusion It is possible for a representative sample of primary care dentists in the North West to agree referral criteria following school dental screening.

INTRODUCTION

The National Screening Committee (NSC) advises the Secretary of State for Health within the Department of Health of England and in the health departments of Wales, Scotland and Northern Ireland.¹ Two of the main roles of the National Steering Committee are:

- To advise on the case for continuing, modifying or withdrawing existing population screening programmes: in particular, programmes inadequately evaluated or of doubtful effectiveness, quality, or value
- To improve the quality of screening.

The National Screening Committee claims that one of the key features of any screening programme is having explicit quality standards and that robust approaches are necessary to ensure that quality assurance is guaranteed.²

School dental screening has been a statutory activity since 1918,³ and falls within the area of responsibility of the National Screening Committee. In England and Wales, school dental screening is undertaken in an *ad hoc* fashion by Primary Care Trusts.⁴ There is confusion about the aims and little standardisation about the way that the process is delivered.⁵ Currently, only dentists are entitled to undertake the school dental screening test in the UK⁶ and the decision taken by a dentist to refer a child for further investigation following screening is a key feature of the screening process. This aspect of the school dental screening programme ought to be amenable to standardisation, yet it is acknowledged that throughout England and Wales, there is wide variation in the range of conditions that are used by dentists as prompts for referral following school dental screening.⁷

Despite the lack of evidence of its effectiveness and the questionable quality standards associated with the process, school dental screening has enjoyed longstanding political support.⁸ However, in 2000, the Government acknowledged that school dental screening '*...is not working at its best throughout the country*' and that the process needed overhauling.⁹

In an attempt to improve the quality of the school dental screening process a Delphi exercise was undertaken to identify whether dentists working within primary care in the North West of England could agree a set of criteria that should trigger a referral following school dental screening. An earlier pilot study using the same technique¹⁰ had suggested that local agreement amongst dentists was possible, but it was not clear whether similar consensus could be achieved across a wider 'regional' footprint.

METHOD

Delphi is the name given to procedure developed by the RAND Corporation in the 1950s to obtain consensus among a group of

¹Dental Public Health Co-ordinator, Halton NHS Primary Care Trust, Victoria House, The Holloway, Runcorn WA7 4th; ²Consultant in Dental Public Health, Halton Primary Care Trust, Victoria House, The Holloway, Runcorn WA7 4th / OHU-NPCRDC, Manchester University Dental School, Higher Cambridge Street, Manchester; ³Professor of Oral Health, OHU-NPCRDC, Manchester University Dental School, Higher Cambridge Street, Manchester; ⁴Professor of Dental Public Health & Primary Care, OHU-NPCRDC, Manchester University Dental School, Higher Cambridge Street, Manchester
*Correspondence to: Dr Martin Tickle
Email: martin.tickle@manchester.ac.uk

Refereed paper

Accepted 15 June 2005

doi: 10.1038/sj.bdj.4813525

© British Dental Journal 2005; 200: 509-512

experts.¹¹ Like committee meetings, Delphi exploits the collective experience of the group members through an interactive process. The Delphi, however, avoids many of the pitfalls of conferences by delivering the communicative process in a unique manner:¹²

- Communication is structured, usually as an unambiguous set of questions
- Anonymity of the participants is preserved
- There is feedback after each stage of the iterative process
- Delphi produces a statistical group response.

The conventional 'Delphi exercise' involves a questionnaire that is designed by a facilitator and posted to each participant. Upon its return, the facilitator summarises the responses and returns this summary to each of the participants with a request for each individual to rescore the questionnaire in light of the collective group response. The participants are able to reassess their opinions in the light of other (anonymous) participants' comments and make a revised judgement. The process continues until a steady state is reached.

The study population were all primary care dentists in the North West of England. General Dental Service (GDS) and Community Dental Service (CDS) dentists were included in the study according to a 10:1 ratio. The proportions of GDS to CDS dentists were chosen to reflect the relative proportions of GDS and CDS dentists in the profession. A 10% sample was considered of sufficient size to provide a representative view from the population and to ensure that the logistical aspects of the study were manageable.

