ASSOCIATION OF BREAST SURGERY

BAPRAS

British Association of Plastic Reconstructive and Aesthetic Surgeons

ONCOPLASTIC BREAST RECONSTRUCTION

Guidelines for Best Practice

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The Editors and Writing Group are responsible for the content of *Oncoplastic Breast Reconstruction: Guidelines for Best Practice* and have full editorial control of this publication.

These Guidelines have been reviewed and are endorsed by:

Association of Breast Clinicians

Association of Chartered Physiotherapists in Oncology and Palliative Care

BASO ~ The Association for Cancer Surgery

Breakthrough Breast Cancer

Breast Cancer Care

British Association of Aesthetic Plastic Surgeons

British Psycho Oncology Society

British Society of Antimicrobial Chemotherapy

Healthcare Infection Society

Macmillan Cancer Support

Maggie's

National Cancer Action Team

National Cancer Intelligence Network

Northern Irish Cancer Network

Royal College of Anaesthetists

Royal College of Nursing

Royal College of Radiologists (Faculty of Clinical Oncology)

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FOREWORD

I warmly welcome these guidelines for best practice in oncoplastic breast reconstruction. They have been developed by a multidisciplinary group of experts for the use of clinical teams across the country and ultimately for the benefit of patients.

The authors acknowledge the limited nature of the evidence base in this area and thus the need for clinical consensus. The findings from the *National Mastectomy and Breast Reconstruction Audit* (NMBRA) which involved more than 18,000 women have, however, provided a firm starting point for the development of these guidelines.

I particularly welcome the 25 quality criteria which emanate from these guidelines. These will provide a simple checklist against which multidisciplinary teams providing oncoplastic breast reconstruction can measure their own performance. This should help to drive better outcomes for patients.

Professor Sir Mike Richards CBE
National Cancer Director

1. INTRODUCTION

Oncoplastic techniques for breast reconstruction (BR) are becoming a new standard of care in the management of breast cancer patients. The recently completed *National Mastectomy and Breast Reconstruction Audit* (NMBRA) involving more than 18,000 women examined a broad range of clinical and patient-reported outcomes. The Audit also looked at important factors such as information and access to reconstructive services, as well as the level of pain, complications, quality of life and well-being experienced by women following a variety of procedures.

This impressive exercise has generated a comprehensive and unique database of current practice, which has put breast reconstruction under the microscope. Multidisciplinary Teams (MDTs) up and down the country strive hard to deliver high quality care; something which was highlighted by the Audit. However, clear variations in pre-operative information, access to services and outcomes have signalled a real need to set new standards of care which describe 'best practice'. These Guidelines are an effort to establish the key elements of best practice in the management of patients considering reconstructive oncoplastic breast surgery (OPBS), using established techniques to reconstruct the breast after total mastectomy or after partial mastectomy to prevent deformity following breast conservation.

1.1 Statement of purpose

New guidelines have been developed to optimise key clinical and patient-reported outcomes experienced by patients undergoing BR. These are designed to complement existing guidelines, including the Association of Breast Surgery *Surgical guidelines for the management of breast cancer.* They would also apply to women requesting risk reducing surgery and the very small number of men who request or require reconstructive surgery. These outcomes have been used as the benchmarks against which changes in care can be measured and compared. The purpose of the Guidelines is to provide all members of the MDT with guidance on best breast oncoplastic and reconstructive practice at each stage of a patient's journey, based on best current evidence. It is hoped they will be of benefit to the wide range of professionals and service commissioners who are involved in this increasingly sophisticated area of clinical practice. A patient version has been developed to support those faced with a bewildering range of choices, which includes further patient input. *Oncoplastic Breast Reconstruction: Guidelines for Best Practice – Information for Patients* is available on the websites of the Association of Breast Surgery, the British Association of Plastic, Reconstructive and Aesthetic Surgeons and Breast Cancer Care.

1.2 Methods

These Guidelines have been developed in response to the increasing use of OPBS in the management of breast cancer and to address the findings of the NMBRA. The NMBRA identified more than 80 unique metrics, reflecting previously undisclosed standards of care, and where appropriate these NMBRA outcomes are referred to. These provided a benchmark for the selection and development of a range of quality criteria, which form the backbone of the new Guidelines. The quality criteria and associated targets define a framework that should be used to assess current practice and deliver high quality care (see section 1.3). These Guidelines cover every stage of the clinical pathway, from the point of diagnosis through to follow up.

The Guidelines were developed by a multidisciplinary working group with expertise in the diagnosis, support, treatment and follow up of patients considering OPBS. A Writing Group produced the Guidelines with input from a Project Group consulted for their views. A patient representative was involved throughout this process and was a core member of the group. The Guidelines represent a consensus opinion on the optimal management of the patient having OPBS. This opinion was informed by peer-review publications, leading to evidence-based recommendations for best practice. The working group also commissioned external advice when developing guidance on pain prevention and infection control, which was incorporated into the relevant sections.

A wide range of stakeholders with an interest in this area of clinical practice provided comments on the draft document, and their feedback was invaluable. A shortlist of key references was drawn up, which can be found at the end of these guidelines. A glossary is also provided to help clarify technical terminology.

These Guidelines reflect the views of a broad range of experts involved in the care of patients with breast cancer who are involved in making decisions about OPBS in a range of clinical settings. They have been developed to provide guidance for all members of the MDT, and for the patients they treat. OPBS is a developing area of clinical practice with a limited evidence base and, as a result, the guidance reflects a combination of peer opinion and the best available evidence. The Guidelines are not intended to be prescriptive or legally binding but should be used to inform decision making when developing a patient management plan. Ultimately, members of the MDT remain responsible for the treatment of patients under their care.

1.3 Complete list of quality criteria

The complete list of quality criteria set out in this guideline are provided below:

QUALITY CRITERIA	
1	**OPBS is discussed with patients requiring a mastectomy** NMBRA outcome: The risks and benefits of breast reconstruction was discussed with a surgeon or BCN in 61% of mastectomy only patients Target: OPBS is discussed in 100% of patients requiring a mastectomy
2	**When a referral for OPBS is made from one MDT to another MDT, full information is made available at the time of the referral and reciprocated following treatment** Target: Full information is available in 100% of patients referred and following treatment
3	**The oncological and reconstructive management is discussed at the MDM. A treatment plan and subsequent modifications are agreed and recorded, including plans for onward referral** Target: The oncological and reconstructive strategy is discussed at the MDM in 100% of patients suitable for OPBS
4	**Medical photography (pre-and post-operative) is part of the clinical record** Target: Medical photography is offered in 100% of BR patients
5	**Patients have access to a BCN or equivalent key worker with expertise in OPBS and psychological assessment and management** Target: Access to a key worker with expertise in OPBS and psychological assessment and management is available in 90% of patients
6	**Patients receive information in a format and level of detail that meets their individual needs. The letter to the GP summarises the information provided and is copied to the patient** NMBRA outcomes: Written information about the risks and benefits of breast reconstruction was received by 47% of mastectomy only patients. Dissatisfaction with the level of information provided was reported by 20% of mastectomy only patients. Target: Written information about the risks and benefits of breast reconstruction is provided to 90% of mastectomy patients
7	**Patients are MRSA (+MSSA in implant cases) screened prior to admission and have topical suppression where positive in accordance with national/local policy** Target: MRSA screening occurs in 100% of patients prior to admission
8	**Patients are risk-assessed for thromboembolism and preventative measures adopted** Target: Risk assessment for thromboembolic risk, and thromboprophylaxis occurs in 100% of patients

9	**Patients are admitted to a single sex ward with dedicated, elective beds** NMBRA outcome: Dedicated beds are reserved for breast cancer surgical patients in 35% of units Target: Dedicated surgical beds are reserved for breast cancer patients in 100% of units
10	**The site of surgery is marked pre-operatively and checked with patients, and correlated with imaging and histopathology records and hospital notes** Target: Notes including relevant imaging and histopathology reports are available in 100% of OPBS patients
11	**Patients undergoing implant-based reconstruction are given a single intravenous dose of appropriate antibiotic(s) on induction** Target: All patients undergoing implant-based reconstruction receive intravenous antibiotics on induction
12	**A formal flap and pain monitoring protocol is in place** Target: Post-operative monitoring of pain and flap viability occurs according to an agreed protocol in 100% of cases
13	**Patients have their post-operative pain levels assessed and recorded** The Audit Commission recommends that less than 5% of patients should report severe post-operative pain NMBRA outcome: Severe pain was experienced by 6% of patients following mastectomy, 17% following IBR and 20% following DBR Target: Less than 5% of patients report severe pain within the first 24 hours
14	**BCN, physiotherapy and psychological reviews take place at key points, including pre-operatively and before discharge** Target: Review by the key worker occurs in 100% of cases prior to discharge
15	**Implant loss at 3 months following BR is assessed and audited** NMBRA outcome: Of women having an implant, 9% of IBR patients reported implant loss, and 7% of DBR patients reported implant loss Target: Complications leading to implant loss occur in less than 5% of cases at 3 months
16	**Unplanned return to theatre following BR is assessed and audited** NMBRA outcome: Following implant or pedicle flap BR, 5% of IBR and 6% of DBR patients have an unplanned return to theatre. Following free flap BR, 13% of IBR and 11% of DBR patients have an unplanned return to theatre Target: Unplanned return to theatre occurs in less than 5% of cases for non-free flap IBR, and in less than 10% of cases for free-flap IBR
17	**Unplanned re-admission is assessed and audited** NMBRA outcome: Re-admission within 3 months is reported in 9% of mastectomy patients, 16% of IBR patients and 14% of DBR patients Target: Unplanned readmission occurs in less than 5% of cases within 3 months
18	**Post-operative complications, return to theatre and length of stay are documented in departmental BR database** Target: There is a regular audit and discussion of all patients with post-operative complications
19	**Patients' satisfaction with BR outcome is measured using standardised assessment tools** NMBRA outcome: At 3 months 72% of patients reported satisfaction with information provision Target: Satisfaction with information provision is reported by 80% of patients at 3 months
20	**Patients' satisfaction with BR outcome is measured using standard assessment tools** NMBRA outcome: At 18 months over 90% of BR patients reported satisfaction with their appearance clothed, and over 60% unclothed Target: At 18 months, over 90% of BR patients report satisfaction with their appearance clothed

