Reducing Trainee Service Provision Burden: An Audit of Cardiac Surgical Follow-Up

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OBJECTIVE: To standardize the discharge policy for outpatient appointments and reduce the burden of service provision placed on trainee surgeons.

DESIGN: Retrospective audit of practice followed by a prospective audit following our intervention.

SETTING: Cardiac surgery outpatient clinic at Liverpool Heart and Chest Hospital, a large tertiary cardiothoracic center in the United Kingdom.

PARTICIPANTS: All patients (total 1002) attending post-cardiac surgery follow-up appointments in the periods January to March 2015 (n = 428), February to March 2016 (n = 250), and February to March 2017 (n = 324).

RESULTS: Introduction of departmentally agreed guidelines on discharge from follow-up reduced the number of inappropriate recalls among patients attending their first postoperative appointment (4.6% vs 17.6%; $p < 0.001$), which was maintained at 1 year (4.5% vs 17.6%; $p < 0.001$). In the initial cohort, a significantly higher proportion of patients were inappropriately recalled if they were seen by registrars who were not from the operating consultant's team (11.7% vs 24.1%; $p = 0.007$); this was not apparent after the guidelines were introduced (5.4% vs 3.8%; $p = 0.62$). There was no increase in the number of patients referred back to the cardiac surgical department after introduction of the guidelines (0.71% vs 2.8%; $p = 0.078$). We calculated an annual cost saving of £3841 ($5377). There was a significant increase in the number of new patients seen by trainees in each clinic (0.15 vs 0.38, $p = 0.04$).

CONCLUSION: Implementation of a discharge guideline decreased the number of unnecessary attendances at the outpatient clinic without an increase in subsequent referrals and was cost neutral. Trainees were able to assess more new referrals, increasing the educational value of the clinics. (J Surg Ed 76:337–342. © 2018 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: education, costs and cost analysis, outpatients

COMPETENCIES: Patient Care, Professionalism, Interpersonal and Communication Skills

INTRODUCTION

Training in surgery competes with service commitments.[1] While postoperative follow-up in the outpatient setting is an important component of aftercare, there are no guidelines as to when patients should be discharged from surgical follow-up. The majority of patients are able to return to normal activity after cardiac surgery, and further follow-up reserved for those with specific ongoing complications.[2] Furthermore, a number of those ongoing issues identified by Brandenburg and colleagues are now managed, in the United Kingdom, by cardiologists. Multiple surgical postoperative follow-up visits do not therefore necessarily add to the patient's clinical care, but do add to the burden of service provision carried out by trainees. This burden is shared with the patients, some of whom travel over 100 miles to attend their appointments. It also represents an additional cost to health care providers.

We had no standardized system for discharging patients from follow-up following cardiac surgery, and many patients seem to return for further follow-up despite making satisfactory progress and being able to perform or exceed their preoperative activities of daily living. We noted an opportunity to minimize the number of unnecessary follow-up appointments and provide the opportunity to reallocate trainees to theater where they

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can develop their operative skills. We developed a set of standardized discharge rules and audited their effectiveness in reducing the number of inappropriate recalls to the outpatient clinic, and also explored the effect on trainee allocation to theater.

MATERIAL AND METHODS

In the initial cohort, clinical documentation and clinic letters for all patients who attended for cardiac surgical follow-up between January and March 2015 were retrospectively reviewed. Patients who had undergone transcatheter aortic valve implantation, an intervention on their thoracic aorta, or who remained under surveillance for an unoperated aortopathy were excluded as they had specific ongoing follow-up requirements. Data were collected on the procedure undertaken; the date of attendance; whether the attendance was the first or a subsequent follow-up; the seniority of the clinician assessing the patient; whether the patient was seen by the operating consultant's team; investigations performed at the clinic; whether there were any ongoing surgical complications and whether the patient was discharged or recalled for a subsequent appointment. We included the management of postoperative atrial fibrillation as an ongoing complication, while electrocardiographical monitoring or surveillance following electrical cardioversion were ongoing. Surgical wound site infections are rarely seen in the surgical clinic as they are managed by specialist tissue viability nurses. All patients were judged as being suitable for discharge if they were progressing in an expected manner and had no ongoing surgical issues. They were subsequently divided into 3 groups: those that were appropriately discharged, those that were appropriately recalled (due to ongoing surgical complications), and those who were inappropriately recalled (i.e., those with no ongoing surgical complications). As a measure of safety, we also checked whether any of the discharged patients were subsequently re-referred to our institution.

