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An Audit to Assess the Quality and Efficiency of Complete and Partial Dentures Delivered by Junior Hospital Staff

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Abstract - *The average number of visits for the construction of metal-based and acrylic dentures by junior hospital staff was 10 visits. Our hypothesis was that supervision would optimise the number of visits and reduce any need for remakes. The first audit cycle was retrospective and included all patients treated by SHOs in the Prosthodontics Department. The standard of care was compared to the British Society for the Study of Prosthetic Dentistry. The re-audit showed that the time taken to completion was reduced by 2 visits for both denture types and. the average length of time was reduced from 31 weeks to 22 weeks. These improvements were directly related to improved supervision by senior staff.*

KEY WORDS: Audit; Dentures; quality of care; delivery time; partial and complete dentures

INTRODUCTION

Dental teaching hospitals within the National Health Service in the UK perform a dual function of providing a referral service to local general dental practitioners (GDPs) and training dentists at both undergraduate and postgraduate levels. To this end, it is important that the clinical activity which takes place within these hospitals is optimised for the benefit of both the patients and clinicians. The audit process described in this article was carried out in the Prosthodontic Department of King's College London Dental Institute at Guy's Hospital, and specifically concentrated on denture cases undertaken by Senior House Officers (trainees) who are dentists with around 2 years post qualification experience (SHOs). The Department has a team of nine Consultants (specialists), and between 2007 and 2008, 10,341 individual patient episodes took place.

Dental Schools in the UK train dentists at the undergraduate, pre-speciality and speciality levels. Prosthodontic SHO's have typically two to three years of clinical experience following qualification and are employed for one year in a training post prior to commencing specialisation. The UK system for specialisation follows a nationally agreed pathway with a 3-5 year training programme supervised by fully trained specialists called Consultants. Treatment within the Department should be Consultant led and supervised at each stage. The supervision should be similar to that at the undergraduate level with each stage of treatment checked by the Consultant. But there was a suspicion at the beginning of this audit that the conformity to this process may have lapsed. Patients needing dentures are referred to the Department by GDPs or self refer. Providing the complexity of the care is within the abilities of dental students, patients are accepted for care by Consultants or senior teaching staff and placed on a waiting list. These lists are open to undergraduates and SHO's for treatment which is free to all patients. A very small number of patients with more complex needs are allocated to specialist trainees.

An issue of local concern was that the time taken for dentures to be delivered by SHOs often appeared to be prolonged and many patients seemed to be receiving treatment within the Department indefinitely, without ever being discharged back to their GDP. There was a limitation on the total time needed to deliver appointments as the current contract with the laboratory required at least two weeks between appointments since the work is posted to a site some distance from the Dental School. SHOs also felt that they often had to carry out a high number of review appointments after treatment plans were completed. Lengthy treatment plans may present difficulties for patients, in terms of extra time commitments and travel costs associated with multiple hospital visits. They may also have a negative impact on patients' perceptions of service delivery within the Department, and indeed patient satisfaction has been found to not be solely related to clinical standards [1]. Frustrated patients can also be difficult and stressful for clinicians to manage and clinical delays are a potential source of complaints [2]. Also, increasing the amount of clinical time required to treat cases may impede access to the Department for newly referred patients, which is inefficient for the Department and not a good use of NHS resources. The aim of this audit was to investigate the process of denture provision by SHOs, and then to improve the quality of care received by our patients, which should in turn enhance the training experience of Senior House Officers.

Audit Standards

The gold standards set for this audit are shown in Table 1. A gold standard for the stages in denture construction was taken from guidelines of the British Society for the

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Table 1. *Gold standards of audit*

Source of referral	*100% from Consultant/ Consultant Clinic*
Total number of visits including post-fit reviews	Acrylic-based dentures 7 visits Metal-based dentures 9 visits
Number of post-fit reviews	2
Denture delivery	100%
Consultant supervised discharge	100%
Outcome of treatment	0% need for immediate re-make of denture

Table 2. *Stages in construction of dentures*

*Stages in denture construction**			
	Acrylic-based dentures		*Metal-based dentures*
1	Primary Impressions	1	Primary Impressions
2	Secondary Impressions	2	Tooth preparations and Secondary Impressions
3	Jaw Registration	3	Jaw registration
4	Wax trial insertion	4	Wax trial insertion
5	Final Insertion	5	Metal framework insertion
6	Review 1	6	Trial insertion (wax + metal)
7	Review 2 and discharge	7	Final Insertion
		8	Review 1
		9	Review 2 and discharge