QUALITY CRITERIA CONTINUED	
21	**Local recurrence rates following OPBS should be no higher than for breast cancer surgery as a whole** *ABS at BASO Surgical guidelines for the management of breast cancer* state that local recurrence rates should be less than 5% at 5 years with a target of less than 3% at 5 years Target: Local recurrence rates are less than 3% at 5 years
22	**Eligible patients are invited to take part in local and national clinical trials and audits of OPBS** Target: Screening for eligibility for clinical trials and national audits occurs in 100% of OPBS patients
23	**Senior trainees with a subspecialty interest in Breast Surgery attend at least one Royal College, Association or International postgraduate meeting or course annually** Target: Over 90% of senior sub-specialty trainees attend a relevant training course or national meeting or equivalent annually
24	**Consultant surgeons performing OP surgery attend at least one Royal College, Association or International postgraduate meeting which includes OP topics annually** Target: Over 90% of Consultants attend a relevant training course or national meeting or equivalent annually
25	**Other MDT members providing an OP service attend at least one educational event annually to support further professional development** Target: 50% of other MDT members providing an OP service attend a relevant training course or national meeting or equivalent annually

PART A1: PATIENT PATHWAY – OUTPATIENT COMPONENT

2. REFERRAL

Referral of a patient with breast symptoms from primary care is detailed in the *Best practice diagnostic guidelines for patients presenting with breast symptoms.* Referral of a patient from the National Health Service Breast Screening Programme is detailed in the *Quality assurance guidelines for surgeons in breast cancer screening.*

For delayed breast reconstruction (DBR) there should be a clear and agreed referral pathway from primary and secondary care. No time limit should be placed on performing DBR after mastectomy. Communication with patients about BR is detailed in NICE guideline *CG80: Early and locally advanced breast cancer diagnosis and treatment* and other national guidelines.

2.1 The discussion about breast reconstruction (BR)

- BR (immediate and delayed) should be discussed with all patients in whom mastectomy is recommended by the Multidisciplinary Meeting (MDM).
- Where applicable, the following should also be discussed:
    - Neo-adjuvant therapy to downsize cancer
    - Other OPBS techniques which avoid mastectomy
    - The full range of external prostheses available

2.2 The offer of breast reconstruction

- BR (immediate or delayed) should be offered to all suitable patients in whom mastectomy is recommended by the MDM, unless there are significant contraindications (see sections 3.1 and 3.2).
- If BR is contraindicated the reasons for this should be explained to the patient and documented in the patient's records.
- All relevant options should be discussed and with equal weighting, irrespective of whether they are available locally.
- Patients should be provided with standardised sources of information, detailing the risks and benefits of different types of BR (see Appendix B for sources).

NB: Reconstructive techniques may also be used to repair large defects resulting from the resection of locally advanced disease and other pathological conditions.

2.3 The referral pathway

- All relevant cancer treatment targets apply. These currently include:
    - The '31 day decision to treatment' target for immediate breast reconstruction (IBR)
    - The '62 day referral to treatment' target for IBR
    - Treatment targets transfer with the patient
- Clear and explicit information, MDM processes, referral and treatment pathways will help to optimise patient outcomes.
- Decisions relating to the oncological and reconstructive aspects of treatment are often complex and every effort must be made to give patients sufficient time and support to consider their options with the operating surgeon and reach a satisfactory decision.

2.4 The referral process

- A clear framework of patient management and referral should be agreed within and between the responsible MDTs and primary care.
- Pathways should be established to ensure referral to an appropriate centre for consideration of oncoplastic procedures (OP) not available locally.
- Close teamwork is necessary between and within oncological and reconstructive teams:

  - To ensure patient access to all reconstructive options
  - To facilitate second opinions
  - To enable discussion of OPBS within the context of oncological treatments
- Where patients are referred elsewhere for OPBS or operated on in another unit all appropriate information should be made available by the referring team, including:
  - Documentation of the MDM discussion prior to the referral
  - Imaging, cytology, pathology and other relevant reports
  - Where possible, all images and histopathology slides and/or reports for review
  - Details of co-morbidity, psychological, psychiatric and other relevant medical history
- Following OPBS a full discharge summary should be sent back to the referring or treating MDT, including copies of operative notes, histopathology slides and/or reports, and a post-discharge plan.

QUALITY CRITERIA	
1	**OPBS is discussed with patients requiring a mastectomy** NMBRA outcome: The risks and benefits of breast reconstruction was discussed with a surgeon or BCN in 61% of mastectomy only patients Target: OPBS is discussed in 100% of patients requiring a mastectomy
2	**When a referral for OPBS is made from one MDT to another MDT, full information is made available at the time of the referral and reciprocated following treatment** Target: Full information is available in 100% of patients referred and following treatment
3	**The oncological and reconstructive management is discussed at the MDM. A treatment plan and subsequent modifications are agreed and recorded, including plans for onward referral** Target: The oncological and reconstructive strategy is discussed at the MDM in 100% of patients suitable for OPBS

3. ASSESSMENT

- All patients should be discussed in the MDM and recommendations recorded.
- Assessment should always be carried out by experienced, appropriate team members (see section 9 and Appendix E). This will enable:
  - A simultaneous evaluation of all the oncological and reconstructive factors
  - Consideration of all appropriate treatment options in light of each patient's individual circumstances and preferences
  - Development of an agreed and documented care plan
- Oncological principles should not be compromised, and should always take precedence.
- When DBR is considered, full clinical assessment and staging should be performed when indicated and the results should be available to inform decision-making.
- The uptake of IBR varies geographically but OPBS should be discussed with, and offered to, all suitable patients.

3.1 Oncological considerations

- For IBR, the likelihood of post-operative adjuvant treatment (in particular radiotherapy) should inform decision making.
- Discussion should include the influence of adjuvant treatment on BR, and *vice versa*, and should cover the following topics:
  - Radiotherapy may have a detrimental effect on the reconstructed breast particularly after implant based procedures
  - Expanders incorporating metal ports within the radiotherapy field may interfere with radiotherapy dosage
  - Systemic neoadjuvant therapy or DBR should be considered where there are concerns that IBR may lead to delays in treatment
  - When performing reconstruction of the partial mastectomy defect the tumour bed should be localised to aid accurate delivery of radiotherapy according to local protocols
- The MDM should agree a strategy for management of the axilla prior to surgery
  - Pre-operative staging should be performed by axillary ultrasound and needle biopsy of abnormal lymph nodes
  - Sentinel lymph node biopsy (SLNB) prior to definitive reconstruction may help to plan the timing and type of reconstruction and avoid reoperating in the axilla after reconstructive surgery
  - Intra-operative assessment of the SLN or staging SLNB may help to reduce the need for further axillary surgery. The sensitivity of intra-operative assessment varies with different techniques

3.2 Patient factors

- Timing and choice of technique will depend on the following factors:
  - Local and systemic disease burden
  - Familial and genetic risk factors
  - Co-morbidities, including BMI and ASA score (see Glossary)
  - Drug and smoking history
  - Psychological suitability
  - Occupation, activities and lifestyle
  - Pre-existing shoulder or musculo-skeletal problems
  - Patients' expectations, choice, goals and attitudes to risk
  - Likely impact of recovery time on family, employment and daily activities
- Additional risks should be discussed and should be clearly stated when consenting the patient. An anaesthetic opinion should be requested prior to admission when there is clinical concern.

3.3 Psychological assessment

- There should be an agreed strategy for psychological assessment and management.
- The psychological well-being of each patient should be assessed pre-operatively to assess needs by a suitably trained member of the MDT (Level 2 - see Glossary).
- Where complex psychological difficulties are identified, referral to more specialised psychology services (Level 3 and 4 – see Glossary) will be required.
- Established screening tools should be used to assess psychological morbidity.

3.4 Technical assessment

- Assessment of technical factors should include:
  - Records from previous surgery, including scars, weights of resected tissue and skin dimensions
  - Skin texture, elasticity and previous radiotherapy
  - Contralateral breast volume and ptosis
  - Resection volume and flap volume
  - Options for contralateral surgery
  - Options for changing the volume of the reconstructed breast
- Assessment of the vascular anatomy may include vascular imaging.
- Assessment of breast morphology should include at minimum the measurement and documentation of:
  - Breast asymmetry
  - Base width
  - Notch to nipple distance
  - Nipple to inframammary fold distance
  - Bra cup size

3.5 Photographic assessment

- Medical photography must be available in all units. A full and tiered consent process must be followed with each patient. Pre-operative and successive post-operative views should be taken for consenting patients undergoing breast conserving surgery or mastectomy. A standard set of views should be acquired in a studio setting for each patient (additional information is in Appendix A).
- All digital images must be stored on a secure server with limited access. When printed copies are generated, they should be placed in the notes.
- Photography should be made available for the oncoplastic breast MDM.
- Each institution must have a named Caldicott guardian.
- Images should never be used for teaching or publication without the patient's expressed consent. The Institute of Medical Illustrators guidelines should also be followed.

QUALITY CRITERIA	
4	**Medical photography (pre-and post-operative) is part of the clinical record** Target: Medical photography is offered in 100% of BR patients

4. INFORMATION PROVISION AND DECISION MAKING

Deciding whether or not to undergo OPBS can be difficult. Patients differ in the amount and type of information they need and their desire to be involved in treatment decision making. Regret and dissatisfaction with outcome are associated with poor or inadequate information provision that does not meet a patient's individual needs.