After the initial audit period, the results were presented to the unit's consultants, and agreement was reached on an institutional standard for discharging patients from further follow-up. The new guideline can be seen in Table 1.

These guidelines were disseminated to the registrars, and a reaudit was completed between February 1 and March 31, 2016, collecting the same data as previously. A further period of data collection was undertaken between February 1 and March 31, 2017, to assess the continuing effect of these changes. A cost analysis was performed on the 2016 data by analyzing the cost of those appointments deemed unnecessary together with the cost of any investigations performed at these visits as well as the tariff received for each appointment.

To assess the impact of these changes on registrar training, we collected the following data. The average number of sessions (half a day) each registrar was allocated to theater over a 10-week period in each of the audit cycles as well as the mean number of new patients seen in each clinic in March of each year studied.

Statistical Analysis

Differences between discharge outcomes were compared using Chi Square analysis. Differences in the number of patients seen in clinic and the mean number of theater sessions allocated were assessed with Student's t test. We considered p values <0.05 to be statistically significant. Statistical analyses were performed using Microsoft Excel 2013 (Microsoft, Redmond, WA) and MedCalc for Windows, version 17.2 (MedCalc Software, Ostend, Belgium).

RESULTS

A total of 428 patients attended cardiac surgical follow-up between January and March 2015. Of these, 278 (65%) were presenting as first-time follow-up patients. The majority of these patients were seen by registrar-level doctors (Table 2). The mean time since operation was 152.5 days; for patients attending for the first time, this was 68.9 days, and for those attending for subsequent visits, the mean time from operation was 307.4 days.

In the 2015 cohort, 182 (65.5%) of the patients attending their first follow-up appointment were discharged; there were 49 (17.6%) who were inappropriately recalled; and the remaining 47 were brought back for management of ongoing surgical complications. Those patients who were seen by members of the operating

TABLE 1. Discharge Criteria for Postcardiac Surgery Patients

Discharge Criteria for Postoperative Patients
A patient attending their first postoperative appointment who is progressing and/or back to normal activities
A patient attending a subsequent follow-up appointment where the reason for ongoing follow-up has been resolved
Patients being discharged should not have any unexplained cardiac symptoms or need surgical management of postoperative complications

TABLE 2. Grade of Doctor Reviewing Follow-Up Patients

	2015 Cohort n (%)	2016 Cohort n (%)	2017 Cohort n (%)
Consultant	31 (7.2)	25 (10.0)	32 (9.9)
Registrar	390 (91.1)	221 (88.4)	291 (89.8)
Core Trainee	7 (1.6)	4 (1.6)	1 (0.3)

consultant's team were significantly less likely to be inappropriately recalled (11.7% vs 24.1%, p = 0.007). The patients were seen by a group of 15 registrars during this period, and the rate of inappropriate recall varied from 0% to 78.9% among these individuals. Review of the notes of patients attending for repeat follow-up showed that 78 of those patients had met the criteria for discharge at their previous appointment; this represented 18.2% of all patients attending for follow-up appointments.

During the 2016 reaudit period, 250 patients attended for follow-up. One hundred and fifty four of these patients attended for their first postoperative assessment. The mean length of time from operation was 163.6 days, 58.5 days for the first-time follow-up appointments, and 332.2 for subsequent follow-ups. One hundred and seventeen (76.0%) of the patients attending for their first follow-up were discharged, 7 (4.6%) were inappropriately recalled. This represented a significant reduction in the number of patients inappropriately recalled (4.6% vs 17.6%, p < 0.001) (Fig. 1). In the reaudit cohort, there was no significant difference between the rate of inappropriate recalls when analyzed according to whether the patients were seen by their own team or not (5.4% vs 3.8%, p = 0.62). The reduction in the number of inappropriate recalls of those patients who were not seen by their own consultant's team was statistically significant (24.1% vs 3.8%, p < 0.001). Of those patients who were attending for subsequent follow-up appointments in the 2016 cohort, 41 (16.4%) had met the criteria for discharge at their previous appointment.

A scatter graph was produced to assess an association between patients seen by their own consultant's team and subsequent discharge (Fig. 2a). There appeared to be a negative correlation in the preguideline cohort, which was not present in the 2016 reaudit cohort.

A further sample of patients was audited in 2017 to assess whether changes in practice persisted. Three hundred and twenty four patients attended for follow-up during this period of which 223 (68.8%) were first-time follow-up attendances. Only 35 (10.8%) of the total number had previously met the discharge criteria. One hundred and sixty seven (74.9%) of the first-time follow-up patients were discharged, and 10 (4.5%) were inappropriately recalled. The proportion of inappropriate recalls remained significantly lower than prior to introduction of the guidelines (3.1% vs 17.6%, p < 0.001) (Figure 1). Rates of inappropriate recall did not differ significantly between those patient seen by the operating consultant's team and by another team (6.1% vs 2.2%, p = 0.13).

