ARTICLE

Assessing the efficacy and social acceptability of using hygienist-therapists as front-line clinicians

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report the patient-perceived acceptability of dental hygienist-therapists when completing routine dental examinations.

Background

For state-funded health systems, it is important that the clinical workforce has the right number of people with the right skills in the right place at the right time to provide the right services to the right people.'[1] One method of achieving this is to fully utilise all the members of the health-care team and explore new potential roles to reflect changes in population need.

The oral health of the adult population in the United Kingdom has been improving decade upon decade.[2] The levels of both dental caries and periodontal disease have fallen and 90% of the adult population now have more than 21 teeth.[3] Of the £3-4 billion spent annually on NHS dentistry, 90% of these costs arise from routine care provided by general dental practitioners (GDPs) in 'high-street' dental practices.[4] Over 50% of this NHS activity relates to the GDP undertaking a check-up without the patient requiring any further treatment.[4] As population health improves further, it is likely that more regularly attending adult patients will only require a check-up in the future.[5,6] This raises a question about the rationale of using the most expensive resource (the GDP) to undertake this task, when other members of the dental team could be used safely, for example, dental hygienist-therapists (HTs).[7–16]

Such an approach has the potential to release resources at a practice level and also increase the capacity to care for those who currently don't access services, thereby reducing the efficiency, cost-effectiveness and equity of NHS service provision.[5,17] HTs also adopt a more preventive approach, when compared to many GDPs, as their clinical training focuses on prevention rather than surgical intervention.[8,18,19] However, although intuitive, using a less expensive resource to undertake a clinical task may not always result in a cost-saving.[20] Less experienced staff may take more time to reach a diagnosis and see fewer patients per session. They may also use more consumables or over-refer.[19] A further substantive barrier to using HTs as a front-line clinician is the social and professional acceptability of the model for patients and GDPs, although the literature would suggest that the use of HTs is accepted by the majority of the population.[21,24] This relates to traditional roles of utilisation. Other surveys have identified substantial negativity[25] and a lack of understanding of HTs' roles and responsibilities.[26,28] The evidence from medicine suggests that patients quickly adapt to new roles within primary health care,[20,29] but regular adult dental attenders may react differently should the HTs adopt a more front-line role.[30]

To test the hypothesis that HTs could offer a cost-effective and acceptable alternative to GDPs when undertaking the check-up, an experimental design is required, such as a pragmatic randomised controlled trial. This was recommended by the Galloway review and again reiterated by Turner *et al.*[8,19,31] The aim of a definitive trial in this context would be to determine whether the standard of oral health differs over the trial period when patients see a HT compared to a GDP for their regular dental check-up, evaluating both the costs and effects of using the HT as a front-line clinician. However, many of the key parameters are unknown, for example, retention and recruitment rates and treatment fidelity.

The aim of this study was to assess the feasibility of undertaking a full trial; estimate retention, recruitment, treatment fidelity and determine the acceptability of the intervention to patients and clinicians alike.

Methods

The study was approved by West of Scotland Research Ethics Committee under a proportionate review (14/WS/1047).

Participants and setting

The eligibility criteria of the feasibility study were designed to ensure that participants were regularly attending adult patients, representative of the group that consume the bulk of NHS resources for the check-up.[17,32] The inclusion criteria for practices were:

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- At least half of regularly attending adult patients seen within the NHS
- Employment of a HT with at least two years of service
- Support of a practice manager.

Patient inclusion criteria were:

- NHS patient
- Adult patient of at least 18 years of age
- Regular attender (attended for at least one check-up within the previous two years)
- Dentate or partially dentate
- Asymptomatic on presentation to the first check-up.

Edentate and patients presenting with pain or problems were excluded.

Sample size

The power calculation accounted for the lowest expected effect in the outcome measures utilised. A sample size of 60 provided sufficient power to estimate a recruitment rate of 50% to within a one-sided 95% confidence interval of 10.62%.[33]

Participant recruitment

An introductory letter and participant information sheet was issued as part of the standard dental check-up process and was followed up by a telephone call, one week later. If verbal consent was provided then the patient was given an appointment to attend a designated clinical session. Upon attendance informed written consent was obtained by a trained member of the research team. Concealed randomisation was performed by the research team, to one of the three research arms: (i) HT only; (ii) GDP then HT; and (iii) GDP only.