4.1 Information format

- Patients should have easy access to:
  - Information in languages other than English and/or interpreters, if necessary
  - Information that meets their individual and changing needs over time, in a choice of formats (e.g. written information, photographs, dvds, face-to-face, audio, recommended websites - see Appendix B)
  - A library of photographs of a range of surgical procedures and outcomes (including breast and donor site outcomes) carried out by their operating surgeon, in a variety of different patients
  - Support and information should be available to partners and other family members where appropriate

4.2 Information about surgical options

- The patient's preference for information and involvement in decision making should be established.
- Patients should have easy access to current, reliable, balanced information relating to suitable surgical options.
- Patients should be made aware that OPBS may not be available locally and that they may have to travel to another unit for treatment.
- The OP team should avoid using emotive or persuasive language when discussing the possible choices with patients.
- All discussions should take place in a private setting.
- Options offered should be clearly documented along with reasons why other options are unsuitable.
- Patients should be made aware of planned additional procedures (e.g. nipple reconstruction, lipomodelling and contralateral surgery) which may be required and the possibility of unplanned procedures.
- Information which should be given and discussed with patients is detailed in Appendix B.

4.2.1 Information about the outcomes of OPBS

- Key information about outcomes of OPBS should be provided. All women should be informed about:
  - The look and feel of a reconstructed breast, which will not be the same as a natural breast
  - National published data concerning the outcomes of BR (e.g. from the NMBRA)
  - The outcomes of their own OP MDT, and whether these differ to national outcomes (see section 11)
  - The possible psychosocial implications of undergoing OPBS, including the time taken to adjust to a reconstructed breast and an altered body image (typically 1 year or more), and the potential impact on quality of life, emotional well-being and sexual functioning
  - The range of physical and psychological effects of surgery (e.g. discomfort, lack of sensation, self-consciousness, body image issues) which contribute to satisfaction with outcome
  - The fact that the exact aesthetic outcome of any individual OPBS procedure cannot be predicted prior to surgery
  - The availability of a delayed procedure if IBR is not chosen or advisable

- The likely proposed date of their surgery

4.2.2 Information about implants

- The Medicines and Healthcare products Regulatory Agency (MHRA) has reviewed literature on the safety of breast implants and has concluded that implants do not increase the risk of connective tissue disorders or the risk of breast cancer.
- Patients should be informed:
  - That modern breast implants do not have a specific lifespan and do not need to be routinely replaced in the absence of concerns
  - That revision or replacement may be required for adverse symptoms or cosmetic deformity in the longer term. Patients should ask their GP to refer them back to their original provider for assessment
  - That there are differences between tissue expanders and fixed volume implants, and between saline and silicone-based devices
  - Of the type of implant or expander used, details of which they should be advised to retain
  - That up to 1 in 10 patients experience loss of their implant in the first 3 months after surgery
  - That up to 1 in 2 patients may require revisional surgery in the first 10 years
- Patients should also receive information about other potential complications of implants and expanders including:
  - Infection
  - Extrusion
  - Capsule formation
  - Rupture
  - Silicone granuloma
  - Silicone bleed
  - Implant malposition
- The risks and benefits of using Acellular Dermal Matrices (ADM) and other implanted products should be discussed if appropriate, including the absence of medium/long term data.

4.3 Information about available support

- Patients who are considering OPBS should be provided with access to:
  - Psychosocial support and information services throughout their treatment (see Appendix B)
  - A variety of resources offering information and support, including opportunities to learn from the experiences of other women who have previously undergone similar procedures, and information and support for partners, families and friends

4.4 Information about the inpatient stay

- Information should describe the hospital stay including:
  - Pre-surgical and anaesthetic assessment and procedures that will take place
  - The length of the planned operation
  - Likely length of stay, including details of enhanced recovery techniques
  - What to bring into hospital
  - Visiting hours
  - What to expect regarding:
    - Drains
    - Urinary catheters and invasive lines
    - Pain relief

        - Devices for warming and prevention of venous thromboembolism
        - HDU care where anticipated
        - Dressings and sutures
    - Bras that are suitable for the immediate post-operative period
    - When the reconstructed breast is likely to be seen for the first time

4.5 Information about the post-operative course

- Post-operative analgesia should be discussed with the patient. There is evidence that regional blocks (intrapleural/ paravertebral / transversus abdominis plane blocks) reduce post-operative analgesic requirements.
- Information should describe strategies for post-operative pain relief, which should be discussed with the anaesthetist (see section 7.1).
- Strategies should be implemented which aim to reduce severe post-operative pain in the first week by 50% from the levels reported by the NMBRA (Table 1).
- Patients should be informed of the very low risk of death, unplanned admission to ITU and return to theatre (Table 1).
- Where relevant, post-operative complications should be explained and where appropriate defined (Table 1), including:
    - Wound infection
    - Seroma
    - Bleeding
    - Donor site complications
    - Flap loss
    - Implant-related complications (see section 4.2.2)
    - Cardiac and thromboembolic events
    - Difficulty with mobility e.g. abdominal or shoulder
    - Lymphoedema
    - Readmission
- Both local and national complication rates should be discussed.
- Where appropriate, comparison should be made to mastectomy only (Table 1).

4.6 Information about the recovery phase

- Information should be given to patients regarding:
    - Exercise and physiotherapy (see Appendix D)
    - The likely recovery time, time to return to normal activities: work, driving, lifting, sport, exercise and post-operative underwear
    - Contact details for difficulties arising out-of-hours or at weekends
    - Follow-up arrangements

4.7 Information about longer term recovery

- Information should be provided regarding:
    - The number of procedures needed to achieve an acceptable outcome
    - Possible longer-term outcomes, including:
        - Local and regional recurrence
        - Asymmetry
        - Weight changes and contralateral ptosis
        - Chronic seroma
        - Chronic pain
        - Shoulder stiffness and pectoral girdle disability
        - Abdominal hernias and other sequelae of abdominal flaps

- Fasciculation (muscle twitching) with muscle flaps
- Keloid scarring
- Axillary fullness following latissimus dorsi reconstruction
- Revisional surgery including lipomodelling, flap, scar and implant revisions
- Quality of life, physical, cosmetic and psychological well-being reported by patients undergoing different types of reconstruction over time

4.8 Supporting patients' decision making

- Discussions should take place in a private setting.
- Patients should have:
  - Access to all information they need to make their choice
  - Sufficient time to reach a decision
  - Access to support from a Breast Care Nurse (BCN) with expert knowledge of OPBS. Patient support and counselling may require more than one consultation
- Patients who are finding it particularly difficult to make a decision should be identified and referred for additional support. Referral routes should be in place for this.
- Any decisions regarding additional surgery should be made by the patient and the MDT.
- A full account of the outpatient consultation(s) should be summarised in the letter to the GP and copied to the patient with their prior agreement.

QUALITY CRITERIA	
5	**Patients have access to a BCN or equivalent key worker with expertise in OPBS and psychological assessment and management** Target: Access to a key worker with expertise in OPBS and psychological assessment and management is available in 90% of patients
6	**Patients receive information in a format and level of detail that meets their individual needs. The letter to the GP summarises the information provided and is copied to the patient** NMBRA outcomes: Written information about the risks and benefits of breast reconstruction was received by 47% of mastectomy only patients. Dissatisfaction with the level of information provided was reported by 20% of mastectomy only patients. Target: Written information about the risks and benefits of breast reconstruction is provided to 90% of mastectomy patients

PART A2: PATIENT PATHWAY – SURGICAL INPATIENT COMPONENT

5. PRE-OPERATIVE PHASE

5.1 Prior to admission

5.1.1 Clinical assessment

- All women should undergo a pre-operative assessment process prior to admission and be provided with information about their operation and recovery (see sections 4 and 7).
- All women should have the opportunity to meet their surgeon and BCN prior to admission. They should have the chance to discuss the details of the operation they are planning to have and the expected post-operative recovery, and to ask further questions.
- Tamoxifen has been shown to slightly increase the risk of venous thrombo-embolic events (VTE). A risk/benefit analysis of continuing treatment should be undertaken in each case and consideration should be given to discontinuing tamoxifen at least a month prior to major surgery.
- Neoadjuvant chemotherapy should be completed 4-6 weeks prior to BR and the levels of neutrophils and lymphocytes must be within safe limits. Patients should be adequately assessed to ensure that these conditions are met.
- Planned major reconstructive surgery should be delayed until any reversible deterioration in systolic ejection fraction has been reversed in patients treated with trastuzamab.
- At least 6 months should elapse before DBR following adjuvant radiotherapy. Carrying out DBR >12 months after radiotherapy can result in fewer post-operative complications such as flap loss and re-operation.

5.1.2 Infection control

- All patients should be screened for MRSA (Meticillin resistant *Staphylococcus aureus*) before surgery or as per national/local MRSA screening policy.
- Higher risk cases, particularly those undergoing implant based reconstruction, should be screened for MSSA (Meticillin sensitive *Staphylococcus aureus*).
- Where screening is positive, patients should be prescribed an appropriate clearance regimen as nasal ointment (e.g. mupirocin or nasal chlorhexidine) and chlorhexidine body wash should be used for the 5 days leading up to admission. This will reduce the level of potentially infective bacteria and has been shown to reduce infection rates by a half in other specialities.
- If screening is unavailable or delayed, empirical therapy to reduce bacterial load may be commenced 5 days prior to surgery in high-risk cases, until results are available. Topical clearance therapy started between 1 and 5 days before surgery is probably still effective if the course is completed after surgery.

