

Survey of consultants in restorative dentistry in the UK regarding ongoing care of patients provided with dental implants

H. P. Beddis,^{*1} K. A. Durey¹ and M. F. W. Y. Chan¹

In brief

Provides an understanding of the challenges faced as a result of limitations on NHS funding for implant-based treatment.

Considers the potential availability of maintenance of implant-retained restorations provided within secondary care.

Considers the potential roles of the general dental practitioner in the maintenance of implant-retained restorations.

Highlights the importance of awareness of the need for maintenance of implants and implant-retained restorations.

Background Funding for implant-based treatment within secondary care is limited, and acceptance criteria are determined locally according to funding agreements with NHS England. Indefinite review of all patients in secondary care is unlikely to be feasible due to limitations on departmental capacity. The increasing number of patients provided with implant-based treatment in secondary care has resulted in a growing maintenance burden, raising the question of who should provide this care. Management of some complications within primary care would facilitate patients' access to treatment, although no specific provision for maintenance of implant-retained prostheses is made within the NHS Dental Charges Regulations. **Materials and methods** An online survey was carried out to review services provided within restorative dentistry departments across the UK, investigating departmental protocols for review and maintenance of patients provided with dental implants. **Results** There was no consensus view on review protocols, discharge or provision of maintenance following implant placement. Fifty-seven percent would indefinitely carry out remake of implant-retained overdentures when clinically indicated, replace worn inserts, housings or abutments. Sixty-one percent would manage loose/lost screw- or cement-retained restorations and 68% would manage fractured restorations. Re-referral for peri-implant disease would be accepted by 64% of respondents. The lack of clear NHS funding for the management of complications was of concern to respondents in this survey.

Introduction

Implant-based treatment may be provided within restorative dentistry departments in the secondary NHS care setting in certain situations, such as loss of teeth due to orofacial trauma or ablative surgery for head and neck cancer, missing teeth due to congenital or acquired defects for example, hypodontia and cleft palate, or difficulties with complete dentures. Funding for this treatment is limited, and acceptance criteria are determined locally according to funding agreements with NHS England. Treatment is

not generally available within hospital restorative dentistry departments in relation to implant treatment either started or provided elsewhere, be it for completion of treatment, comprehensive management of complications or prosthodontic or peri-implant maintenance. However, patients may be provided with the treatment required to alleviate pain or infection for patients provided with treatment elsewhere, for example by removing implants associated with repeated infections.

Implants may be restored with either fixed crown and bridgework, or with removable overdentures. Fixed prostheses may be either screw- or cement-retained (Fig. 1). Definitive implant-retained crowns or bridges may be constructed using a substructure (for example, titanium, cobalt-chromium, zirconia) and veneering porcelain or acrylic. Abutments for cement-retained crowns may be constructed in

metal or zirconia. Once the abutment or prosthesis is screwed in place, the screw head is usually protected by a material, for example, cotton wool or PTFE tape followed by a restorative material, for example, composite. Overdentures may be retained with either bars or individual magnetic, ball-ended or locator attachments (Fig. 2).

Ongoing clinical and radiographic review of implant cases is essential to monitor the peri-implant tissues and the prostheses, however, indefinite review of all patients in secondary care is unlikely to be feasible due to limitations on departmental capacity. Patients are therefore discharged to their general dental practitioner (GDP) following completion of treatment. Over time, complications may arise, affecting either the implants themselves, the prostheses or the peri-implant soft and hard tissue. Common prosthetic or technical complications are listed in Table 1.^{1,2}

¹Leeds Dental Institute, Department of Restorative Dentistry, Worsley Building, Clarendon Way, Leeds, LS2 9LU
*Correspondence to: Hannah Beddis
Email: h.beddis@leeds.ac.uk