Lists of all NHS non-specialist general dental practitioners (GDPs) were requested from 11 local Health Authorities in the North West of England. From these lists, a master list of all GDPs was drawn up and a simple, random sample selected. The Dental Service Managers of all 18 Community Dental Services in the North West were asked to supply lists of all Community Dental Officers who were involved in their school dental screening programmes. From a master list of all eligible CDS dentists, a simple random sample was drawn.

Following a review of the available literature and in light of the results of the previously published pilot study,¹⁰ a list of clinical conditions that were likely to trigger a referral following school dental screening was compiled (the criteria).

All of the GDS and CDS dentists selected for inclusion in the Delphi exercise (the participants) were contacted by letter with an outline explanation of the study and an invitation to take part in it. Enclosed with the covering letter was a scoring form containing the list of provisional criteria. The dentists were asked to score each criterion on a scale of 1-9, where 1 indicated definitely no need for referral and 9 indicated a definite need for referral. In addition the dentists were asked if there were any other clinical conditions that they felt should be included in the list of criteria. Any new item suggested by more than 25% of the corresponding dentists was added to the list of criteria before inviting the participating dentists to re-score the revised list in the second round of the Delphi process.

The dentists were asked to complete the first round questionnaire and return it in a pre-paid envelope within two weeks. Two weeks after the questionnaire was sent out a reminder letter and a further questionnaire were sent out to non responding dentists, asking for the questionnaire to be returned within a further two weeks. After one month those dentists who had failed to respond were contacted by telephone.

The responses were aggregated and levels of agreement amongst responders were assessed using two linked parameters. Firstly the median score of responses was used to measure the overall assessment by the group for each criterion's inclusion. The higher the median value, the greater the group's desire to include that criterion. Secondly, the interquartile range was used to meas-

Table 1 Proposed referral criteria following school dental screening

Child with permanent canines in maxillary arch that cannot be palpated
Child with caries in the permanent dentition
Child with caries in the deciduous dentition
Child with darkened/discoloured permanent incisors
Child aged 9-10 years with overjet greater than 10 mm
Child over 6 years with either gross plaque, calculus or swollen gums
Child registered with a GDP with caries in permanent dentition
Child registered with a GDP with caries in deciduous dentition
Child with evidence of sepsis
Child not registered with a GDP

ure the collective strength of feeling by the group for each criterion's inclusion. The narrower the interquartile range the more united was the group thinking on the criterion. The study steering group arbitrarily agreed that for any criterion to be accepted the interquartile range should be no more than 3 scale points with the lower value being no less than 7.

All dentists who replied to the first questionnaire were sent the summary of the group scores for each criterion together with a copy of their own scores for each criterion from the first questionnaire. Dentists were then asked to reconsider each criterion and re-score it in light of their own and the group's summarised first round scores. All responders were asked to return the second questionnaire within a two week time period. Non-responding dentists were sent a reminder along with another copy of the first round results. The responses of the second questionnaire were analysed in the same way as the first.

Finally, the demographic differences between responders and non-responders were examined to check for the possible presence of non-response bias.

RESULTS

One thousand and eighty seven non-specialist, general dental practitioners (GDPs) were identified in 11 local Health Authorities in the North West of England and 120 (11%) were randomly selected for inclusion in the study. Within the Community Dental Service (CDS), 79 dentists were identified as being eligible and 12 (15%) were randomly selected, giving a total sample of 121 participating dentists. The list of 10 potential referral criteria that formed the basis of the Delphi process, and which was sent to each participating dentist, is shown in Table 1.

Response to first round of Delphi exercise

The 121 participating dentists were sent by post a copy of the potential referral criteria. Within two weeks of the first posting 54, (44.6%) responses were returned.