5.2 On admission to hospital

- All patients should:
    - Meet with their anaesthetic team pre-operatively to consider multimodal analgesia, antiemetic medication, monitoring and positioning
    - Be risk-assessed for thromboembolism and preventative measures adopted. These may include mechanical and /or pharmacological prevention
    - Be admitted to a single sex area, into dedicated, elective OP beds and should not share a ward with patients undergoing potentially contaminated surgery (such as emergency general surgery or urology)
    - Be admitted to a ward with a record of excellent infection control measures and audited outcomes, as defined by audit records of infection control interventions and infection surveillance

5.2.1 Marking

- Pre-operative marking is an important part of the procedure and should be done before theatre with the patient sitting or standing with a chaperone present. If the tumour is palpable it should be marked on the skin by the operating surgeon, or if it is impalpable, it should be marked by the radiology team. Confirmation of the tumour site should be made with the patient and correlated with imaging and histopathology reports prior to anaesthesia.
- Reconstructive plan:
    - Breast base 'footprint', midline and inframammary fold should be marked on the skin as a minimum (see section 3)
    - Where applicable, pedicles and extent of excision (for therapeutic mammaplasty) and skin pattern should be measured, recorded and marked pre-operatively
    - Consideration should be given to cosmetic complications of scar placement avoiding the upper medial quadrant and choosing inframammary fold, periareolar, radial or lateral incisions in preference, although oncological safety should never be compromised
    - Where relevant, perforators should be identified pre-operatively and marked on the skin
- All consenting patients should have pre-operative photography as part of their patient record. This may include images of the operative mark up (see section 3)
- Access to radiology and nuclear medicine images as required.

5.2.2 Consent

- Consent should follow established NHS and GMC guidelines. The information and discussion that has taken place during the decision making phase (see section 4) should be documented in the notes and a copy of the clinic letter should be sent to the GP and patient. On admission, a summary of these discussions is repeated and any further questions answered.
- All clinical records must be available to the operating surgeon.

5.3 Patient support

- The patient's emotional well-being should be assessed during their hospital stay.
- Emotional and psychosocial support should be available throughout the inpatient stay, as necessary, with easy access to the patient's BCN/keyworker.

5.4 Theatre equipment and instrument requirements

- Dedicated theatre time and space (all day lists) are required for OP and microsurgical procedures. Immediate access to theatres is required for emergency free flap salvage 24 hours per day. A selection of the following equipment is required for safe OPBS:
    - An electrically adjusted operating table
    - Adequate table attachments for safe patient positioning
    - Heating mattress
    - High intensity head lights
    - Lighted retractors designed for breast surgery
    - An operating microscope suitable for microvascular surgery
    - Magnifying loupes
    - Microsurgical instruments and microvascular clamps
    - Plastic surgery breast trays and instruments
    - Insulated retractors and diathermy tips
    - Bipolar forceps and scissors
    - Ultrasound Doppler probes
    - Tumescent equipment
    - Lipomodelling equipment

5.5 Implant bank (including Acellular Dermal Matrices [ADMs])

- An adequate breast implant bank with an appropriate mix of sizes, styles and types of implants including expanders, adjustable implants, fixed volume implants and sizers must be available.
- The bank should be located in the theatre suite beside the OP theatres.
- The bank should be managed by a named member of staff (and a deputy in case of leave) in conjunction with the suppliers. Stock rotation must be practiced.
- The implants to be used in each case on every theatre list together with any consignment stock must be verified before the patient is anaesthetised. Implants must be replaced as soon as they are used.
- A database should be established to record implant use (e.g. implants and ADMs) and complete details as recorded by the manufacturer. This will enable subsequent review in keeping with MHRA guidance.

QUALITY CRITERIA	
7	**Patients are MRSA (+MSSA in implant cases) screened prior to admission and have topical suppression where positive in accordance with national/local policy** Target: MRSA screening occurs in 100% of patients prior to admission
8	**Patients are risk-assessed for thromboembolism and preventative measures adopted** Target: Risk assessment for thromboembolic risk, and thromboprophylaxis occurs in 100% of patients
9	**Patients are admitted to a single sex ward with dedicated, elective beds** NMBRA outcome: Dedicated beds are reserved for breast cancer surgical patients in 35% of units Target: Dedicated surgical beds are reserved for breast cancer patients in 100% of units
10	**The site of surgery is marked pre-operatively and checked with patients, and correlated with imaging and histopathology records and hospital notes** Target: Notes including relevant imaging and histopathology reports are available in 100% of OPBS patients

6. OPERATIVE PHASE

6.1 General principles

- The surgeon should check the implant bank for the appropriate implants which have been selected by base, height, projection and shape.
- *The World Health Organisation (WHO) Safer Surgery Checklist* is undertaken which requires surgical, anaesthetic and nursing input to confirm the sterility and availability of equipment and supportive and preventative measures to optimise treatment.
- A single intravenous dose of prophylactic antibiotic given on induction of anaesthesia is recommended:
    - The antibiotic spectrum of prophylaxis should cover both Gram positive and Gram negative bacteria, particularly the most common cause of post-operative infection, *Staphylococcus aureus*
    - Regimens may differ between hospitals and local prescribing policies but flucloxacillin and gentamicin or cefuroxime are appropriate options
    - In truly penicillin allergic patients, clindamycin and gentamicin or vancomycin/ teicoplanin and gentamicin may be considered. The latter regimen should be used for patients known to be colonised with MRSA
    - In patients undergoing delayed procedures who are proven MRSA carriers, BR is not advisable until decolonisation has been confirmed
    - If the operation lasts longer than 4 hours or there is significant blood loss, a second dose may be indicated
- Pressure relief and avoidance of hyperextension of elbows, and hyperextension and hyperabduction of shoulders, should be managed by careful patient positioning.
- Fluid balance and patient temperature must be carefully monitored intra- and post-operatively, particularly in longer operations involving pedicled or free flaps. Adequately hydrated, warm patients have fewer infective complications and improved flap perfusion.
- A strategy for post-operative analgesia should be recorded in each patient.
- An effective antiemetic strategy should be used such as propofol infusions, 5HT3 antagonists and a multimodal approach to minimise retching and the bleeding caused by raised intravenous pressure.
- A formal free flap monitoring protocol should be in place to provide early identification of flap circulation impairment (see Appendix C).
- An ADM should be prepared according to the manufacturer's recommendations.

6.2 Theatre discipline

6.2.1 Reducing risk of infection

- Measures to reduce the risk of infection are paramount in theatre. Although there may not be clear evidence for all surgical procedures, the minimal movement of personnel and an established protocol in the theatre environment is likely to minimize infection risk.
- Recommendations of the *NICE Surgical Site Infection Clinical Guideline 2008* should be observed.
- Ultra Clean Ventilation (UCV, 'laminar flow') has been shown to reduce infections in orthopaedic implant surgery and it is recommended in OPBS where such facilities are available:
    - If unavailable, the number of personnel in theatre and 'theatre traffic' should be actively reduced to a minimum to reduce turbulent air flow and minimise the bacterial load in the theatre air
    - A policy of minimal movement of personnel within the operating theatre is a recommended principle whatever the theatre ventilation system
- Preparation of the skin prior to draping using 2% chlorhexidine with 70% isopropyl alcohol with tint provides the best skin decontamination for the most prolonged period. It should be applied to the whole area to be decontaminated, but sparingly to avoid pooling. Povidone-

Iodine or isopropyl alcohol are less effective alternatives.

  - A single preparation is adequate, additional preparation does not increase the antimicrobial effect. The fluid must not be wiped off, but must be allowed time to dry for the maximal antimicrobial effect during surgery. *Allowing drying will remove the risk of ignition, which is higher if the preparation pools or is soaked into a swab*

- Adherent drapes should be applied to the operative field. Surgeons should have a consistent gowning and gloving routine (using the closed glove method) to reduce contamination of the surgical site.
- Reducing implant infections requires meticulous implant discipline:
  - The implant pocket should be created with very gentle tissue handling and careful haemostasis
  - The implant cavity may be washed out to remove any necrotic material
- The implant should be opened just before use to reduce contamination from airborne bacteria.
- The surgeon should use a 'minimal or no touch' technique where possible to reduce the risks of contamination of the implant. Care should be taken when changing gloves. A safe option is to leave existing gloves on and double glove just before handling the implant or to wear two pairs of gloves from the start of the procedure, removing the outer gloves before handling the implant.
- Breast ducts harbour bacteria, particularly anaerobes which are a possible source of infection. An occlusive nipple dressing may reduce the potential for contamination.

6.2.2 Reducing risk of donor-site seroma

- Seroma is a common complication affecting half of immediate, and a third of delayed, reconstruction patients and the duration of seroma drainage tends to be prolonged by age, high BMI, blood loss and operation length.
- Measures have been used with variable success to reduce seroma, including quilting, fibrin sealant and triamcinolone.
- Closed suction drains should be used to prevent luminal contamination. Infection risks are increased by using drains, so the fewest number of drains should be used for the shortest possible period of time. Infection risks are also reduced if drains are tunnelled and the entry site protected from contamination by a dressing.
- With increased pressures to improve efficiency, attempts are being made to reduce lengths of inpatient stay. There is no evidence of increased complications following early discharge with drains *in situ*. However, if early discharge is planned, clinic time must be available for healthcare professionals to support these patients.

QUALITY CRITERIA	
11	**Patients undergoing implant-based reconstruction are given a single intravenous dose of appropriate antibiotic(s) on induction** Target: All patients undergoing implant-based reconstruction receive intravenous antibiotics on induction
12	**A formal flap and pain monitoring protocol is in place** Target: Post-operative monitoring of pain and flap viability occurs according to an agreed protocol in 100% of cases

7. POST-OPERATIVE PHASE

7.1 Inpatient post-operative phase

7.1.1 Pain relief

The NMBRA recorded severe post-operative pain in a significant proportion of women both in the first 24 hours and in the first week after surgery. A multimodal approach is required to improve upon these figures.