Refereed Paper. Accepted 1 June 2017
DOI: 10.1038/sj.bdj.2017.711

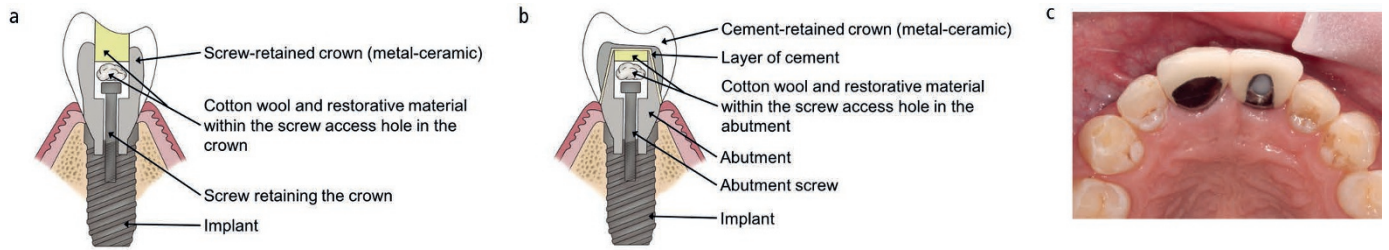


Fig. 1 (a) Diagrams representing the components of a screw-retained crown; (b) Diagrams representing the components of a cement-retained crown; (c) Occlusal view of screw-retained single crown replacing the 21. Note composite restoration in the palatal screw access hole

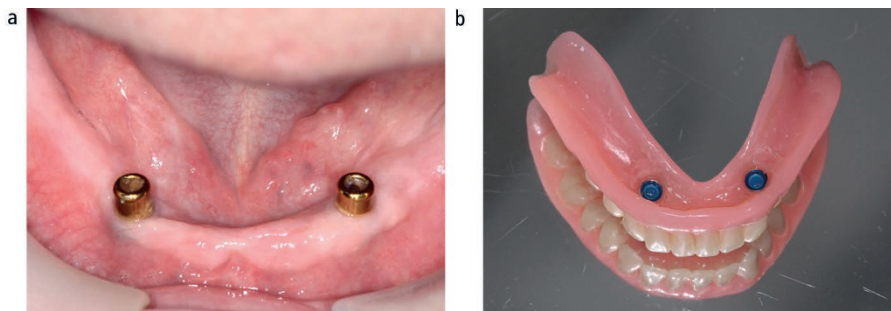


Fig. 2 (a) Locator abutments *in situ*; (b) Lower implant-retained overdenture with locator housings and blue-coloured retentive inserts

The increasing number of patients provided with implant-based treatment in secondary care has resulted in a growing maintenance burden, raising the question of who should provide this care. Management of complications obviously varies in complexity, but a number of issues are straightforward to

manage with appropriate training, for example replacement of worn overdenture inserts or replacement of restorations lost from the screw access holes of fixed restorations.

When complications arise, re-referral of the patient to the restorative dentistry department at which they were initially treated may not be

convenient for them. There may be a significant waiting list before assessment and treatment, or they may need to travel long distances, particularly if they have moved away from the area in which treatment was provided. Management of some complications within primary care would facilitate patients' access to treatment, however, no specific provision for maintenance of implant-retained prostheses is made within the NHS Dental Charges Regulations.³

The advice from the NHS Business Service Authority is shown in Box 1.⁴ It mentions 'cleaning and polishing' and also makes reference to 'long term maintenance', which could be interpreted broadly to include repair to crowns, bridges or overdentures retained by implants. The suggestion is that to provide this type of care, GPs should seek a 'one-off' agreement on a case-by-case basis from the NHS Local Area Team. As the availability of such 'one-off' agreements varies locally,⁵ it is unclear as to what treatment can be provided within NHS general dental practice.

A survey was carried out to review services provided within restorative dentistry departments in secondary care across the UK. The aims were to assess departmental protocols for review, discharge and provision of maintenance treatment for patients provided with dental implants. Information was gathered regarding the frequency of review following implant placement, length of review period before discharge, and management provided for complications affecting those implants or restorations provided within the respective departments.

Methods

An online survey was developed by the authors using the Survey Monkey website (www.surveymonkey.net). This survey (Appendix 1) was open for responses between 20 April and 26 May 2016. Restorative Dentistry-UK (RD-UK) is a group of consultants and specialists in

Table 1 Common technical and prosthetic complications affecting implant-retained prostheses

Fixed prostheses	Implant-retained overdentures
Loss of restoration from screw access hole	Loss of retention due to wear of retentive elements
Ceramic fracture	Fracture of the denture acrylic/teeth
Screw loosening or fracture	Loss of attachment from the denture
Debond of cement-retained crown	Loosening of the abutment
	Need for reline/rebase of the denture

Box 1 NHS Business Service Authority advice on maintenance of dental implants⁴

Dental implants aren't generally available on the NHS as part of primary care.