**Based upon the British Society for the study of prosthetic dentistry guidelines.*

Table 3. *Data collected*

1. Type of denture constructed: including details regarding the exact type of denture i.e. complete/partial denture(s); acrylic or cobalt-chrome based denture(s); whether the denture was an immediate replacement.
2. Source of referral to SHO.
3. Previous attempts at denture provision by SHO grade operators.
4. Details of every appointment attended by the patient: date; treatment carried out; additional information.
5. Details of appointments which the patient failed to attend or cancelled at short notice.
6. Number of SHOs involved in the treatment plan.
7. Whether treatment was completed or is still ongoing.
8. Whether laboratory work from a previous attempt at denture provision was utilised.
9. Whether a denture was delivered.
10. Any stated reasons for prolonging of the treatment.
11. Whether the patient has returned since for a remake and if so, any explanations for this which have been recorded.
12. Date of patient discharge (if appropriate).
13. Consultant countersignature of discharge.
14. Whether a discharge letter was sent to the patient's GDP (re-audit only)

Table 4. *Action plan implemented after first audit cycle*

Primary implementations

- All cases to be treatment planned by a Consultant prior to referral to an SHO.
- Increased level of Consultant supervision
  – An e-mail was sent to all members of the Department detailing the results of the audit and the action plan.

Secondary implementations

- Introduction of a 'Two-review' rule.
  – If a patient has reached the third review appointment and is still having problems the SHO is advised to seek Consultant advice.
- Introduction of standard discharge protocols.
  – At the final appointment a Consultant should check that a satisfactory denture has been provided and should sign the patient notes to indicate that this has been carried out.
  – discharge letter proforma was designed and placed onto the clinic to be sent to the patient's GDP on completion of the treatment plan which is to be audited in the second cycle.
- Liaise with reception staff and nurses.
  – If a patient has not been seen in the Department for over six months and requests an appointment, they should be directed to a Consultant Clinic rather than directly onto the SHO list.

Study of Prosthetic Dentistry [3]. This standard was adapted and agreed locally with senior members of the Department, giving our gold standard for the total number of visits required to construct acrylic-based and metal-based dentures, of 7 and 9 visits respectively(Table 2). Ideally all dentures should be delivered and there should be no need for remakes. At the end of a treatment plan, prior to the discharge of a patient, a Consultant should examine the denture. This serves the dual purpose of ensuring the patient has been provided with a satisfactory prosthesis and monitoring the training needs of the SHO.

METHOD

The first cycle of the audit was retrospective and included all patients treated by SHOs in the Department between the 1st February 2007 and the 31st July 2007. Prior to commencement, it was approved by the Audit Department of Guy's and St Thomas' NHS Foundation Trust. The primary sources of data were patient record folders and initially the patient sample was compiled from day-lists retrieved from the hospital computer system. A proforma was designed for data collection (Table 3) and it was initially piloted on five randomly selected sets of notes, which were not to be included in the audit.

The inclusion criteria for the audit were all patients that had at least one denture constructed by an SHO during the audit period and for whom the full patient records were available. All other types of removable prostheses were excluded e.g. training bases and Michigan splints. Each case was anonymised by allocating it a code to ensure patient confidentiality and the data were collected by the two SHOs involved in carrying out the project. Having analysed the results of the first cycle an action plan was drawn up and implemented throughout the Department (Table 4). A prospective re-audit was then planned and executed between the 1st February 2008 and the 5th August 2008.

RESULTS

The first audit cycle included 44 cases and the second cycle included 23 cases. In the first cycle of the audit 17 cases of the total 44 involved the construction of full dentures and in the re-audit 9 cases of the total 23, were full denture cases. This meant that in both cycles similar proportions (40%) of complete and partial denture cases were managed by the SHOs. Figure 1 illustrates the source of referrals of patients to the SHO lists. It was found that in the initial audit approximately half of all cases were referred from Consultants within the Department, and this increased to 61% in the re-audit. Also the number of patients being referred from 'other' sources reduced from 22% to 9%. The mean number of visits required to construct acrylic-based and metal-based dentures in comparison to the gold standard is shown in Figure 2. In the initial audit, both the acrylic-based and metal-based dentures required a mean of 10.5 visits to complete, which reduced to 8.1 visits and 9.9 visits respectively in the second audit cycle. The range also reduced significantly from 20 as the highest number of visits in the initial audit, to 12 in the re-audit. The mean number of post-fit reviews in the initial audit was 2.8 and in the re-audit reduced to 1.8. Overall average length of time taken to complete cases also reduced from 31 weeks 2 days to 22 weeks and 6 days. Table 5 illustrates that a denture was delivered to the patient in almost all cases investigated in both audit cycles.