- Pain after oncoplastic surgery is complex and multifactorial. Immediate post-operative pain may have surgical and non-surgical site components; later pain often has a neuropathic element. Individual patients vary in their response to standard doses of opioid medication such as morphine.
- A multi-modal approach to analgesia should be considered – options include patient controlled analgesia (PCA), regional techniques, local anaesthetic wound infiltration and a combination of opioid and non-opioid analgesics. Frequent review is mandatory and rescue options should be entered in the medical record.
- Choices in local anaesthetic techniques are evolving, with ultrasound technology leading to improvements in efficacy and reliability. Options should balance benefits and potential complications; simple techniques including wound infiltration and instillation of local anaesthetic through surgical drains are effective.
- The effective treatment of acute post-operative pain may reduce the incidence of chronic pain after surgery.
- Patients' pain and pain relief should be assessed objectively to allow the identification and treatment of post-operative pain. This should be recorded on the post-operative monitoring chart (see Appendix C).

7.1.2 Early post-operative management

- Flap reconstruction patients will require close post-operative monitoring. This can be delivered outside a dedicated HDU/ ITU facility ('Level 1 critical care') by sufficient numbers of ward staff with appropriate skills (see section 9 and Appendix C).
- A flap monitoring process should be in place. Compromised flap circulation should be identified according to monitoring guidelines (for example Appendix C) and the responsible surgeon contacted if indicated.
- All returns of the patient to theatre should be documented in the departmental BR database. Post-operative infections, partial or total flap failures, mastectomy skin flap necrosis and systemic complications must be classified (defined in the Glossary) and recorded in the BR database.
- A physiotherapist and BCN should see patients before discharge to assess the patient's physical and emotional well-being, and provide advice and support, preferably pre-operatively and from the first post-operative day as necessary. Patients undergoing abdominal flap reconstruction require physiotherapy in the immediate post-operative phase to reduce the risk of atelectasis.
- Length of stay varies according to patients' need and surgeon preference and should be recorded.

7.1.3 Infection control

- The effects of post-operative infections may be minimized by regular surveillance, early identification and treatment, and by removal of drains as soon as possible. Dressings should be left intact as long as clinically indicated unless there is 'strike through'. If fluid passes to the exterior surface of the dressing, bacteria can easily pass though the dressing to contaminate the wound. In this situation dressings must be replaced using an aseptic technique.
- In the event of suspected infection, swabs should be taken prior to commencement of antibiotics. A change in inflammatory markers can signify infection as well as an inflammatory reaction to an ADM if used.

- Empirical, intravenous antibiotics which cover *Staphylococcus aureus* may be started whilst awaiting microbiology results, as this is the most common causative organism:
    - The antibiotic prescribed for treatment should be different from that given for prophylaxis as the organisms which evade prophylactic antibiotics are probably resistant to them
    - If the breast ducts have been opened (in nipple sparing mastectomy or therapeutic mammaplasty) anaerobes should be covered
    - If infection is associated with necrotic material (for example in partial flap necrosis) broader spectrum antibiotics to cover Gram negative organisms should be included
- In rare cases, delayed infection can be masked during adjuvant chemotherapy when host responses are impaired. In these patients urgent investigation and resuscitation is necessary. Empirical broad spectrum antibiotics may be commenced which, according to local protocols, may include IV co-amoxiclav, ceftriaxone and metronidazole or piperacillin/tazobactam.

7.2 Timing of adjuvant therapy

- The use of radiotherapy after OPBS should conform with national guidelines. It may need to be delayed until wound healing is complete.
- Adjuvant chemotherapy should be started once wound healing is complete.
- Unexpected complications should be discussed at the MDM to reduce delay.

7.3 Patient support

- Patients' psychosocial well-being should be monitored at key points including during their hospital stay and prior to discharge.
- Patients at high risk (previous psychiatric history, poor coping skills, limited social support) should be monitored post-operatively and further contact to establish psychological recovery should be negotiated and agreed with the patient. This arrangement should be documented in the hospital notes.
- All patients should have access to psychosocial support during their hospital stay, as necessary (e.g. BCN for Level 2 support and psychologist for Level 3 and 4 support).
- Patients should be supported and prepared for seeing the results of surgery for the first time.
- Access to the BCN should continue, and patients should be offered contact numbers for on-going support and advice.

QUALITY CRITERIA	
13	**Patients have their post-operative pain levels assessed and recorded** The Audit Commission recommends that less than 5% of patients should report severe post-operative pain NMBRA outcome: Severe pain was experienced by 6% of patients following mastectomy, 17% following IBR and 20% following DBR Target: Less than 5% of patients report severe pain within the first 24 hours
14	**BCN, physiotherapy and psychological reviews take place at key points, including pre-operatively and before discharge** Target: Review by the key worker occurs in 100% of cases prior to discharge

8. POST-DISCHARGE PHASE

8.1 Early post-discharge phase

- Discharge plans should be discussed as part of the consent process with details of out-of-hours contacts, and arrangements for nursing support and removal of drains which should be provided as locally as possible to the patient.
- Asymptomatic seromas should be reviewed in outpatients and aspirated under sterile conditions if signs of infection or symptoms develop.
- A BCN should be available at the results appointment, following MDM discussion, to provide continuity, explanation and support. The clinic letter to the GP should summarise the following core information:
    - The surgical procedure carried out and, following IBR:
        - The full histopathological findings
        - Any adjuvant treatment options recommended by the MDM
        - Any further treatment selected following discussion with the patient
        - A summary of any psychosocial assessment and needs of the patients
        - A copy of this letter should be sent to the patient with their agreement
- Unplanned readmission should be recorded in the BR database.
- Satisfaction with cosmetic outcomes is subjective and difficult to measure, but the sensation and appearance of a reconstructed breast are important to the patient. Patient Reported Outcome Measures (PROMS) should be used to elicit women's opinions about reconstruction and satisfaction with the outcome of surgery.
- Post-operative photographs should be taken at 1 year to provide an objective assessment of results. In addition, patient-reported, clinician-reported and photographic aesthetic outcome assessments should take place at regular intervals, such as 6 months, 1 and 5 years, or until regular follow up is completed.

8.2 Long-term complications and unplanned reoperations

- Psychological consequences of breast cancer can be severe for some patients, and may be delayed, presenting months or years after the completion of treatment. Healthcare professionals should be aware that some patients may need additional psychosocial support.
- Aesthetic outcomes of implant-based BR are reported by some authors to deteriorate over time, particularly if complicated by clinically significant capsular contracture. This may occur in a significant proportion of patients, particularly following irradiation.
- Although patients undergoing BR using autologous flaps may require flap revision during the first post-operative year, once complete, autologous BR requires fewer additional procedures. Abdominal weakness and pectoral girdle dysfunction may complicate autologous reconstruction.

8.3 Patient support

- A discharge summary should be sent to the GP and any help required with drains and dressings should be arranged in the community where appropriate.
- Out-of-hours contact details should be provided to all patients.
- Patients undergoing IBR should be given clear details of the first follow-up appointment where the histopathology results will be discussed, if appropriate, and a treatment plan will be agreed.
- Patients should have early access to specialist physiotherapy. This is particularly important for rehabilitation after extensive OPBS so as to reduce morbidity, such as frozen shoulder or lymphoedema, and to regain mobility as rapidly and safely as possible. This must be available and carried out by an experienced physiotherapist who is familiar with the surgical techniques and potential surgical complications (see Appendix D).
- Patients should be provided with information about the availability of longer-term support,

including what support is available, how it can be accessed, who to contact and how contact can be made. Information should provide details of team members, and other sources of support such as local and national support groups (see Appendix B).

- Patients should be reminded about the information they were given pre-operatively regarding the post-operative adjustment required, including the time it may take to adjust to an altered body image after surgery (see section 4).
- Patient's ongoing adjustment should be considered, assessed and addressed during routine follow-up appointments and those requiring higher level psychological intervention (Levels 3 and 4) following discharge should be identified and referred on as appropriate.
- Patient satisfaction with the reconstructed breast, the donor site, and provision of care should be assessed, using validated instruments (as used in the NMBRA), at regular intervals, e.g. at 6 months, 1 and 5 years or until active follow up is completed.
- A mechanism should be in place to refer the patient back for revisional surgery.

QUALITY CRITERIA	
15	**Implant loss at 3 months following BR is assessed and audited** NMBRA outcome: Of women having an implant, 9% of IBR patients reported implant loss, and 7% of DBR patients reported implant loss Target: Complications leading to implant loss occur in less than 5% of cases at 3 months
16	**Unplanned return to theatre following BR is assessed and audited** NMBRA outcome: Following implant or pedicle flap BR, 5% of IBR and 6% of DBR patients have an unplanned return to theatre. Following free flap BR, 13% of IBR and 11% of DBR patients have an unplanned return to theatre Target: Unplanned return to theatre occurs in less than 5% of cases for non-free flap IBR, and in less than 10% of cases for free-flap IBR
17	**Unplanned re-admission is assessed and audited** NMBRA outcome: Re-admission within 3 months is reported in 9% of mastectomy patients, 16% of IBR patients and 14% of DBR patients Target: Unplanned readmission occurs in less than 5% of cases within 3 months
18	**Post-operative complications, return to theatre and length of stay are documented in departmental BR database** Target: There is a regular audit and discussion of all patients with post-operative complications
19	**Patients' satisfaction with BR outcome is measured using standardised assessment tools** NMBRA outcome: At 3 months 72% of patients reported satisfaction with information provision Target: Satisfaction with information provision is reported by 80% of patients at 3 months
20	**Patients' satisfaction with BR outcome is measured using standard assessment tools** NMBRA outcome: At 18 months over 90% of BR patients reported satisfaction with their appearance clothed, and over 60% unclothed Target: At 18 months, over 90% of BR patients report satisfaction with their appearance clothed
21	**Local recurrence rates following OPBS should be no higher than for breast cancer surgery as a whole** *ABS at BASO Surgical guidelines for the management of breast cancer* state that local recurrence rates should be less than 5% at 5 years with a target of less than 3% at 5 years Target: Local recurrence rates are less than 3% at 5 years

