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Accurately costing unilateral delayed DIEP flap breast reconstruction☆

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Summary *Introduction:* Free tissue transfer for breast reconstruction is widely practiced in the UK and its availability forms part of the NICE guidelines in treating breast cancer. Free flap reconstruction scores highly on patient reported outcome measures for both immediate and delayed procedures. However there are significant resource implications and a concern that the financial burden is not adequately met by the fixed price tariff system (Payment by Results). This study aims to compare the cost of treatment with both local financial estimates and reimbursement.

Method: We conducted a prospective costing analysis for 10 consecutive delayed unilateral DIEP breast reconstructions from August 2011 by a single surgeon in Frenchay Hospital, Bristol. Comparison was made to both the hospital's costing estimates and the Health Resource Group (HRG) tariffs received for 27 similar cases performed by the same surgeon in the 2010–11 financial year.

Results: The mean treatment cost for performing a delayed unilateral DIEP procedure was £7628 (±£754 Standard Deviation). This compared to an estimate from the financial department of £8072 ± (£1683 SD). These values were not significantly different ($p = 0.27$). The HRG tariff was £8792 (±£423 SD). There was an average net income of £720 per case. Personnel in theatre represented the largest cost area at an average of 73% of total cost.

Conclusions: This study highlights that the costs of this procedure have been estimated accurately by the financial department and that the current HRG code provides adequate reimbursement. The new HRG code for 2012–13, HRG JA14z, provides significantly less reimbursement at £7012 and measures need to be taken to address this. This study has identified that personnel costs are the greatest contributor to overall cost and allowed us to recognise and implement changes to improve efficiency.

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Introduction

The deep inferior epigastric artery flap was first described by Koshima and Soeda.[1] Since then it has become a mainstay of autologous breast reconstruction.[2,3] However although the patient reported outcome measure (PROM) data scores free flap reconstruction very highly for both immediate and delayed reconstruction,[4] the cost of the initial procedure is high.[5]

A number of centres have published data looking at costs in comparison to alternatives both in terms of timing (immediate vs. delayed) and alternative reconstructive techniques (implants vs. local flaps vs. free flap alternatives). Comparisons performed by Kaplan et al.[5] and Kroll et al.[6] demonstrated lower and comparable costs for DIEP reconstruction compared to TRAM reconstruction. Thoma et al. compared costs to health benefit in quality adjusted life years to demonstrate that DIEP flaps were an attractive alternative to TRAM reconstructions in the Canadian health system.[7] Damen et al.[8] and Atherton et al.[9] have compared medium and longer term cost outcomes; Damen et al. finding that implant reconstruction remained cheaper overall but unsuitable for all patients; Atherton et al. finding that by the end of the process, both implants and DIEP reconstruction cost similar amounts. They also highlighted the inequality and insufficiency of reimbursement within the UK system for breast reconstruction.

This study aimed to compare the cost of treatment in our unit with both local financial estimates and reimbursement under the Payments by Results system (PBR).[10] Independent assessment of our costs also allowed us to identify strategic areas for efficiency savings.

To assess the costs accurately we prospectively applied a cost analysis technique similar to that described by Neyt et al.[11] For comparability and accuracy we have focused on cost analysis for unilateral delayed breast reconstruction with a DIEP flap.

Methods

Cost analysis technique

From August 2011 until November 2011, 10 consecutive patients undergoing a unilateral delayed DIEP breast reconstruction by a single surgeon were prospectively included in the cost analysis exercise. Patient journeys were followed from admission until discharge analysing service input and treatment costs. Data was collected for each individual case in theatre, recovery and whilst an inpatient. Subsequent follow up and further procedures for example: symmetrisation and nipple reconstruction are included under separate income tariffs and were therefore not included in this series. Our costs were assessed for a single surgeon who undertakes free tissue breast reconstruction regularly and routinely. In each area costs were collected for consumables, static costs and staffing.

Consumable costs — for example for drugs, surgical equipment, dressings, etc— were calculated by individually accounting for each item used multiplied by the unit cost obtained from theatre/ward purchasing. Static costs — cost of building upkeep, theatre running costs, surgical set maintenance (but not replacement costs as a percentage of total possible uses), etc— were estimated using financial department data. All staff involved in the theatre case were noted individually and their relative costs calculated as a percentage of their "per session" cost (based on the time they spent on the case), similar process was used to estimate staff costs in recovery and on the ward.

Financial department data

Financial department data was obtained from the North Bristol NHS financial coding department using the HRG code JAZ01[12] for the same consultant and cross checking with patient records to ensure that all cases were unilateral delayed DIEP breast reconstructions. 2010—11 financial year was chosen for comparison as the nearest year with costing and tariff data available. After excluding the immediate free DIEP and bilateral breast reconstructions, 27 delayed unilateral DIEP reconstructions were performed across that time period by the same surgeon. Estimates of cost had been produced by the financial department using an average cost per unit time method. In theatre, this was based on estimated theatre running costs, the average cost of surgical and anaesthetic staff multiplied by the time taken for the case. On the ward, an average cost per night figure, which accounted for increased staffing levels, was used. Tariff data was also obtained for these patients for the same time period and compared to costs to generate estimated income data.

Statistical comparison

Data was assumed to be independent and parametric. A non-paired two tailed student *t*-test was used for comparison in Microsoft Excel 2010.

Results

There were no complications during the inpatient stay of any of the 10 cases, no cases required surgical revision in the first year of follow up. The average operative time was 451 min and the average hospital stay was 5.7 days (summarised in Table 1).

The average cost of performing a unilateral delayed DIEP breast reconstruction as calculated by micro costing was £7628 (±£754 Standard Deviation; range £6324.06—£8332.68). The average cost estimated for the same procedure by the financial department was £8072 (±£1683 SD; range £5286.18—£14,866.70). These two figures are not significantly different ($p = 0.27$).

Table 1 Summary of patients included in the cost analysis exercise.

Patients	10
Mean operative time (min)	451.5 (range 320—540)
Length of stay (days)	5.7 (range 5—7)
Complications	0