The proportion of discharges which were supervised by a Consultant by way of a counter-signature in the notes, increased from 3% in the first audit cycle to 70% in the second (Table 5). 61% of discharges in the second audit cycle were also accompanied by a discharge letter. In the first audit cycle almost one third of all dentures completed had to be immediately remade, however in the re-audit this was reduced to zero. Some reasons stated in the notes for prolonged treatment or the immediate remake of dentures included: "the patient rejecting the denture; multiple post-fit review appointments; multiple failed appointments or cancellations; significant non-prosthetic work included within the treatment plan; patient illness; labwork not ready or lost; treatment plans changed mid-treatment; and significant changes made to the denture after it was fitted which were outside of the original treatment plan."

DISCUSSION

The re-audit showed reductions in the average number of visits required to construct both acrylic-based and metal-based dentures, and although both were slightly higher than the gold standard, they may be considered to be acceptable given the complexity of the hospital cases. The reason for the reduction in the treatment time was an improvement from Consultant supervision. Before the audit most SHOs received little direct supervision of clinical care and following the audit this increased and the direct supervision improved delivery and quality of patient care. In both cycles, all patients treated by SHOs within the specified six-month periods, were included, however this figure was lower in the re-audit. This decrease in the re-audit reflected the increased time that supervision had on through-put and that an outcome of another clinical strategy reduced the number of patients on the waiting lists. New patients, selected for SHO treatment, were then taken directly from Consultant Clinics without the need for a waiting list. This ensured that SHOs were directly allocated suitable training cases by the Consultants. A significant improvement was the reduction in range of total number of visits. In the re-audit the greatest number of visits was 12 which is far more acceptable than 20. Hopefully due to the increased level of Consultant supervision and the introduction of the 'two-review' rule, this should not happen again in the future. Indeed the average number of post-fit review appointments was 1.8 in the re-audit which met the set gold standard of 2.

In every case a denture was delivered, and a significant increase was found in the number of Consultant supervised discharges which rose from 3% to 70% in the re-audit, again reflecting the increased level of supervision. This should improve the quality of time spent by SHOs in this Department, especially if they are managing to complete more treatment plans in a shorter space of time. Also none of the dentures provided had to be immediately remade which is a significant improvement when compared to the initial audit where this was the case for approximately one third of patients.