Table 1 Results of recruitment rate and different recruitment methods

Recruitment method	Practice 1 recruitment rate	Practice 2 recruitment rate	Total recruitment rate
Letters	3/63 (4.6%)	0/40 (0%)	3/110 (2.7%)
Telephone calls	27/29 (93.1%)	7/11 (63.6%)	34/40 (85.0%)
Face-to-face	0/0 (0%)	23/28 (82.1%)	23/28 (82.1%)
Total recruited	30/92 (32.6%)	30/86 (34.9%)	60/178 (33.7%)

Table 2 Results of retention of patients

	Retention at Appointment 2	Retention at Appointment 3
Arm 1: HT only	15/20 (75.0%)	12/20 (60.0%)
Arm 2: GDP / HT (alternate)	14/20 (70.0%)	12/20 (60.0%)
Arm 3: GDP only	18/20 (90.0%)	14/20 (70.0%)
Overall	47/60 (78.3%)	38/60 (63.3%)
Chi square test	P = 0.279	P = 0.574

Intervention

Following written consent, the patients attended their routine dental check-up appointment and the Study Record Sheet (SRS) was completed. If the patient was healthy and no further treatment was required, then the patient returned to the recall list, to be contacted again in six months using a modified recall letter and follow-up telephone calls. Where treatment was deemed necessary by the front-line clinician, patients were referred to the relevant practitioner, based on their Scope of Practice.[34] The study ran for 15 months.

'THE AIM OF A DEFINITIVE TRIAL WOULD BE TO DETERMINE WHETHER THE STANDARD OF ORAL HEALTH DIFFERS WHEN PATIENTS SEE A HT COMPARED TO A GDP'

Outcome measures

The primary outcomes for the study were:

- Recruitment rate
- Retention rate
- Treatment fidelity.

Secondary outcomes related to pragmatic measures of oral health, as identified by the clinicians' examination at the check-up:

- Proportion of teeth with at least one site that bleeds on probing (BoP)
- Proportion of teeth with at least one site that is above 3.5 mm (partial disappearance of the black band of the Basic Periodontal Examination (BPE) probe)[35]
- Proportion of teeth with at least one site per tooth that had visible plaque
- Proportion of teeth with active caries, defined as frank cavitation into at least the enamel (white spot lesions were also noted on the SRS).

Qualitative interviews

In parallel to the feasibility study, an opportunistic sample of patients was recruited for semi-structured interviews. These were recorded digitally then transcribed verbatim for thematic analysis. The principle of saturation was used to determine the final number of interviews undertaken.[36] To facilitate triangulation, the transcripts were coded separately by different members of the research team.[37,38] Constant comparative analysis was utilised to allow for any

unexpected topics to be fed back into the topic guide and inform future interviews.

Results

Recruitment

Two practices were identified that had participated in previous research[39] and each successfully recruited 30 patients. The overall recruitment rate was 33.7%, however, the method of recruitment had an influence (Table 1). One hundred and ten letters were distributed to practice patients and only resulted in three recruited patients (2.7%). The second method utilised follow-up telephone calls and reported a recruitment rate of 85%. The third method was the use of face-to-face invitation. One practice, recruited 23 of its 30 patients using this method (recruitment rate of 82.1%), the other practice did not utilise face to face recruitment. The overall recruitment rate through direct contact with patients, either by telephone or by a face-to-face invitation, was 83.8% (57/68).

Retention

Over the 15-month period, three recall appointment cycles were employed by the feasibility study. Of the initial 60 participants 47 attended the second round of routine examinations (78.3%) and this reduced to 38 patients at the final round of routine examinations (63.3%), with very little difference between the arms of the study (Table 2). The reasons given were difficult to ascertain as 15 patients did not respond to any follow-up letters or telephone calls. Four patients were blocked by the practice for routinely failing to attend appointments, two patients left the area and one had become too ill to attend the dental practice.