Following a written reminder to the non-responders, a further 32 questionnaires were returned within two weeks. A further follow-up telephone call to those who had failed to respond led to a further two responses, giving a total sample for analysis of 88 (72.7%). No new criteria for referral following the school dental screening were suggested by the participating dentists in the first round Delphi exercise.

Analysis of first round results

Table 2 sets out the median scores and interquartile range scores for each of the 10 criteria following the first round of questionnaires. The results show that for nine of the 10 criteria, the median score was 7 or above, suggesting that there was general group agreement that nine criteria should be included. One criterion, 'child registered with a GDP with caries in deciduous dentition', with a median score of 5.0, failed to meet the agreed score for group acceptance.

Table 2 The median scores and interquartile range scores for each of the ten criteria following the first round of questionnaires (n = 88)

Criteria	Median Score	25th Percentile	75th Percentile
Child with permanent canines in maxillary arch that cannot be palpated	7.0	5.0	9.0
Child with caries in the permanent dentition	9.0	9.0	9.0
Child with caries in the deciduous dentition	7.0	5.0	9.0
Child with darkened discoloured permanent incisors	9.0	7.0	9.0
Child aged 9-10 years with overjet greater than 10 mm	9.0	7.0	9.0
Child over 6 years with either gross plaque, calculus or swollen gums	9.0	7.0	9.0
Child registered with a GDP with caries in permanent dentition	9.0	6.25	9.0
Child registered with a GDP with caries in deciduous dentition	5.0	2.0	7.0
Child with evidence of sepsis	9.0	9.0	9.0
Child unregistered with a GDP	8.0	5.0	9.0

Table 3 The median scores and interquartile range scores for each of the 10 criteria following the first and second round of questionnaires (n = 88)

Criteria	Results of 1st Round			Results of 2nd Round		
	Median Score	25th Percentile	75th Percentile	Median Score	25th Percentile	75th Percentile
Child with permanent canines in maxillary arch that cannot be palpated	7.0	5.0	9.0	7.0	5.5	9.0
Child with caries in the permanent dentition	9.0	9.0	9.0	9.0	9.0	9.0
Child with caries in the deciduous dentition	7.0	5.0	9.0	7.0	6.0	9.0
Child with darkened/discoloured permanent incisors	9.0	7.0	9.0	9.0	8.0	9.0
Child aged 9-10 years with overjet greater than 10 mm	9.0	7.0	9.0	9.0	8.0	9.0
Child over 6 years with either gross plaque, calculus or swollen gums	9.0	7.0	9.0	9.0	8.0	9.0
Child registered with a GDP with caries in permanent dentition	9.0	6.25	9.0	9.0	7.0	9.0
Child registered with a GDP with caries in deciduous dentition	5.0	2.0	7.0	5.0	3.0	7.0
Child with evidence of sepsis	9.0	9.0	9.0	9.0	9.0	9.0
Child unregistered with a GDP	8.0	5.0	9.0	8.0	6.0	9.0

When the agreed group standard of having an interquartile range of three scale points with the lower point being 7 was considered, five criteria failed to meet the standard, leaving five criteria that were acceptable to the group following the first round of the Delphi process:

- Child with caries in permanent dentition
- Child with darkened/discoloured permanent incisors
- Child aged 9-10 years with overjet greater than 10 mm
- Child over six years with either gross plaque, calculus or swollen gums
- Child with evidence of sepsis.

Analysis of second round results

In the second round of the Delphi exercise, dentists were asked to respond in the light of the collective group decisions about each criterion. In all, 54 dentists (61%) changed their response in some way between the first and second rounds of the Delphi exercise. Thirteen dentists (14.7%) failed to respond to the written reminder sent out two weeks after the second round had been posted and for these dentists, their second round scores were treated as being identical to their first round scores.