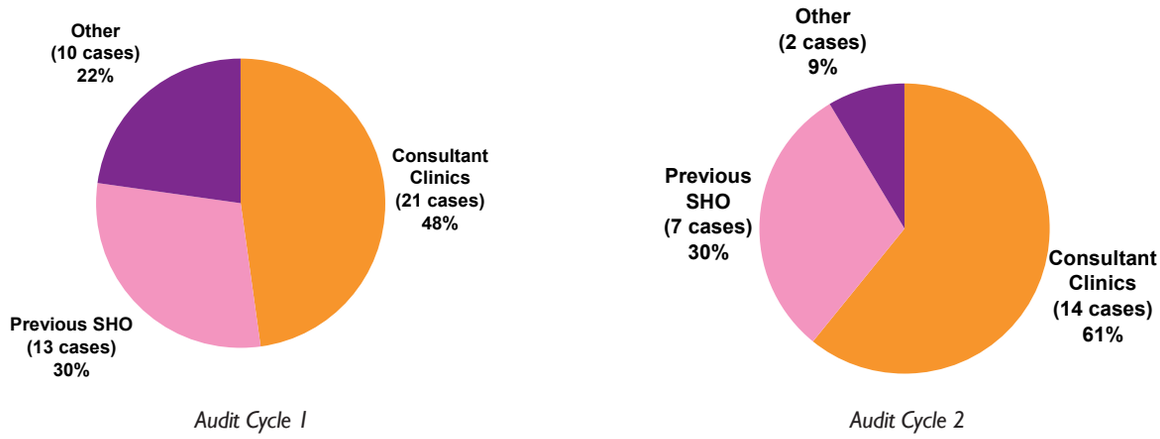

Figure 1. *'Source of referrals to SHO lists in audit cycles 1 and 2'*

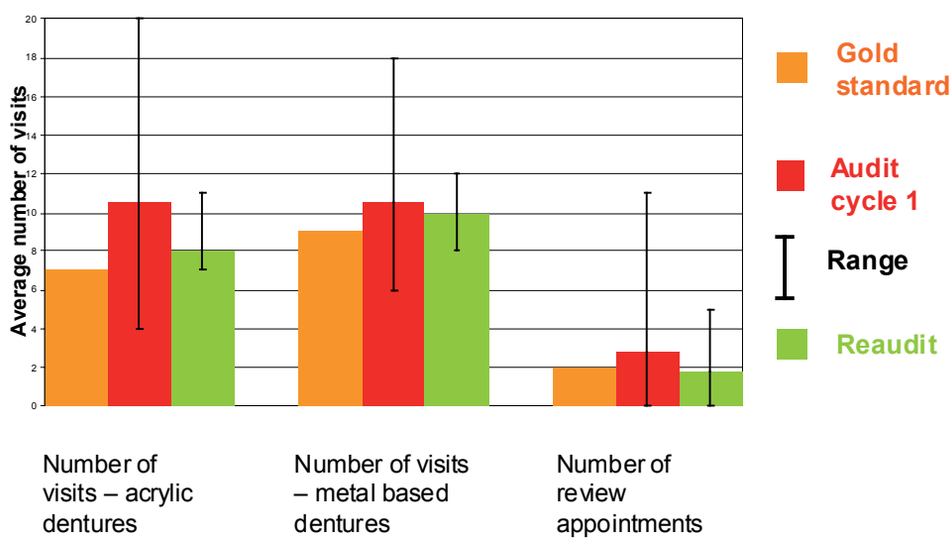

Figure 2. *'Total number of visits and post-fit reviews required to construct acrylic-based and metal-based dentures in audit cycle 1 and re-audit, compared to the gold standards'*

Table 5. *Denture delivery, supervised discharges and use of discharge letters*

	Gold standard	*Audit cycle 1*	*Reaudit*
Prosthesis delivery	100%	97%	100%
Supervised discharge (counter-signature in notes)	100%	3%	70%
Immediate remake	0%	29%	0%
Discharge letter sent	100%	-	61%

In 61% of cases in the second cycle of the audit, the standard discharge letter was used to refer the patient back to their GDP. This is something which previously was not carried-out and so patients never seemed to leave the hospital system. In cases where patients did not have a GDP, the letter was sent to the patient and they were advised to take it to their new dentist. Hopefully with more patients being discharged this will provide more opportunity for new patients to be taken on. The use of the discharge letter proforma is something which can be re-enforced and re-audited in the future. Incidentally, currently there is no waiting list for staff or SHO treatment which usually means that if someone is identified in a Consultant Clinic as 'appropriate for provision of a denture within a secondary care setting', their treatment can be commenced reasonably quickly.

Although in theory all patients referred to the Department should be assessed by a Consultant the first audit showed this had not occurred. Some referrals between SHOs occurred following the delivery of an unsuccessful denture. Following the second audit improved supervision resulted in the elimination of cases referred between SHOs. Ideally, all referrals should be agreed by Consultants but because of the number of dentures needed to train 180 undergraduates senior teaching staff (non Consultant) also accept patients for care. Although the proportion of cases referred from Consultant Clinics increased in the re-audit to 61%, it is still significantly below the gold standard of 100%. Although this seems disappointing, measures introduced in the action plan to try and increase this percentage are likely to take a longer period of time to come to fruition, and it will be interesting to see if this percentage increases in future audit cycles.

Audits on the provision of dentures are not uncommon [4,5]. These audits focused on the referral letters, perceptions of care by patients and the quality of the prosthesis. To our knowledge no audit or research has investigated the time taken to deliver dentures and the impact of supervision on dentists in training. The impact of supervision on undergraduate training has been well recognised in other studies [6,7] but its effect on training of other staff is also important.

CONCLUSION

Valuable improvements were achieved in carrying out this clinical audit and it would be beneficial for further audit cycles in other prosthodontic areas to be carried out to monitor progress. Although this audit focused on denture care the lessons learnt are applicable to most other restorative procedures delivered by dentists in training. In particular, the importance of Consultant supervised discharges should be emphasised to future SHOs, together with the usage of the discharge letter proformas that were introduced.

ADDRESS FOR CORRESPONDENCE

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