Fidelity

Treatment fidelity was at a consistently high level across all three rounds of check-up appointments. Overall, this was 94.7% for the study. At baseline, all SRSs were completed in full. In the second round of check-up appointments, only one record sheet was missing data in the BoP, plaque and pocketing section (Table 3). In the final round of check-up appointments, only two forms were not completed in full.

Clinical outcomes

Table 4 presents the proportions of sites with BoP, plaque, pocketing and caries at each of the appointment sessions. The proportion of sites with BoP was 46.7%, 14.5% and 32.1% in Arms 1, 2 and 3 respectively; plaque 68.2%, 43.7% and 60.9%, pocketing 23.0%, 10.9% and 24.3%; caries 1.7%, 1.4% and 1.9.

Table 3 Results of fidelity

	Fidelity Appointment 1	Fidelity Appointment 2	Fidelity Appointment 3
Practice 1	30/30 (100%)	24/24 (100%)	17/18 (94.4%)
Practice 2	30/30 (100%)	22/23 (95.7%)	19/20 (95.0%)
Overall	60/60 (100%)	46/47 (97.8%)	36/38 (94.7%)

Table 4 Proportion of sites with bleeding on probing (BoP), plaque, pocketing (greater than 3.5 mm), caries across the three arms of the study

	Arm 1: HT only	Arm 2: GDP then HT (alternate)	Arm 3: GDP only
Proportion of sites with BoP (%)			
Appointment 1: Baseline	213/478 (44.6)	87/506 (17.2)	142/535 (26.5)
Appointment 2: Follow up	162/406 (39.9)	122/312 (39.1)	129/486 (26.5)
Appointment 3: Outcome	136/291 (46.7)	69/284 (14.5)	119/371 (32.1)
Proportion of sites with plaque (%)			
Appointment 1: Baseline	289/478 (60.5)	227/506 (44.9)	301/535 (56.3)
Appointment 2: Follow up	196/406 (48.3)	146/312 (46.8)	217/486 (44.7)
Appointment 3: Outcome	197/291 (68.2)	124/284 (43.7)	226/371 (60.9)
Proportion of sites with pocketing (%)			
Appointment 1: Baseline	55/478 (12.0)	53/506 (10.1)	97/535 (18.1)
Appointment 2: Follow up	52/406 (12.8)	29/312 (9.3)	90/486 (18.5)
Appointment 3: Outcome	67/291 (23.0)	31/284 (10.9)	90/371 (24.3)
Proportion of sites with caries (%)			
Appointment 1: Baseline	11/478 (2.3)	6/506 (1.2)	14/535 (2.6)
Appointment 2: Follow up	4/406 (1.0.)	5/312 (1.6)	9/486 (1.9)
Appointment 3: Outcome	5/291 (1.7)	4/284 (1.4)	7/371 (1.9)

Results of qualitative interviews with patients

Of the total sample of 60, 15 patients were interviewed before no new themes emerged. Patients had a mean age of 52.5 years and 60.0% of interviewees were female. Forty-seven percent of interviewed patients were from the 'HT only' group, the remainder being split equally between the 'alternate' and 'GDP only' group. Patients were interviewed immediately following the routine examination at check-up appointments two