It's possible that your Commissioner (Area Team / Local Health Board) may, occasionally agree for a patient to be provided with implants. This would have to be discussed with the Commissioner and would only be agreed if there was a clinical reason as to why no other restoration would be appropriate.

If dental implants have been provided under the NHS (having been agreed and funded by the Commissioner) then generally, if clinically required, cleaning and polishing can be provided under the NHS if it's not already scheduled to be done as part of any maintenance programme from the provider of the implants.

If the Commissioner has agreed to provide the patient with dental implants, your practice should consider asking for the one off agreement to be provided in writing which sets out any future terms for long term maintenance and what you'll be expected to provide.

restorative dentistry. A covering letter and invitation to participate was sent via email to all members on the RD-UK mailing list, followed by a reminder email two weeks later. All responses were anonymous, and questions regarding the participant's job title and unit in which they work were optional.

Results

One hundred and twenty-five RD-UK members were invited to participate in the survey, and 37 responses were obtained (30% response rate). Of 33 participants who provided their job title, there were 29 consultants in restorative dentistry, three professors/honourary consultants in restorative dentistry, one professor in periodontology and one senior lecturer/honourary consultant in restorative dentistry. Twenty-two participants from 17 units gave their place of work.

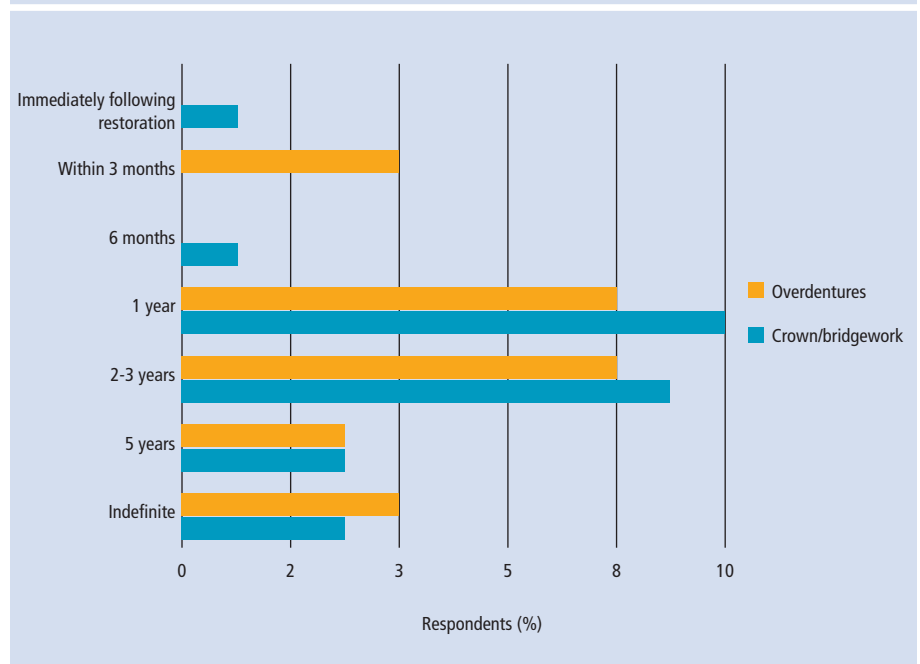
Eighty-nine percent (33/37) of respondents were involved in the placement and/or restoration of dental implants. Of these, 70% placed and restored dental implants, whereas 30% only restored implants. Not all respondents answered every question; those with free text responses were not mandatory.

Review protocols

Free-text responses were invited regarding review protocols following completion of treatment. Not all respondents provided answers to these questions. There was significant variation in the responses, although 80% (24/30 respondents) reported carrying out initial review between 1-3 months following definitive restoration with crown/bridgework. Following an initial period of more frequent short-term review 40% (12/30 respondents) then reviewed patients annually for a variable time period before eventual discharge (Fig. 3).