A cost analysis was performed by calculating the cost of the appointments and any investigations performed on the 78 patients who had met the discharge criteria

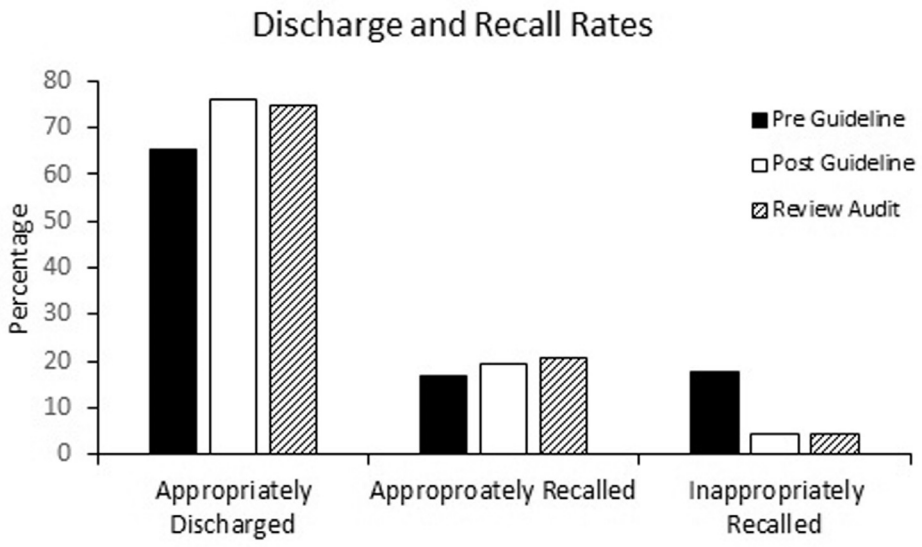

FIGURE 1. The discharge decisions for patients attending cardiac surgical follow-up pre- and postimplementation of the standardized discharge guidelines. There was a significant reduction in patient inappropriately recalled following introduction of the guidelines (p < 0.001) which was maintained when audited after a further 12 months (p < 0.001).

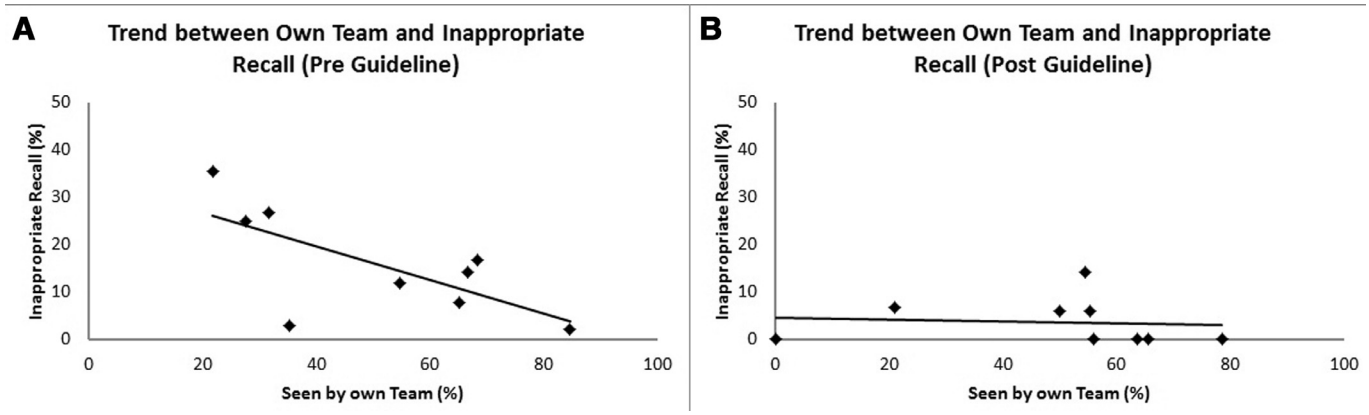

FIGURE 2. In the preguideline cohort, there was a negative correlation between the proportion of patients seen by their own team and those inappropriately discharged (A), there was no correlation in the 2016 postguideline cohort (B).