PART B: CLINICAL REQUIREMENTS

9. KEY REQUIREMENTS FOR AN ONCOPLASTIC (OP) SERVICE

- OP surgery is an integral part of breast cancer management but service provision is very varied.
- OP teams should be defined by the type of OP service they provide, based on a range of factors including:
  - Caseload
  - Casemix
  - Timing of reconstruction
  - Range of procedures
  - Personnel
  - Skills (see Appendix E for essential skills)
  - Training activity
- OP Units have previously been defined as level 1 or level 2 training units but a new definition is recommended which includes all aspects of OPBS which should be provided by two different levels of service:
  - The OP Unit (OPU), providing all core OPBS procedures*
  - The OP Centre (OPC), providing all core OPBS procedures as well as a full range of complex procedures*

**Core OPBS procedures include the full range of primary, secondary and tertiary procedures detailed in 9.2. Complex procedures demand the more advanced skills required for free flap and chest wall reconstruction, and for the correction of developmental and acquired abnormalities detailed in 9.3.*

9.1 Requirements for the OPU

- The OPU is defined as a core component of a breast unit typically providing a breast service for a local population of 250,000 or more. The OPU must:
  - Provide a comprehensive range of core OPBS procedures and
  - Establish a referral pathway to an OPC
- All OPUs should be supported by core members of the MDT with specific expertise in the management of patients undergoing OPBS including a nominated:
  - *Lead surgeon* with expertise in core OP procedures and onward referral*
  - *Supporting surgeon(s)* with competence in management of OP complications
  - *BCN* (often the designated 'Key Worker') with expertise, knowledge and skills in OPBS
  - *Radiologist* skilled in image interpretation of the OP patient
  - *Pathologist* operating according to the Royal College of Pathologist/NHS Breast Screening Programme Pathology guidelines and skilled in OP specimen analysis
  - *Oncologist* skilled in the neoadjuvant and adjuvant treatment of patients undergoing OPBS
  - *Anaesthetic and pain team clinicians* experienced in anaesthetic and pain management strategies in OPBS
  - *Coordinator* with responsibility for OP audits and trials
  - *Theatre team* skilled in the preparation and use of equipment, instruments, implants and expanders for OPBS and in maintaining an implant bank
  - *Ward team* with expertise in patient monitoring, management and mobilisation following OPBS procedures

**In some units this role may be delivered by an oncological breast surgeon and a reconstructive plastic surgeon working collaboratively.*

- All OPUs should be supported by an extended 'in house' or offsite OP team including:
  - *A specialist physiotherapist* skilled in managing the post-reconstruction patient
  - *A psychologist* qualified to provide Level 3/4 support
  - *A geneticist* with established Cancer Network links
  - *A medical photographer* familiar with guidelines and consent

9.2 Workload and casemix of the OPU

- The workload and casemix of the OPU should be sufficiently varied to:
  - Offer patients a full range of choices
  - Maintain competence
  - Ensure Continuing Professional Development (CPD)
- OPUs should perform 25 or more major OP procedures per year which should include the following casemix*:
  - Immediate and delayed techniques
  - Implants and expanders
  - Primary procedures - subpectoral/LD reconstruction
  - Primary procedures - oncoplastic breast conserving surgery (OPBCS)
  - Primary procedures - immediate bilateral reconstruction following risk-reducing mastectomy
  - Secondary procedures - symmetrising surgery, nipple reconstruction and pigmentation (with adequate training, and a recall register), elective implant or expander exchange, injection port removal
  - Tertiary procedures - implant or expander exchange for complications, capsulotomy and capsulectomy, correction of poor cosmetic outcome, lipomodelling for conditions endorsed by the *Lipomodelling Guidelines for Breast Surgery*

**Some OPUs may not be able to offer all these procedures but patients should have access to them by referral to an OPC.*

9.3 Requirements for the OPC

- The OPC* is defined as a major referral centre typically serving a large regional or sub-regional population. The OPC should:
  - Have sufficient personnel and expertise to manage tertiary referrals
  - Provide a full range of OP techniques
- The OPC team should include members with expertise over and above the expertise available on the OPU including:
  - *A lead surgeon* with overall responsibility for organisation and delivery of the service and with expertise in complex OPBS
  - *Supporting surgeon(s)* comprising at least 3 other surgeons with expertise in complex OPBS. At least 2 should be plastic surgeons with sub-specialty skills in breast reconstruction, including a range of microvascular procedures
  - *A nominated radiologist* skilled in advanced vascular imaging, such as Magnetic Resonance Angiography (MRA)
  - *A nominated anaesthetist(s)* with regular sessions working with surgeons performing OPBS, to optimise the perioperative care of these patients in conjunction with ward staff and surgeons
  - *A nominated theatre team* with expertise in the preparation and use of equipment and materials required for microvascular surgery and other major reconstructive procedures including primary, revision and salvage surgery
  - *A nursing team* which should include a BCN appropriately trained in supportive care with specialist knowledge of OP techniques. In addition a specialist nurse with plastics training will also be involved in managing complex dressings and nipple tattooing

  - *A nominated ward team* with expertise in monitoring, management and mobilisation of patients following microvascular surgery
  - *A specialist physiotherapist* with experience in minimising and treating problems arising from complex reconstructive surgery
  - *Trained outpatient nurses* with OP experience
- OPCs should offer and carry out at least 100 major OP procedures per year including:
  - All procedures carried out by the OPU
  - A range of pedicle flaps
  - A range of free flaps
  - Revisional procedures to correct the broad range of adverse outcomes resulting from OPBS
  - Chest wall reconstruction for locally advanced disease
  - A full range of cosmetic breast surgery
  - Correction of developmental and acquired breast abnormalities
  - Lipomodelling for conditions referred by OPUs and endorsed by the *Lipomodelling Guidelines for Breast Surgery*

** In some regions the function of the OPC is delivered through a 'hub and spoke' arrangement where MDTs from different centres collaborate to deliver this level of care.*

9.4 The pre-operative OP MDM

- The OP MDM is the central component of the OP service for NHS and private patients, which provides balanced information and advice about reconstruction, as well as the timing and types of appropriate procedures.
- All symptomatic and screen-detected cancers should be discussed at the pre-operative MDM.
- This discussion should include all cancers suitable for OPBS.
- All cases should be discussed by the members of the OP team:
  - During a weekly MDM (OPU model) or
  - During a regular OP MDM (OPC model)
- The pre-operative MDM should consider the three key components which influence decision making including:
  - Patient-related factors
  - Tumour-related factors
  - Treatment options
- A treatment plan should be developed, agreed and recorded for all patients with tumours that are suitable for OPBS.

9.5 The post-operative OP MDM

- The pre-operative treatment plan should be reviewed at the post-operative OP MDM. Any modifications made to the plan as a result of clinical complications, histopathology and other factors should be recorded in the minutes of the MDM.
- Specimens resected during OP BCS have a large surface area, and demand careful orientation and margin analysis:
  - Clear radial margins (defined by local protocols) should be confirmed by the surgeon and the pathologist and recorded in the minutes of the MDM
  - Further surgery should be carried out for involved margins and reasons for non-compliance should be recorded in the minutes of the MDM
- Patients should be invited to take part in local and national clinical trials and audits of OPBS.
- The need for further psychosocial support should be considered.

9.6 Establishing formal links between OPUs and OPCs

- OPUs and OPCs will normally be located within the same Cancer Network, but referral to other Centres may be indicated in special circumstances.
- OPUs should develop, agree and implement a formal protocol for the referral of patients to OPCs. This should include all relevant clinical, treatment and follow up details.
- All patients who wish to discuss techniques that are not available at the OPU should be offered immediate referral to an OPC.
- Outline information explaining the more complex techniques should be readily available to patients considering referral.
- A formal letter of referral should be sent by the OPU, which includes details of the key clinical, radiological and histopathological findings and the MDM discussion.
- A formal discharge summary should be generated by the OPC and sent to the OPU detailing the surgical treatment, the histopathological findings and the MDT discussion.

QUALITY CRITERIA	
22	**Eligible patients are invited to take part in local and national clinical trials and audits of OPBS** Target: Screening for eligibility for clinical trials and national audits occurs in 100% of OPBS patients

10. TRAINING REQUIRED TO DEVELOP AND MAINTAIN COMPETENCE

10.1 General requirements

- OPBS is a rapidly developing area of clinical practice. Many techniques are relatively new, and training must address the needs of the whole OP MDT. Appendix E describes essential skills for members of the oncoplastic team and Appendix F describes training opportunities. Consultant surgeons appointed to OPUs and OPCs should be able to demonstrate formal training either as:
  - General Surgeons with OP skills, or
  - Plastic Surgeons with OP skills
- Surgeons applying for consultant posts with an interest in OPBS must have completed:
  - All mandatory components of the Intercollegiate Surgical Curriculum Programme (ISCP)
  - The Intercollegiate Specialty Examination, and
  - Have obtained a CCT (or an equivalent qualification) in General or Plastic Surgery

10.2 Surgeons from a background in General Surgery

- By obtaining a CCT in General Surgery, the CCT-holder will be qualified to practice as a consultant general surgeon with an interest in Breast Surgery.
- The consultant general surgeon with an interest in Breast Surgery should have an understanding of OPBS including:
  - Breast reconstruction
  - Oncoplastic breast conserving surgery (OPBCS)
  - The diagnosis and management of the complications of OPBS
- All newly appointed consultant general surgeons who support MDT colleagues performing OP procedures should have successfully completed the ISCP in General Surgery (or equivalent training programme), and hold a CCT in General Surgery (or equivalent qualification).
- By obtaining a CCT in General Surgery with a subspecialty interest in Breast Surgery, the CCT-holder will be qualified to practice as a consultant oncoplastic breast surgeon.
- The consultant oncoplastic breast surgeon should have a detailed understanding of, and expertise in, all aspects of OPBS including:
  - BR
  - OPBCS
  - The diagnosis and management of complications
  - The selection and performance of a range of appropriate procedures recommended by the MDM
- All newly appointed consultant oncoplastic breast surgeons performing OPBS either as a member of an OPU or OPC MDT should have successfully completed the ISCP in General Surgery with a subspecialty interest in Breast Surgery (or equivalent training programme) and hold a CCT in General Surgery with a subspecialty interest in Breast Surgery (or equivalent qualification).
- Newly appointed consultant oncoplastic breast surgeons should have undertaken an Interface Oncoplastic Breast Fellowship, or equivalent.
- For the OP trainee the final 3 years of subspecialty training are spent extending and consolidating OP experience, including the development of expertise in specific areas. Training during this period can be enhanced by an Interface Oncoplastic Breast Fellowship (see Appendix F) or equivalent.