Table 5 Coding frame

Themes	Codes	Example
1. Beliefs of patient which inform acceptance of HT	(a) HT skill level	'[they] know what they're doing. That's the main thing'
	(b) HT qualities	'I just feel…A bit more relaxed, yes, because you think well, this isn't the dentist who's going to drill. It's a bit more, yeah, at ease'
	(c) Trust in system	'I sort of hoped that the system or the therapist themselves would know whether it's going to be something that's in their capability'
	(d) Trust in practice	'If I come to this practice I put my faith in them because they are doing my teeth a great'
	(e) Comparison to medicine – embracing teamwork	'the nurses do a lot of…practice nurse do some of the treatments. And, I think that this is what they're talking about'
	(f) Training explanation/ acceptance	'he explained that they are properly qualified, that the people who are doing the check-ups are qualified'
	(g) See benefit in role substitution	'it, sort of, takes the pressure off the dentist and leaves them to do the dental work… I think it's a great idea'
2. Impact of patient involvement in study	(h) Patient experience – trust in HT	'the dentist came out and explained to the therapist.so the therapist is learning from the dentist….I wouldn't put trust on a therapist at this point in time'
	(i) Positive feedback on HT check up	'I may have had some reservations maybe before I'd seen the therapist, but have been very happy'
	(j) Which is the best method, GDP only, HT only, alternate	'I suppose in the perfect world, you know, a mix of both would be good, but I've sort of got faith in the system that whether seeing the dentist or therapist'
	(k) Difference in payment – are dentists worth more?	'doesn't make any difference….If you're getting the same treatment by somebody that's qualified I really don't see what difference it makes'
3. Patient's preferences	(l) Prefer HT or GDP	'I don't care as long as they do the job and do what is good for me or whatever I'm not bothered'
	(m) Seeks consistency in practitioner	'I think if you were seeing a different one every single time and you're having to go through, you'd probably lack a bit of confidence'

or three. The transcripts were grouped into 13 codes and three emerging themes (Table 5). Patients showed a belief in the HT's skill level and an embedded trust in the health care system to ensure patient safety. There was also an acceptance of HTs when performing the dental check-up and patients appreciated the alternate pathway, particularly the potential for a second opinion. In contrast, two patients showed a strong preference for continuity care with either GDP or HT. The majority of patients expressed the view that the same payment should be made irrespective of who conducted the check-up.

Discussion

The aim of this study was to assess the feasibility of a definitive trial to evaluate the costs and effects of using HTs to undertake the check-up and the results appeared to be positive. When the recruitment strategy employed direct contact (telephone or face-to-face), the recruitment rate was 83.8%. This is consistent with the literature.[40,41] Failure to attend for a routine check-up appointment is a common concern for all 'high-street' NHS dental practices,[42] so retention was always considered to be more of a challenge. Many adult NHS patients on a six-monthly recall strategy for their check-up appointment will fail to respond to reminders and commonly attend between six and 12 months after their previous appointment.[42] This is particularly common in areas of social deprivation. Due to constraints on the time frame of this feasibility study, deadlines for the second and third examination were imposed and a failure to attend at this point was thereby classed as a loss-to-follow-up. Despite this the retention rate was 63.3%, which suggests that a definitive trial is possible. It is anticipated that the longer timeframe in a full trial would allow for slippage from the six-monthly routine check-up appointment cycle.

The strength of this study was this it offered a unique opportunity to assess the recruitment, retention, fidelity and acceptance of patients when using HTs to undertake the routine check-up. Existing evidence suggests that HTs are socially acceptable, but the use of HTs as a front-line clinician undertaking routine check-ups has not been explored.[21,23-25,43] The results from this study are encouraging, as undertaking the routine check-up has traditionally been seen as the preserve of the GDP.

Overall, the views of patients were positive. Points of particular interest were that the majority felt that the same amount should be charged for a routine check-up with a HT, compared to a GDP. There was a consensus

that, if given the option, patients would prefer to have continuity of care. However, there was also an understanding that this may not be feasible within the confines of a state-funded system.

Saturation was achieved after a relatively low number of patient interviews. The reason for this could be that the practices involved in this study have utilised H-Ts for many years, with both practices allowing H-Ts to complete restorations which is more unusual nationally.[6,18] Despite this, the evidence gathered supports the findings relating to patient acceptance of H-Ts within the existing literature.[21,23-25,44] Furthermore, it confirms the acceptability of H-Ts when completing tasks previously undertaken by GDPs.

Conclusion

This study highlights the potential for greater utilisation of H-Ts in the routine dental check-up. A randomised control trial to fully investigate the potential of H-Ts to complete the routine examination appears feasible.