TABLE 3. Cost Analysis of the Unnecessary Appointments

	Cost	**Number**	**Subtotal**
Appointment	£93	78	£7254
CXR	£40	61	£2440
Electrocardiogram	£16	66	£1056
Echocardiogram	z£85	17	£1445
CT scan	£186	3	£558
MRI	£387	2	£774
		Cost of appointments	£13,527
	Income	**Number**	**Subtotal**
Follow-up tariff	£157	78	£12,246
		Income from appointments	£12,246
		Balance	£1281.00
		Weekly average*	£100.08
		Yearly estimation†	£5204.06

*The weekly average was calculated by dividing the total cost by the 12.8 weeks over which the data were collected.
†The yearly estimation is calculated by multiplying the weekly estimate by 52.

prior to their attendance during the 2015 cohort. The calculations can be seen in Table 3. The total cost of the unnecessary appointments was calculated at £13,527, with an associated tariff totaling £12,246 over the 12.8 weeks that data were collected. This equates to a yearly saving of £5204 if the inappropriate recall rate was reduced to zero. As we saw a relative reduction in unnecessary appointments of 73.8% (17.6% to 4.6%), we calculated a potential annual cost saving of £3841 ($5377) with the observed level of guideline adherence.

Of the 281 patients discharged between January and March 2015, 2 (0.71%) were referred back to the surgical service with a mean interval of 121 days. One of these patients had developed a paravalvular leak following mitral valve replacement and subsequently underwent reoperation. The second was referred for recurrent pleural effusions which were associated with general deterioration, no surgical intervention was performed. There were 180 patients discharged between February and March 2016. Five of these were referred back to the surgical service. There was no significant increase in the rate of re-referral (0.71% vs 2.78%, p = 0.078).

The mean number of new patients seen by trainees in each clinic increased from 2015 to 2017 (0.15 vs 0.38, p = 0.04). There was no statistically significant increase in the number of theater sessions each trainee was allocated per week (3.49 vs 3.65, p = 0.54).

CONCLUSIONS

Descriptions of the outpatient management of cardiac surgical patients in the literature are scarce, with only 1 paper from nearly 4 decades ago identified in our searches.[2] Additionally, we identified no national or international guidelines on the follow-up of these patients. Surgical training requires developing skills in a broad range of settings including the outpatient clinic, but also in the

operating theater. With the introduction of the European Working Time Directive, there has been a reduction in the time available to train without a corresponding reduction in the level of service provision.[3] As such, there have been efforts to change the way in which services are delivered. Follow-up clinics are seen to offer limited educational value and can be protocolized, as seen by a number of nurse-led clinics that have been described elsewhere.[4]

Previous studies in a noncardiac surgical setting have shown and demonstrated a number of factors which affect the perceived effectiveness of an outpatient service,[5] among which was the pressure on time. We believed that the number of patients attending the outpatient clinic had an influence on this time pressure. Observational data suggested that a number of these patients had no ongoing clinical issues that required surgical follow-up, and we sought to quantify and address this. Our initial audit confirmed that nearly 1 in 5 patients were not being discharged from follow-up despite their condition no longer requiring surgical input. Furthermore, we found a significant reduction in the number of patients inappropriately recalled from 17.6% to 4.6% following the introduction of a simple discharge policy. The main driver of this reduction was seen among those patients that were not seen by their own consultant's team. In the preguideline cohort, patients were 6 times more likely to be brought back unnecessarily when not seen by their own team; this difference had been eliminated in the postguideline group. McKee and colleagues identified the consultants' personalities as a factor affecting the organization of clinics. They described different levels of risk-averse behavior with some consultants tending to bring patients back for further review "just to be sure."[5] An audit in Ireland identified an "SHO trap" (Senior House Officer) where less experienced clinicians were less likely to discharge patients.[6] We postulate that potential unfamiliarity with an individual consultant's practice may lead trainees to similarly "play safe" and offer further appointments to patients who could have otherwise been discharged, particularly when assigned to the clinic of a consultant they do not routinely work with. Formalization of an agreed discharge policy across the department gives confidence to those trainees that their decision-making concurs with normal practice.

The significant reduction noted following the implementation of the original guidelines could be attributed to the "Hawthorne" effect and the expectation that management practice in clinic was being observed. An audit of Cardiology clinics where a clinical nurse specialist highlighted patients for discharge prior to their follow-up review had a discharge rate of 34% for these highlighted patients in the initial cohort, but this reduced to 22% and 10% in subsequent audit cycles.[7] We performed a repeat audit in 2017 to evaluate whether there had been a return to previous practice. This cycle was performed without notification and without reiteration of the discharge guidelines. Our data showed a persistent reduction in the number of inappropriate repeat follow-ups suggesting that our introduction of local guidelines *did* have a lasting effect on outpatient clinic practice.