10.3 Surgeons from a background in Plastic Surgery

- There is a steady convergence of the OP components of the ISCP in General and Plastic Surgery that cover the final years of postgraduate training. OP training in Plastic Surgery will take place during the final 2 years, prior to CCT.

- Training during this period can be enhanced by a 12 month peri-CCT Interface Oncoplastic Breast Fellowship (see section 10.2).
- Training should take place over an indicative period of 12 months, either during an Interface Oncoplastic Breast Fellowship, or during a mono-specialty post in Plastic or in General Surgery.
- Trainees should have completed the Intercollegiate Specialty Examination in Plastic Surgery, and have declared an interest in OPBS.
- All newly appointed consultant plastic surgeons performing OPBS as a member of an OP MDT should have successfully completed the ISCP in Plastic Surgery with a subspecialty interest in Breast Surgery (or equivalent training programme) and hold a CCT in Plastic Surgery with a subspecialty interest in Breast Surgery (or equivalent qualification).
- Newly appointed consultant plastic surgeons should have undertaken an Interface Oncoplastic Breast Fellowship or equivalent.

10.4 Additional educational opportunities for trainees

- All senior trainees with a subspecialty interest in Breast Surgery should attend at least one Royal College, Association or International postgraduate conference annually.
- All senior trainees with a subspecialty interest in Breast Surgery should attend at least one course, workshop or masterclass annually.

10.5 Professional development for consultants and other MDT members

- All consultant oncoplastic breast surgeons should attend at least one Royal College, Association or International postgraduate meeting that includes OP topics annually.
- Other MDT members should attend at least one educational event annually to support further professional development and to ensure the delivery of up to date OP services.

QUALITY CRITERIA	
23	**Senior trainees with a subspecialty interest in Breast Surgery attend at least one Royal College, Association or International postgraduate meeting or course annually** Target: Over 90% of senior sub-specialty trainees attend a relevant training course or national meeting or equivalent annually
24	**Consultant surgeons performing OP surgery attend at least one Royal College, Association or International postgraduate meeting which includes OP topics annually** Target: Over 90% of Consultants attend a relevant training course or national meeting or equivalent annually
25	**Other MDT members providing an OP service attend at least one educational event annually to support further professional development** Target: 50% of other MDT members providing an OP service attend a relevant training course or national meeting or equivalent annually

11. DATA COLLECTION AND AUDIT REQUIREMENTS

On-going, prospective audit is essential for the provision and maintenance of a high-quality OP surgical service. Units should routinely collect outcome data for each patient undergoing OPBS and, as a minimum, individual patient care should be audited against agreed performance indicators and target standards. This core outcome set will include a combination of process, plus clinical, cosmetic, and patient-reported outcomes. The MDT plays a pivotal role in ensuring that accurate, complete and timely data is submitted for all breast cancer patients to allow a meaningful long-term comparison of outcomes following both oncological and OP techniques.

- Each OPU and OPC should identify an audit lead who will assume overall responsibility for this process and that a secure electronic database is used to facilitate contemporaneous and timely data collection.
- First, to audit the process of providing an OP breast service for breast cancer by the MDT:
    - All patients undergoing mastectomy should be given information about BR and advice on their suitability for the various types of IBR and DBR. All patients undergoing BR should be discussed at the OP MDM
    - All patients undergoing OPBS should be given a treatment plan to include the possible number of planned operations subsequent to the initial cancer operation (i.e. further shaping/modelling, nipple/areolar reconstruction and contralateral symmetrisation). This is important when monitoring unplanned re-operation as a measure of quality
- Second, to audit the clinical, cosmetic, and patient-reported outcomes:
    - All patients have hospital-level recording of surgical complications at fixed time intervals, based on nationally agreed definitions of complications. The timing of the recording of complications and by whom they are recorded should be agreed locally, and should reflect national practice
    - All patients should have hospital-based measures of cosmetic outcome, including pre- and post-operative photography at agreed time intervals (coinciding with other outcome measurements)
    - All patients should be asked to report outcomes, at agreed time intervals, using validated measures of quality of life as well as their own experience of OPBS, e.g. the 'Breast Q' validated questionnaire used in the NMBRA
- Summary audit data relating to key performance indicators should be presented as part of the Unit's peer review and may be used for the process of revalidation. Audit data should also be freely available to patients to allow them to make informed decisions about where they wish to be treated and to aid the process of shared decision making and informed consent.

Examples of key performance indicators for OPUs and OPCs, target standards of care and recommended assessment methods are summarised in Table 2. A proposed minimum data set for each individual is proposed in Table 3. Work is currently under way to determine a core outcome set for research and audit in reconstructive breast surgery (University of Bristol in collaboration with the COMET Initiative), so the contents of this outcome set may change as the results of the research project become available.

12. KEY REFERENCES

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13. TABLES

Table 1: Selected NMBRA data

	Mastectomy (%)	Immediate Reconstruction (%)	Delayed Reconstruction (%)	Approximation
Pre-Discharge				
Death	0.2	0.1	0.1	~1/1000
Emergency transfer to ITU/HDU	0.5	0.9	0.7	~1/100
Unplanned return to theatre	1.9	4.6	5.6	~1/20
		Total (planned and unplanned) return to theatre rate with free flap surgery: 11.8%		~1/10
Distant and/ or systemic complications	0.9	3.1	2.7	~1/50
Total flap loss		Overall for pedicled flaps: 0.2%		~1/500
		Overall for free flaps: 2.0%		~1/50
At 3 months				
Wound infection requiring antibiotics	17	24	27	Mastectomy: ~1/5 Reconstruction: ~1/4
Unplanned readmission	8.9	15.8	13.9	Mastectomy: ~1/10 Reconstruction: ~1/6
Implant loss	-	8.9	6.9	~1/10
Partial flap loss requiring surgery	-	3.1	4.9	~1/20
Donor site hernia (weakness or bulge)	-	4.5	3.9	~1/20
Severe pain within the first week	5.2	11.4	9.4	Mastectomy: ~1/20 Reconstruction: ~1/10
At 18 months				
Reported donor site morbidity		Latissimus dorsi (including shoulder girdle): ~10-20% DIEP/TRAM: ~10%		~1/10 ~1/10

Selected adverse outcomes and complications reported within the National Mastectomy and Breast Reconstruction Audit. Data is obtained from the third (2010) and fourth (2011) reports of the audit. Data is displayed for mastectomy, immediate and delayed reconstruction, and where more appropriate for specific reconstruction techniques. Approximate values are provided in the far left column which may simplify description. Pre-discharge data are percentages based on patient records from 17,844 women, 3 month data percentages from patient reported outcomes returned by 6,882 women, and 18 month data percentages from patient reported outcomes returned by 7,110 women.

Table 2: Example of performance indicators – minimum data

Process outcomes	**Target standard**	**Assessment method**
Percentage of patients requiring mastectomy with whom OPBS discussed	100%	MDM evidence
Percentage of appropriate patients being offered OPBS discussed at OP MDM	100%	MDM evidence
Percentage of patients offered all clinically appropriate procedures at OP MDM	100%	MDM evidence
Percentage of patients offered referral to a plastic surgeon if OP MDM recommends referral	100%	MDM evidence
Provision of sufficient information for decision making and informed consent	100%	Patient satisfaction with information PROM (as per NMBRA)
Percentage of patients satisfied with care received	100%	Patient satisfaction with care PROM (as per NMBRA)
Clinical outcomes	Target standard	Assessment method
Complication rates for index procedures	TBA	Clinical audit
Return to theatre for unplanned surgery rates, including complications, and un-planned surgery outside the agreed initial treatment plan	TBA	Clinical audit
Local and systemic recurrence rates	TBA	Clinical audit
Satisfaction with outcome	TBA	Patient satisfaction with outcome PROM (3 and 18 months, as per NMBRA)
Cosmetic outcomes	Target standard	Assessment method
Objective cosmetic outcome	NA	Standardised photography as part of the patient's clinical record before and after any surgical intervention. Clinical based assessment of cosmetic outcome with agreement nationally on photographic assessment method, timing post-operatively and by whom this should be undertaken
Satisfaction with cosmetic outcome	TBA	Patient satisfaction with cosmetic outcome PROM (3 and 18 months, as per NMBRA)

Table 3: Example of individual patient data collection

Stage of patient pathway	Outcome	Details
Pre-operative phase	Discussed at oncoplastic OP MDM	Yes/No
	Offered all clinically feasible forms of OPBS	Yes/No
	Offered referral to OPC	Yes/No
	Satisfaction with information	PROM
	Satisfaction with involvement in decision making	PROM
Procedure phase	Complications requiring intervention	Yes/No (+ details)
	Length of stay	In days
	Readmission/reoperation	Yes/No (+ details)
Post-operative phase	Satisfaction with care	PROM
	Satisfaction with outcome	PROM
	Revisional procedures if any	Yes/No (+ details)
	Contralateral symmetrisation if any	Yes/No
	Number of procedures required to complete process	Number of procedures
	Cosmetic outcome	Photographs and PROM
	Oncological outcome	Clinical audit