The length of the review period before discharge varied but was most often done at 1-3 years following definitive restoration. Responses were similar for patients provided with overdentures. Seven percent (two respondents) provided indefinite annual review, and 3% (one respondent) arranged indefinite 6-12 monthly reviews with a hygienist only. Of those respondents carrying out radiographic review (26 respondents), 48% (12 respondents) would do so annually; 4% (one respondent) every six months; 15% (four respondents) biannually and 35% (nine respondents) only if problems arose. A number of free text comments indicated that the review period would vary according

Fig. 3 Review period before discharge



to various patient-related factors, with longer review periods for oncology patients (five responses) or in the presence of complications or symptoms (ten responses) in particular.

Maintenance of restorations (including on a re-referral basis)

Implant-retained overdentures

Twenty-nine percent (8/28 respondents) indicated that they would not provide maintenance of implant-retained overdentures, advising patients to seek maintenance within primary care (Fig. 4). Fifty-seven percent (16/28 respondents) would indefinitely carry out remake of implant-retained overdentures when clinically indicated, replace worn inserts, housings or abutments. Fifty percent (14/28 respondents) would repair fractures of acrylic. Eight free-text comments suggested that GDPs were often unwilling or unable to provide this type of treatment, so there was no option but to accept the patients for treatment.

Implant-retained crown and bridgework

Similar responses were given for acceptance of patients requiring maintenance of implant-retained crown and bridgework (Fig. 5); 61% (17/28 responses) would manage loose/lost screw- or cement-retained restorations and 68% (19/28 responses) would manage fractured restorations.

Only 46% (13/28 responses) would accept re-referral for management of restorations lost from screw access holes, and free-text

comments suggested that this was expected to be managed within primary care.

Fourteen percent (4/28 responses) would not accept any re-referrals for maintenance of implant-retained crown or bridgework.

Management of peri-implantitis

Again, questions regarding acceptance of re-referrals for peri-implantitis related specifically to those patients who had been provided with their implant treatment within the department. In the absence of peri-implantitis, 76% of responders would not provide any ongoing peri-implant supportive therapy.

In a question asking whether re-referral would be accepted for peri-implant disease, 64% (18/28 responses) indicated that they would do so. However, in a separate question inviting free-text responses as to whether peri-implant supportive therapy would be provided for implants placed within the department, 71% (20/28 comments) indicated that at least one course of treatment would be provided in at least some cases, which may be followed by discharge back to the GDP following stabilisation by 14% (4/28 comments). The reason for this disparity in responses to the two questions is not clear.

Other concerns raised

Respondents were invited to express any other opinions related to the long-term review and maintenance of patients provided with implant-based treatment. The following concerns were expressed:

Fig. 4 Percentage of respondents carrying out maintenance of implant-retained overdentures

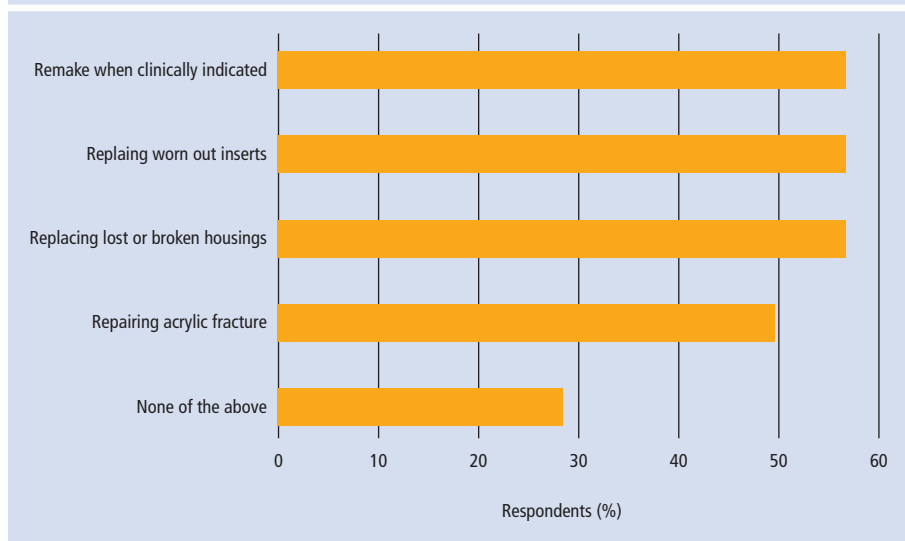
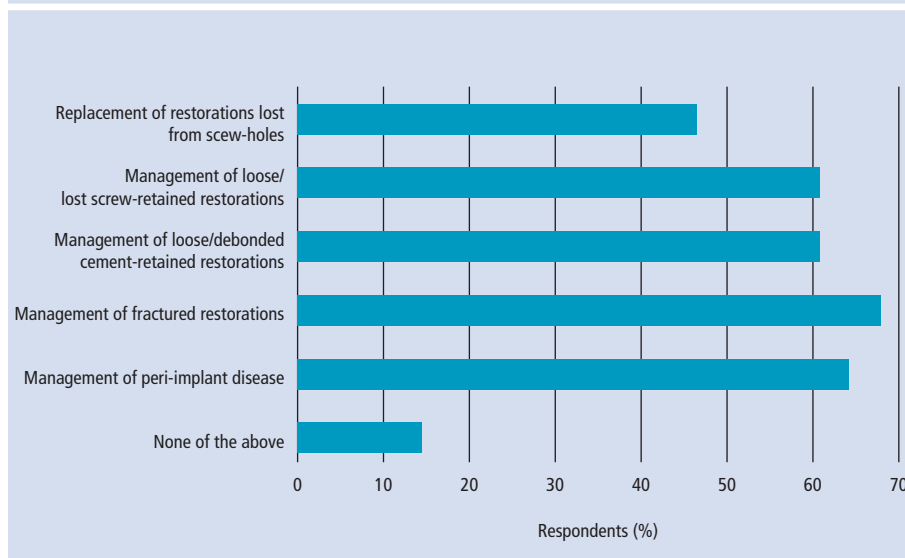