The proportion of patients who were deemed to be dischargeable at their previous appointment remained similar in both the 2015 and 2016 cohorts at 18.2% and 16.4% suggesting that there is scope for a lasting reduction in the number of patients seen in the outpatient clinic. Our most recent data revealed that only 10.8% of the patients who attended had previously met the criteria for discharge. This time lag is understandable since clinic appointments are made in advance and that a fall in inappropriate recalls would only be seen in clinic attendances at a later stage. It is also encouraging that patients did not seem to be being re-referred to the service after discharge, a sign that the increased proportion of discharged patients was appropriate. Others have succeeded in reducing unnecessary reviews to a greater extent: 1 study in a medical outpatient setting where patient records and investigations were screened prior to the appointment, with unnecessary follow-up visits cancelled, demonstrated a 40% reduction in attendances.[6] We noted an increase in the overall number of follow-up patients seen in the 2017 cohort when compared to the 2016 cohort. While this may seem counterintuitive following an intervention to decrease the number of unnecessary attendances, it is likely to reflect the fact that 2 additional surgeons were employed by the time of the 2017 analysis, with a subsequent increase in the number of clinic sessions.

We collected data on any patients who were re-referred to the surgical service following discharge as a measure of safety. This number was low for both time periods, being less than 3%. There was no significant change in the groups seen before and after implementation of the guideline; we expect that this proportion would increase if patients were being inappropriately discharged. In addition, we saw an increase in the number of patients who were appropriately discharged, with no change in the proportion who were appropriately recalled suggesting that the increase number of discharges was seen among patients who truly had no ongoing surgical issues, whereas those who did were still brought back for review.

Efforts to increase the efficiency of surgical services are not new, with one author stating in 1983 that "surgeons can play a constructive part in the management of health-care cost by improving the efficiency of their practice."[8] This surgeon referred to the role of the outpatient clinic as an efficient way of managing patient's preoperative investigations, a practice that is

now commonplace. There does however appear to be further scope to continue with such efforts in the present day, albeit with the aim now of improving the efficiency of the outpatient setting. Our cost analysis suggested a yearly saving of only £3841 ($5377) from implementing a policy for discharging patient from follow-up. In relation to the department's overall budget, this is modest but shows that changes to improve training can be cost neutral. Our data did not capture wider costs associated with these appointments such as the cost of transporting patients to their appointments, a cost not borne by the hospital. Neither does it consider the inconvenience to the patients of travelling to a tertiary center which can be some distance away.

One of the potential benefits from reducing the number of clinic attendances is that trainee surgeons could be allocated to fewer outpatient clinic sessions and be redeployed to theater sessions instead. We have not shown a significant increase in the number of session attended each week; however, such analysis was complicated as the number of registrars employed was not equivalent between audit periods. We saw a small increase in the mean number of sessions attended by each trainee per week, which was coupled with an increase in the number of registrars from 11 to 13. While the mean number remains less than the 4 sessions a week recommended by the Joint Committee on Surgical Training, attempts are made to ensure that the nationally appointed trainees meet this number.[9] We did see a significant increase in the number of new patients seen by trainees in each outpatient clinic, although it remains less than 1 per clinic. While we have not demonstrated that a reduction in unnecessary clinic attendances increases the number of theater sessions allocated to each trainee, it appears that it has allowed more time for the trainees to assess new referrals.

A potential weakness of this study was that as a tertiary center, some complications may be dealt with locally without us being aware, or through telephone advice. This may potentially underestimate the proportion of patients who were inappropriately discharged. We did not survey the opinions of the patients as to the utility of repeat follow-up patients. A previous study in a general surgical setting found that only 12% of patients had their management changed at the time of their postoperative follow-up, but 85% of those patients felt their postoperative attendance had been worthwhile.[10] While these authors included patients who had undergone minor procedures such as hernia repairs and appendectomies, there was a proportion of patients who had surgery on abdominal aneurysms. This would suggest that an initial follow-up with the surgical team has benefit, particularly following major surgery, but that subsequent reviews are unlikely to alter ongoing management.

While we have demonstrated an increase in the efficiency of the outpatient follow-up clinic by safely reducing the number of follow-up appointments offered, we have not shown that this necessarily allows redeployment of the surgical trainees to the operating theater. We did see an increase in trainees' exposure to new referrals in the clinic, which should improve their educational benefit.

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