1. Birch S, Kephart G, Murphy GT, O'Brien-Pallas L, Alder R, MacKenzie A. Health human resources planning and the production of health: development of an extended analytical framework for needs-based health human resources planning. *J Pub Health Manag Pract* 2009: S56–S61.
2. White D A, Tsakos G, Pitts N B *et al.* Adult Dental Health Survey 2009: common oral health conditions and their impact on the population. *Br Dent J* 2012; **213:** 567–572.
3. Steele J, Treasure E, O'Sullivan I, Morris J, Murray J. Adult Dental Health Survey 2009: transformations in British oral health 1968–2009. *Br Dent J* 2012; **213:** 523–527.
4. Health and Social Care Information Centre. NHS Dental Statistics for England 2013–2014. 2014. Available online at http://content.digital.nhs.uk/catalogue/PUB14738/nhs-dent-stat-eng-13-14-rep.pdf (accessed February 2015).
5. Watt R G, Steele J G, Treasure E T, White D A, Pitts N B, Murray J J. Adult Dental Health Survey 2009: implications of findings for clinical practice and oral health policy. *Br Dent J* 2013; **214:** 71–75.
6. Godson J H, Williams S A, Csikar J I, Bradley S, Rowbotham J S. Dental therapy in the United Kingdom: part 2. A survey of reported working practices. *Br Dent J* 2009; **207:** 417–423.
7. Turner S, Tripathee S, MacGillivray S. Direct access to DCPs: what are the potential risks and benefits? *Br Dent J* 2013; **215:** 577–582.
8. Galloway J, Gorham J, M L, Richards D *et al.* The professionals complementary to dentistry: systematic review and synthesis. 2003.
9. Nash D A, Friedman J W, Kardos T B, Kardos R L, Schwarz E, Satur J *et al.* Dental therapists: a global perspective. *Int Dent J* 2008; **58:** 61–70.
10. Brocklehurst P, Ashley J, Walsh T, Tickle M. Relative performance of different dental professional groups in screening for occlusal caries. *Community Dent Oral Epidemiol* 2012; **40:** 239–246.
11. Hopcraft M S, Morgan M V, Satur J G, Wright F A C. Utilizing dental hygienists to undertake dental examination and referral in residential aged care facilities. *Community Dent Oral Epidemiol* 2011; **39:** 378–384.
12. Kwan S Y L, Prendergast M J. The use of clinical dental auxiliaries as examiners in caries prevalence surveys in the United Kingdom: a feasibility study. *Community Dent Oral Epidemiol* 1998; **26:** 194–200.
13. Brocklehurst P, Kujan O, Glenny A M *et al.* Screening programmes for the early detection and prevention of oral cancer. *Cochrane Database Syst Rev* 2006; **19:** CD004150.
14. Macey R, Walsh T, Glenny AM *et al.* Protocol for diagnostic test accuracy study: the efficacy of screening for common dental diseases by Dental Care Professionals. *BMC Oral Health* 2013; **13:** 45.
15. Evans C, Chestnutt I G, Chadwick B L. The potential for delegation of clinical care in general dental practice. *Br Dent J* 2007; **203:** 695–699.
16. Tickle M, McDonald R, Franklin J, Aggarwal V R, Milsom K, Reeves D. Paying for the wrong kind of performance? Financial incentives and behaviour changes in National Health Service dentistry 1992–2009. *Community Dent Oral Epidemiol* 2011; **39:** 465–473.
17. Godson J H, Williams S A. Inequalities in health and oral health in the UK. *Dent Update* 2008; **35:** 243–250.
18. Dyer T A, Brocklehurst P, Glenny A M *et al.* Dental auxiliaries for dental care traditionally provided by dentists. *Cochrane Database Syst Rev* 2014; **20:** CD010076.
19. Turner S, Tripathee S, MacGillivray S. Benefits and risks of direct access to treatment by dental care professionals: A rapid evidence review. Final Report to the General Dental Council, 2012.
20. Sibbald B, Shen J, McBride A. Changing the skill-mix of the health care workforce. *J Health Serv Res Policy* 2004; **9 (Suppl 1):** 28–38.
21. Dyer T A, Robinson P G. The acceptability of care provided by dental auxiliaries: A systematic review. *J Am Dent Assoc* 2016; **147:** 244-54.