Fig. 5 Percentage of respondents carrying out maintenance of fixed implant-retained crown or bridgework



- Lack of guidance/criteria for:
 - Service providers' responsibility for maintenance of implants and implant-retained restorations
 - What treatment should be provided within primary care
 - Management of patients experiencing problems with treatment provided within the private sector
- The need to discharge patients from secondary care to create capacity to manage new patients, contrasting with the need for maintenance care to be available
- Difficulties in maintenance associated with the range of implant systems in existence, and particularly with patients' lack of

knowledge as to the type of implants with which they have been provided

- Need for clarity of patient information and consent at the outset as to who will provide maintenance in future, and that this may need to be sought in the private sector
- The need for development of funding and skills in primary care.

Discussion

The questions in the survey were developed following discussion among the authors, and piloted within the department to check for errors. A wider pilot was not deemed feasible as the authors did not have access to the target

mailing list; the invitation to the survey was disseminated by RD-UK on behalf of the authors.

The response rate was relatively low (30%). However, online survey response rates may be on average only around 40%.⁶ There was no specific database of those RD-UK members involved in implant-based treatment, so the invitation was sent to a broad range of consultants and specialists in practice and in secondary care. As such, since the covering letter with the email invitation explained that the survey was related to the provision of implant-related treatment, specialists or consultants not involved in implant treatment, or not working in secondary care, may likely have opted not to participate. The response rate therefore probably appears artificially low relative to the responses from the 'target' population (that is, providers of implant treatment in secondary care). Only four respondents (11%) were not involved in either the restoration or placement of dental implants, and therefore did not complete the remainder of the survey.

Frequency of clinical and radiographic review

There is no consensus within the literature as to the recommended frequency of clinical review following implant placement. This is reflected in the responses from this survey, with a variety of review protocols described. Recall intervals will often be modified by patient factors (for example, risk factors, type and complexity of treatment provided, levels of oral hygiene, presence of complications), but in general, more frequent review is advocated in the first year following restoration of implants, followed by 6-12 monthly review in the absence of complications.^{7,8} Patients provided with implant treatment in secondary care would likely also be under routine review from their own GDP.

A 2004 Consensus statement by Lang *et al.* recommended that while it is 'appropriate' to take a radiograph at the time of placement of a prosthesis, repeated radiography should be based on clinical assessment rather than pre-determined protocols.⁹ Other published guidance recommends radiographic examination; at fit of prosthesis,^{7,10} one year later,^{7,11} then biannually^{7,11} or if signs or symptoms should arise.^{7,10,11}

Provision of ongoing maintenance

An increasing number of patients are being provided with implant-based treatment. Limitations on departmental capacity mean

that it is unlikely to be feasible for all patients provided with implant-based treatment to be seen indefinitely for review. Most (26/30) respondents to this survey would discharge patients back to their GDP within five years of treatment completion.