Table 3 sets out the median scores and interquartile range scores for each of the 10 criteria following the second round of questionnaires; the results of the second round are set alongside the results of the first round scores for ease of comparison. It shows that despite the fact that the majority of participating dentists did adjust their second round scoring slightly in the light of the consensus view from the first round, there was little significant change to the scoring for each of the criteria. For two criteria, 'Child with caries in the permanent dentition', and 'Child with evidence of sepsis', maximum scores were returned by the respondents in the second round, as in the first round. For three criteria,

'Child with darkened/discoloured permanent incisors', 'Child aged 9-10 years with overjet greater than 10 mm' and 'Child with either gross plaque, calculus or swollen gums' the group interquartile range narrowed by one scale point, (from 2 to 1) after the second round of questionnaires. These three criteria had already met the inclusion criteria in the first round. Four criteria, 'Child with permanent canines in maxillary arch that cannot be palpated', 'Child with caries in the deciduous dentition', 'Child registered with a GDP with caries in deciduous dentition' and 'Child unregistered with a GDP' were rejected by the respondents in the second round of questionnaires as they were in the first round. The status of only one criterion, 'Child registered with a GDP with caries in permanent dentition' changed following the second round of questionnaires. The interquartile range for this criterion reduced from 3.75 to 3, with the lower point being no less than 7, and therefore the group's standards for inclusion were met.

Thus out of the possible 10 criteria that the participating dentists were asked to consider, five were accepted after both first and second rounds of the Delphi process, and one further criterion, rejected after the first round, was accepted after two rounds of the Delphi process. In total then, six criteria were accepted by the group:

- Child with caries in permanent dentition
- Child with darkened/discoloured permanent incisors
- Child aged 9-10 years with overjet greater than 10 mm
- Child over six years with either gross plaque, calculus or swollen gums
- Child with evidence of sepsis
- Child registered with a GDP with caries in permanent dentition.

In order to establish if those dentists that responded to the Delphi exercise were different in some way to those who failed to respond, three demographic characteristics were considered:

- Gender
- Townsend score of electoral ward of residence of the practice
- Number of years since qualification,

No statistical differences were found in the values of these three characteristics between responders and non-responders, suggesting that the effect of non-response from 27.3% of the population was negligible.

DISCUSSION

It is clear from this study that clinicians working in the General Dental Services and Community Dental Services in the North West of England are able to agree on clinical criteria for the referral of children following school dental screening. Initially there were a total of 10 potential referral criteria that the participating dentists were asked to consider and they were given the opportunity of introducing other criteria if they felt it appropriate. In the event, no other referral criteria were suggested that met the group standard for inclusion. After two rounds of the Delphi technique, six criteria were identified as being appropriate for use in the school dental screening process.

The Delphi exercise is best suited to problems that involve a mixture of scientific evidence and social values¹² and as such is applicable to issues associated with school dental screening. However, there are shortcomings associated with the Delphi exercise. It is important to establish that the participants are representative. In this study proportionate random samples were taken from all GDS and CDS dentists in the North West Region, and so the sample was likely to capture the 'consensus' dental view from primary care dentists across the North West of England. Drop out rates with Delphi exercises are typically high,¹³ yet in this study almost three quarters (72.7%) of those approached completed the exercise. The study compared three characteristics of responding and non-responding dentists that might be expected to influence treatment decisions. The results suggest that the non-responders do not differ significantly from those dentists that responded and so the lack of participation in the study by the non-responders is unlikely to have biased the results significantly.

By necessity, there is an arbitrariness of 'cut off' points within the Delphi technique and this is a well recognised problem.¹⁴ The 'cut off' points for agreement chosen in this study were identical to those used in an earlier pilot study.¹⁰ The results of this study were very similar to those of the earlier study, suggesting that there is a consistency of view about screening referral criteria amongst primary care dentists in the North West of England.

Those dentists participating in this study supported the need to refer children (registered or not) who present at a dental screening test with caries in their permanent teeth, untreated trauma to permanent anterior teeth, large overjet, poor oral hygiene and sepsis.