22. Nilchian F, Rodd H D, Robinson P G. Influences on dentists' decisions to refer paediatric patients to dental hygienists and therapists for fissure sealants: a qualitative approach. *Br Dent J* 2009; **207:** 326–327.
23. Dyer T A, Humphris G, Robinson P G. Public awareness and social acceptability of dental therapists. *Br Dent J* 2010; **208:** 16–17.
24. Dyer T A, Robinson P G. Exploring the social acceptability of skill-mix in dentistry. *Int Dent J* 2008; **58:** 173–180.
25. Ross M, Ibbetson R, Turner S. The acceptability of dually-qualified dental hygienist-therapists to general dental practitioners in South-East Scotland. *Br Dent J* 2007; 202: E8.
26. Gallagher J, Wright D. General dental practitioners' knowledge of and attitudes towards the employment of dental therapists in general practice. *Br Dent J* 2003; **194:** 37–41.
27. Ward P. The changing skill mix–experiences on the introduction of the dental therapist into general dental practice. *Br Dent J* 2006; **200:** 193–197.
28. Jones G, Devalia R, Hunter L. Attitudes of general dental practitioners in Wales towards employing dental hygienist-therapists. *Br Dent J* 2007; 203: E19.
29. Laurent M, Reeves D, Hermens R, Braspenning J, Grol R, Sibbald B. Substitution of doctors by nurses in primary care. *Cochrane Database Syst Rev* 2009; **18:** CD001271.
30. Morris A J, Steele J, White D A. Adult dental health survey: The oral cleanliness and periodontal health of UK adults in 1998. *Br Dent J* 2001; **191:** 186–192.
31. Innes N P, Evans D J. Evidence of improved access to dental care with direct access arrangements. *Evid Based Dent* 2013; **14:** 36–37.
32. Milsom K M, Jones C, Kearney-Mitchell P, Tickle M. A comparative needs assessment of the dental health of adults attending dental access centres and general dental practices in Halton and St Helens and Warrington PCTs 2007. *Br Dent J* 2009; **206:** 257–261.
33. Lancaster G A, Dodd S, Williamson P R. Design and analysis of pilot studies: recommendations for good practice. *J Eval Clin Pract* 2004; **10:** 307–312.
34. GDC. Scope of Practice. Available online at http://www.gdc-uk.org/dentalprofessionals/standards/documents/scope%20of%20practice%20september%202013%20(3).pdf (accessed November 2016).
35. British Society of Periodontology. Basic Periodontal Examination (BPE). Available online at http://www.bsperio.org.uk/publications/downloads/39_143748_bpe2011.pdf (accessed November 2016).
36. Morse J M. The significance of saturation. *Qual Health Res* 1995; **5:** 147–149.
37. Pope C, Ziebland S, Mays N. Qualitative research in health care analysing qualitative data. *BMJ* 2003; **320:** 114 116.
38. Mays N, Pope C. Qualitative research in health care: assessing quality in qualitative research. *BMJ* 2000; **320:** 50.
39. Macey R, Glenny A, Walsh T, Tickle M, Worthington H, Ashley J *et al.* The efficacy of screening for common dental diseases by hygiene-therapists a diagnostic test accuracy study. *J Dent Res* 2015; **94:** 70S-78S.
40. Bower P, Brueton V, Gamble C *et al.* Interventions to improve recruitment and retention in clinical trials: a survey and workshop to assess current practice and future priorities. *Trials* 2014; **15:** 399.
41. Treweek S, Lockhart P, Pitkethly M *et al.* Methods to improve recruitment to randomised controlled trials: Cochrane systematic review and meta-analysis. *BMJ Open* 2013; **3:** e002360.
42. Reekie D, Devlin H, Worthington H. The prevention of failed appointments in general dental practice. *Br Dent J* 1997; **182:** 139–143.
43. Brocklehurst P, Pemberton M, Macey R, Cotton C, Walsh T, Lewis M. Comparative accuracy of different members of the dental team in detecting malignant and non-malignant oral lesions. *Br Dent J* 2015; **218:** 525–529.
44. Phillips E, Shaefer H L, Aksu M N, Lapidos A. Is a mid-level dental provider model acceptable to potential patients? Community Dent Oral Epidemiol 2016: DOI: 10.1111/cdoe.12230.

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