Eighty-six per cent (25/29 respondents) of respondents would accept re-referrals for maintenance of implant-retained crown/bridgework, 57% (17/29 respondents) would accept re-referrals for maintenance of implant-retained overdentures, and 64% (19/29 respondents) would accept re-referrals for peri-implantitis. Around a third of respondents would encourage the patient's GDP to provide the maintenance, but it was often acknowledged that GDPs may be reluctant to carry out this treatment. Responses from a number of restorative dentistry departments indicated that they are unable to provide ongoing repair and maintenance work due to restrictions on funding.

Adoption of a shared care approach between primary and secondary care would be beneficial. Management of appropriate complications within primary care would facilitate patients' access to treatment. The attitude of GDPs with regards to maintenance of implant overdentures using the locator system was investigated in a 2014 survey, which found that only 17% of GDPs were involved in the placement or restoration of dental implants.¹² Similarly, a 2009 survey found that 20% of GDPs would 'always' or 'sometimes' provide some of the treatment involved in a mandibular implant-supported overdenture.¹³ Few GDPs were prepared to carry out maintenance such as replacement of overdenture inserts or tightening of abutments.¹² Fifty percent of GDPs felt that they should not be responsible for maintenance of implant overdentures, with most feeling that this should be provided within secondary care. The most common reasons given were insufficient time, remuneration, lack of training and equipment. Indeed, 74% of GDPs have indicated that they would like further training in the management

of prosthodontic complications of implant-retained overdentures.¹² The attitude of GDPs towards fixed implant-retained restorations has not been investigated, but is likely to be similar.

Training for GDPs who refer patients for implant-based treatment would enable management of some complications within primary care, facilitating patients' access to treatment. This could be part of a managed clinical network, or could be offered via local courses, for example, through local education and training boards (LETBs), and could be delivered by secondary care providers.

Funding arrangements for the ongoing care of implant-retained restorations within the NHS is not clear, and lack of NHS funding appears to be a significant barrier to the ongoing management of implant cases in both primary and secondary care.

There is a need for identification of appropriate care providers, and development of a system through which maintenance care can be provided. This could potentially be achieved through adding implant-related maintenance treatments to the NHS Dental Charges Regulations for primary dental care, and/or clarification of secondary care funding agreements for ongoing treatment. It may be that secondary care providers should assist the GDP to gain a 'one-off agreement' from the local area team, enabling them to provide at least peri-implant maintenance therapy. As access to these agreements is variable, patients should perhaps be informed that they may need to seek future ongoing maintenance treatment on a private basis.

Conclusions

There was no consensus view among the respondents to this survey on review protocols, discharge or provision of maintenance following implant placement.

As time goes on, more patients are being provided with implant-based treatment, therefore, more patients will require treatment

for associated complications. There is no clear funding for the management of these complications within either primary or secondary care, and this was of concern to respondents in this survey. The lack of funding and, therefore, availability of this treatment may potentially affect the long term success and efficacy of the implants and implant-retained restorations, which would have been provided to patients already in priority groups to have qualified for implant treatment under the NHS in the first instance.

Note:

The results of the survey were presented in poster form at the RD-UK/SRRDG Annual Conference in October 2016, winning the Poster Prize.