It is interesting to note, however, that this group of dentists was much less enthusiastic about the referral of children with caries in their deciduous dentition. These findings are consistent with those of the pilot study undertaken in 1999¹⁰ and are reflected in the results of local and national surveys of child dental health which suggest that the restorative care of the deciduous dentition is becoming less of a priority for primary dental care practitioners in the UK. This change in clinical practice is mirrored in the falling restorative index in the deciduous dentition. Among eight-year-olds, the deciduous restorative index has fallen by half in the 20 years to 2003 from 50% to 24%.¹⁵

The original objectives of the school dental inspection were concerned with the detection of disease in order to secure treatment. More recently the objectives have moved toward the identification of children not in receipt of regular dental care, and the promotion of attendance.⁸ Despite the change in approach, this study suggests that the unregistered child is not seen as being in need of referral following dental screening. This observation is important as it suggests that this group of primary care dentists is not convinced of the merits of extending the dental registration of previously unregistered children via the school dental screening programme. This may be seen potentially as a lost opportunity to bring children with dental need into regular contact with a dentist.

School dental screening is a process that starts with the identification of the 'at risk' population and ends with the successful treatment of the conditions identified by the screening test¹ and only when each step in the process is 'quality assured' will the school dental screening programme meet the exacting standards set out by the NSC.

This study has considered just one step in the school dental screening quality assurance process, but it is an important one as it has established consensus for a set of referral criteria among primary care dentists in the North West for this dental public health activity.

This study has demonstrated that it is possible for dentists in the North West of England to identify dental conditions that should prompt referral following a school dental inspection. The focus of these criteria was predominantly associated with conditions affecting the permanent dentition. Caries in the primary dentition and dental registration were deemed to be of less importance. These findings have been used in a wider research programme that has examined the effectiveness of school dental screening and the results of this wider study are expected to be reported in due course.

The study team would like to thank all those dentists who participated in the study. The financial support of NHS North West is also acknowledged.

1. Department of Health. *First report of the UK National Screening Committee*. London: Department of Health, 1998.
2. Department of Health. *Second report of the UK National Screening Committee*. London: Department of Health, 2000.
3. Department of Education. *The Education Act*. London: HMSO, 1918.
4. Mander C. *Dental screening of school children*. Bristol: South West Research and Development Directorate, 1995.
5. Jenner A M, Lennon M A. An evaluation of the school dental inspection. *Comm Dent Health* 1986; **3**: 221-226.
6. Department of Health. *The Dentists Act*. London: Department of Health, 1984.
7. Catleugh M A. School dental screening in the Community Dental Services of England and Wales in 2003. MSc Thesis: University of Liverpool, 2004.
8. Milsom K M. School dental screening – what value? *Br Dent J* 1995; **178**: 322.
9. Department of Health. *Modernising NHS dentistry – Implementing the NHS Plan*. London: Department of Health, 2000.
10. Milsom K M, Tickle M, Jenner A, Moulding G. The identification of agreed criteria for referral following the dental inspection of children in the school setting. *Br Dent J* 1999; **186**: 37-40.
11. Dalkey M, Helmer O. An experimental application of the Delphi method to the use of experts. *Management Science* 1963; **9**: 458-467.
12. Webler T, Levine D, Raker H, Renn O. A novel approach to reducing uncertainty The Group Delphi. *Technological Forecasting and Social Change* 1991; **39**: 253-263.
13. Jillson J A. The National Drug-Abuse Policy Delphi: Progress report and findings to date. In Linstone H A, Turoff M (Eds). *The Delphi Method: Techniques and applications*. Reading, MA: Addison-Wesley, 1975.
14. Broomfield D, Humphris G M. Using the Delphi technique to identify the cancer education requirements of general dental practitioners. *Medical Education* 2001; **35**: 928-937.
15. Pitts N, Harker R. *Children's dental health in the United Kingdom, 2003*. London: Office of National Statistics, 2004.