

National trends in immediate and delayed post-mastectomy reconstruction procedures in England: A seven-year population-based cohort study



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Abstract

Introduction: Little is known about post-mastectomy reconstruction procedural trends in women diagnosed with breast cancer in England. Our aim was to examine patterns of immediate and delayed reconstruction procedures over time and within regions.

Methods: Women with breast cancer who underwent unilateral index immediate or delayed post-mastectomy reconstruction between 2007 and 2014 were identified using the National Hospital Episode Statistics database. Women were grouped into categories based on the type of reconstruction procedure. Adjusted rates of implant and free flap reconstructions were then calculated across regional Cancer Networks using a regression model to adjust for age, disease, comorbidities, ethnicity, and deprivation.

Results: Between 2007 and 2014, 21 862 women underwent immediate reconstruction and 8653 delayed reconstruction. Immediate implant reconstruction increased from 30% to 54%, and immediate free flap reconstruction from 17% to 21%. Adjusted immediate implant and free flap proportions ranged from 17 to 68% and 9–63%, respectively, across regions. Free flaps became more common in the delayed setting, rising from 25% to 42%. However, adjusted rates ranged from 23% to 74% across regions. Networks with high/low rates of free flaps for immediate tended to have high/low rates for delayed reconstruction.

Conclusion: There has been a substantial increase in the use of immediate implant reconstruction in England. In comparison, there has been an increasing use of autologous free flap reconstruction for delayed procedures. Significant regional variation exists in the type of reconstruction performed, and these patterns need to be examined to determine if variation is related to service provision and/or capacity barriers. © 2016 Elsevier Ltd, BASO ~ The Association for Cancer Surgery, and the European Society of Surgical Oncology. All rights reserved.

Keywords: Breast cancer; Breast reconstruction; Free flap; Implant; Expander; Practice variation

Abbreviations: ADM, acellular dermal matrix; BCS, breast conserving surgery; HES, Hospital Episode Statistics; ICD10, International Classification of Diseases, 10th revision; IMD, Index of Multiple Deprivation; NHS, National Health Service; OPCS4, Office for Population Census and Surveys classification, 4th revision.

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Introduction

The psychosocial impact on women with breast cancer who undergo mastectomy has been well documented.^{1,2} In 2002, the National Institute for Health and Clinical Excellence in the UK recommended that post-mastectomy reconstruction should be available to all women.³ Whilst in the US, the 1999 Women's Health and Cancer Rights mandated that health insurance providers cover reconstruction costs. Subsequently breast cancer care services have evolved, and in numerous countries encouraging evidence indicates a rise in reconstruction uptake.^{4–7}

Currently women have several reconstruction options available to them either at the time of mastectomy or at a later date. These include implants, autologous pedicled flaps with or without implants, and autologous free flap reconstructions.⁸ In recent years, there has been the development of materials that facilitate direct to implant reconstruction such as acellular dermal matrices (ADM) and titanium mesh.

Studies of immediate breast reconstruction from early 2000s revealed a ratio of 2:1 for autologous to implant procedures.^{9,10} Authors have demonstrated higher patient satisfaction following autologous reconstruction, and greater longevity of aesthetic results at long term follow-up comparative to implant reconstruction.^{11,12} Despite this evidence, a rise in immediate implant procedures has been reported in the US.^{13,14}

Little is known about the types of breast reconstruction technique delivered across England, either in immediate or delayed procedures. Further, procedural trends in the delayed setting remain underreported worldwide.^{15,16} Understanding such national patterns of breast cancer care is crucial for future service planning, from both a funding and training perspective. Information about regional practice is also required to evaluate whether the health care service is meeting its principle of delivering equality of access for people with equivalent needs.^{8,17} The aim of our study was therefore to evaluate the trend in type of immediate and delayed post-mastectomy reconstruction procedures performed in the English NHS. We also examined regional patterns of immediate and delayed reconstruction.

Methods

This study used data extracted from the Hospital Episode Statistics (HES) database between 1 January 2000 and 31 March 2014.¹⁸ This database contains records on all patients admitted to English National Health Service (NHS) hospitals, and allocates patients a unique identifier that allows for longitudinal follow-up. Each record contains demographic and clinical information including diagnoses, and operative procedures. Diagnoses are coded using International Classification of Diseases, 10th revision (ICD10),¹⁹ while procedures are coded using the UK Office for Population Census and Surveys classification, 4th revision (OPCS4).²⁰

The study included women aged 16 years or over with breast cancer (ICD10: C50 and D05) who underwent unilateral initial mastectomy (OPCS4: B27) in English NHS hospitals. Women with previous BCS (OPCS4:B28 excluding B28.4) were excluded because their previous surgery may have affected their reconstruction choice. Women undergoing bilateral mastectomy were also excluded. Women were then grouped into those having immediate reconstruction and those having delayed reconstruction. Immediate reconstruction was identified if a woman had a reconstruction procedure code with the same laterality and date as their mastectomy. Mastectomies occurring between 1 April 2007 and 31 March 2014 were included in our immediate reconstruction group. Delayed reconstruction was identified if women had an index reconstruction procedure occurring between 1 April 2007 and 31 March 2014 with the same laterality as a previous unilateral mastectomy occurring between 1 April 2000 and December 2013.

Patient variables

Patient age was defined as age at reconstruction. The presence of comorbidities was based on a woman's RCS Charlson comorbidity score,²¹ with the exception of a diagnosis of breast cancer (which was removed from the list of conditions counted in the Charlson score) as all patients had this diagnosis code. The area-based Index of Multiple Deprivation 2004 (IMD) score was used to measure socioeconomic deprivation, and categorised patients into quintiles from 1 (least deprived) to 5 (most deprived).²² A small number of women without IMD data were excluded as these patients were thought to be overseas visitors (152 women). Ethnicity was grouped into 4 categories: White (including mixed ethnic categories), Asian, Black, or Unknown ethnicity. Finally, each woman was assigned to one of the 28 English Cancer Networks that existed on 31 March 2012 based on the hospital provider code at mastectomy surgery.

Outcome definition

Type of reconstruction was grouped in five categories: implant or expander, pedicled flap, pedicled flap with implant or expander, free flap, and non-specific 'Other' breast reconstruction code without implant or expander ([Appendix 1](#) for OPCS4 procedure codes). Women were assigned into one of five categories based on their index reconstruction procedure.

Analysis

The proportion of women in each type of reconstruction category was plotted over time based on reconstruction date for both immediate and delayed reconstruction. Among women undergoing immediate implant/expander reconstruction, the incidence of concurrent non-specific 'Other'

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