1. Sailer I, Muhlemann S, Zwahlen M *et al*. Cemented and screw-retained implant reconstructions: a systematic review of the survival and complication rates. *Clin Oral Implants Res* 2012; **23 Suppl 6**: 163–201.
2. Pjetursson B E, Thoma D, Jung R *et al*. A systematic review of the survival and complication rates of implant-supported fixed dental prostheses (FDPs) after a mean observation period of at least 5 years. *Clin Oral Implants Res* 2012; **23 Suppl 6**: 22–38.
3. National Health Service England. The National Health Service (Dental Charges) Regulations 2005. 2016. Available at <http://www.legislation.gov.uk/ukssi/2005/3477/schedule/3/made> (accessed August 2017).
4. NHS Business Services Authority. NHS Dental Services 'Ask Us'. 2014. Available at https://contactcentre-services.nhs.uk/selfnhsukokb/AskUs_Dental/template.do?name=Can-I+provide+dental+implants+on+the+NHS%3F&id=41786 (accessed August 2017).
5. NHS Business Services Authority. Personal Communication. 24th November 2016.
6. Cook CH, Heath F, Thompson R L. A meta-analysis of response rates in web- or internet-based surveys. *Educ Psychol Measurement* 2000; **60**: 821–836.
7. Association of Dental Implantology. A Dentist's Guide to Implantology. 2012 Available at http://www.adi.org.uk/profession/dentist_guide/a-dentists-guide-to-implantology.pdf (accessed August 2017).
8. Shumaker N D, Metcalf B T, Toscano N T *et al*. Periodontal and periimplant maintenance: a critical factor in long-term treatment success. *Compend Contin Educ Dent* 2009; **30**: 388–390, 392, 394.
9. Lang N P, Berglundh T, Heitz-Mayfield L J *et al*. Consensus statements and recommended clinical procedures regarding implant survival and complications. *Int J Oral Maxillofac Implants* 2004; **19 Suppl**: 150–154.
10. Todescan S, Lavigne S, Kelekis-Cholakias A. Guidance for the maintenance care of dental implants: clinical review. *J Can Dent Assoc* 2012; **78**: c107.
11. Mombelli A, Lang N P. The diagnosis and treatment of peri-implantitis. *Periodontology* 2000 1998; **17**: 63–76.
12. Vere J W, Elias S, Wragg P F. Attitudes of general dental practitioners to the maintenance of Locator retained implant overdentures. *Br Dent J* 2014; **216**: E5.
13. Field J C, Rousseau N, Thomason J M *et al*. Facilitation of implant provision in primary care. *Br Dent J* 2009; **207**: E20.

Appendix 1 Survey to consultants in restorative dentistry regarding ongoing care of patients provided with dental implants

We would like to invite you to participate in an online survey of consultants and specialists in restorative dentistry in the UK. This survey forms a review of services provided within restorative departments in secondary care across the UK relating to the short- and long-term care of patients provided with dental implants.

The results of the survey may be presented in poster form at a future conference, or form part of a future publication. No specific information regarding geographic locations will be included, and all data will be anonymised.

We would be very grateful if you could complete the survey, which should take no more than 10 minutes.

1. What is your job title?

(Free text)

2. Which unit do you work in?

(Free text/prefer not to say)

3. Are you involved in the placement/restoration of implants within your department?

Yes/no

a. If yes: Placement/Restoration/Both

4. Following implant placement, do you take radiographs:

	Always	Usually	Sometimes	Never	N/A
Following implant placement					
Following provision of provisional restoration					
Following provision of definitive restoration					

5. Following provision of the definitive restoration, what is your review frequency?

(Free text eg, first review at 6 months, then annually; 6 monthly; none)

6. How long, if at all, do you review patients within your department following restoration of implants? OR Please describe your review protocol for patients provided with dental implants.

Free text

7. How often do you take routine radiographs following implant placement:

- a. Every 6 months
- b. Every year
- c. Every 2 years
- d. Only take radiographs if problems arise
- e. n/a
- f. Optional free text box for further details

8. Regarding implant-supported overdentures provided within your department, do you provide any of the following services indefinitely? (tick all that apply)

- a. Remake when clinically indicated
- b. Replacing worn-out inserts in the denture
- c. Replacing lost or broken attachments/housings within the denture
- d. Repairing fractures of acrylic
- e. Optional free text box for further details

9. Regarding implant-retained crown/bridgework provided within your department, do you provide any of the following services indefinitely? This includes accepting re-referrals following discharge. (tick all that apply)

- a. Replacement of restorations lost from screw-holes
- b. Management of loose/lost screw-retained restorations
- c. Management of loose/debonded cement-retained restorations
- d. Management of fractured restorations
- e. Management of peri-implant disease
- f. None of the above
- g. Optional free text box for further details

10. In the absence of peri-implantitis, do you provide peri-implant supportive therapy for implants placed within your department? eg routine recalls with a staff hygienist

- a. Always
- b. Never
- c. In certain situations (please give examples; free text)

11. In the presence of peri-implantitis, do you provide peri-implant supportive therapy for implants placed within your department? eg routine recalls with a staff hygienist

- a. Always
- b. Never
- c. In certain situations (please give examples; free text)

12. Do you have any other comments about the long-term review and maintenance of patients provided with dental implants in secondary care?

Thank you for your time.