14. APPENDICES

APPENDIX A: MEDICAL PHOTOGRAPHY

- General Medical Council (GMC) guidelines describing professional and consent issues should be followed, as should guidelines by the Institute of Medical Illustrators including:
  - Lighting (2 matched lights at 45 degrees) and background (black or evenly lit white. If a colour is used, it should be uniform green)
  - Standard breast views (anterior, oblique at 45 degrees both sides and lateral both sides)
  - Specific views of flap donor sites

References:

GMC: Making and using visual and audio recordings of patients:
http://www.gmc-uk.org/guidance/ethical_guidance/making_audiovisual.asp

Institute of medical illustrators: Breast photography guidelines
http://www.imi.org.uk/document/breast-photography

APPENDIX B: INFORMATION PROVISION

Information which should be given to patients and discussed with them in detail includes:

- The types of OPBS, their pros and cons, and the individual suitability of each type for the particular patient
- The risks and benefits of each procedure
- The likely number of procedures involved to achieve a final result
- The likely length of hospital stay for each procedure
- The likely length of time taken to return to normal daily activities after each type of procedure
- The timing of OPBS, and the pros and cons of immediate and delayed procedures, including:
    - Psychosocial implications
    - Treatment and technical implications for example the implications of adjuvant treatments such as radiotherapy
- The effects of radiotherapy on autologous reconstructions and implants
- The influence of chemotherapy, and reassurance that evidence that reconstruction leads to delays in chemotherapy administration is lacking
- Reassurance that OPBS does not impair future cancer detection
- The likely position and length of scarring on the breast and any donor site
- The risks of smoking and the influence of other risk factors
- Alternatives to BR, including no reconstruction and the use of prostheses
- The possibility of contralateral surgery, including types, timing, risk and benefits, and possible outcomes
- The possibility of nipple reconstruction, including alternatives to surgery (e.g. tattooing, NAC prosthesis)
- Complications and sequellae leading to unnatural breast consistency and appearance (hardness, movement, ptosis, wrinkling etc.)
- Details of local and national support services (see below). Patients offered IBR should be assured that BR is also available at a later date, as a delayed procedure

Links to support services and patient information:

- **BAPRAS guide to breast reconstruction:** http://www.bapras.org.uk/page.asp?id=642
- **Breast Cancer Care:** www.breastcancercare.org.uk
- **Breakthrough Breast Cancer:** www.breakthrough.org.uk
- **Cancer Research UK:** http://cancerhelp.cancerresearchuk.org/type/breast-cancer/treatment/surgery/reconstruction/
- **Healthtalkonline:** http://www.healthtalkonline.org/cancer/Breast_Cancer/Topic/1537/
- **Macmillan Cancer Support:** http://www.macmillan.org.uk/Cancerinformation/Cancertreatment/Treatmenttypes/Surgery/Breastreconstruction/Breastreconstruction.aspx
- **Maggie's Cancer Caring Centres:** www.maggiescentres.org
- **Breast reconstruction: your choice.** Rainsbury R. Straker V. (Eds) (2008). Class Publishing

APPENDIX C: FREE FLAP MANAGEMENT: MONITORING AND OPTIMISATION

Introduction, Rationale and Monitoring chart

Free flaps involve the transfer of tissue from one area of the body to another, with the division and re-anastomosis of the blood vessels. In order to survive, the circulation to the flap must be restored and maintained to bring blood into (artery) and out of (vein) the flap. After anastomosis the blood vessels are kept open, by keeping the patient warm, well hydrated and pain free. These guidelines give specific methods of achieving these goals and details of how to monitor the flap.

It is essential that the flap is monitored very closely as any compromise can be corrected if problems are swiftly identified and corrected in the operating theatre as soon as possible, but definitely within 5 hours. If any change in the flap is identified, medical staff should be contacted immediately to review the patient.

Free flap monitoring and optimization

Recommendation	Action	Rationale
Monitor flap every 30 mins for 24 hours Hourly thereafter	Document flap observations on the chart regularly to identify changes quickly.	Flap problems are the most common in the first 72 hours after surgery (50% in 4 hours, 80% in first 24 hours, 95% in first 72 hours). Venous compromise with flap congestion is three times more common in these early stages.
Flap Temperature	Check with the back of your hand or finger and compare with skin on shoulder. Keep patient warm and cover flap with warm gamgee. Strips for comparing flap temperature with surrounding skin are available	A cold flap (>2 degrees different) can indicate venous or arterial problems.
Flap Turgor	Press gently on flap to assess turgor.	A 'full', swollen, tense flap with increased turgor indicates a flap with venous compromise and / or a haematoma. An 'empty', flat flap with decreased turgor may indicate arterial compromise.
Flap Colour	View flap in good light to assess colour.	A purple, cyanotic, bluish or dusky flap is present with venous compromise. A pale, mottled flap indicates a flap with arterial compromise.
Flap Capillary Refill	Press on flap gently with your finger or a shaped instrument (e.g. the handle of a pair of scissors) for 5 seconds. Release the pressure and time the return of the pink colour.	Capillary refill should take about 2 seconds. In venous congestion it is brisk (<2 seconds). In arterial compromise it is sluggish (>2 seconds).
Flap Doppler signal	A mark may be made on the flap at the site of the dominant perforator or pedicle. The Doppler probe should be applied in this area. Alternatively implantable devices are available.	A triphasic pulsatile signal can be heard if the artery is working and a lower pitched more constant sound can be heard if the venous outflow is patent.

Recommendation	Action	Rationale
Relieve patients pain	Administer analgesia as required.	Pain increases the stress response to surgery and should be controlled to improve flap perfusion.
Prevent nausea and vomiting	Propofol infusions and 5HT3 antagonists, multimodal antiemetics	Retching and vomiting raises venous pressure and causes bleeding and flap congestion
Positioning	Adjust positioning for comfort (hips and knees flexed after DIEP flap) and to relieve pressure areas.	Avoiding tension improves wound healing.
Keep urine output more 0.5 mls / kg / hour	Use IV fluids overnight to maintain urine output. Avoid diuretics in the hypovolaemic patient. Encourage oral fluids after first post-operative night. Catheter can be removed when patient can comfortably get out of bed.	Dehydration reduces flap perfusion and may encourage an anastomotic thrombosis
Maintain systolic BP >100mmHg	Use IV fluids to maintain blood pressure. Avoid vasoconstrictors as these can compromise flap perfusion.	Low blood pressure and peripheral vasoconstriction can affect flap perfusion.
Aim not to allow patient to become cold. They should be normothermic	Use warm room and warm air blanket (e.g. Bair Hugger).	If the patient is cold the circulation to the peripheries and the flap is reduced.
Prevent DVT	Low Molecular Weight Heparin (LMWH) according to risk factors 12 hours prior to surgery (night before operation). TEDS on admission. Leave flowtrons on for first 24 hours post operation. Encourage ankle dorsi / plantar flexion after flowtrons removed.	Prolonged surgery and bed rest increase the risk of DVT, especially in patients with risk factors.
Prevent Chest Infection	Encourage deep breathing exercises. Encourage cough with manual support of abdomen (after DIEP). Sit out of bed as soon as possible post operation	Chest infection more common after long operation and prolonged bed rest.
Conservative blood transfusion strategy	Minimise the use of blood transfusion: it is unusual to require transfusion if HB > 8g/dl.	Optimum physiological flow characteristics occur at an HB of 10g/dl.

Monitoring Chart

Date /Time											
Pain Visual Analogue Scale (Score 1-10)											
Nausea Scale (Score 1 – 10)											
Flap Temperature Warm / cold											
Flap Turgor Empty, normal, swollen											
Flap Colour White, pale pink, dark pink, purple											
Flap Capillary Refill Brisk/ 2 secs/ slow											
Flap Doppler signal Audible /Inaudible											
Urine output >0.5 mls / kg / hour											
Systolic BP >100mmHg											
Patient's temperature											
TEDS / Low Molecular Weight Heparin (LMWH) prescribed											
Breathing exercises / physiotherapist referral											

All standard ward equipment present on any acute surgical ward should be available at all times. In addition, monitoring equipment for arterial lines must be available for those patients undergoing free flap reconstruction who may have arterial lines sited. These patients should be managed in an ITU or HDU or in an equivalent Level 1 critical care setting that may be provided on the oncoplastic ward. Doppler ultrasound must be available for free flap monitoring along with appropriate room lighting. Additional flap monitoring devices can be used but will depend on local circumstances. Appropriate training must be provided. A protocol for post-operative management, particularly for those undergoing flap reconstruction should be available. Out of hours ward facilities must be provided for recently discharged patients.

APPENDIX D: PHYSIOTHERAPY GUIDANCE

Physiotherapy following breast reconstruction

OPBS involves complex surgery, and affects not only the shoulder joint and function of the arm, but also the shoulder girdle, thoracic spine, abdominal musculature or pelvic girdle depending on which procedure is used. Regaining shoulder mobility and full function of the arm, whilst simultaneously minimising donor site morbidity are essential components in the management of breast reconstruction patients. Post-operative physiotherapy plays an important role in the rehabilitation of the patient, and it is imperative that physiotherapy treatment, starting as early as possible, is carried out under the supervision of a specialist physiotherapist who is familiar with the surgical techniques and attendant complications, and experienced in treating such patients. The following guidelines are neither exhaustive nor prescriptive and are based on experience as evidence in this field is very limited. References for relevant published research are included.

Physiotherapy guidelines following reconstruction with an implant/expander

- The implant is generally placed sub-muscularly, in a pocket created underneath the pectoralis major and therefore movements that involve using or stretching the pectoralis major should be avoided for 2 to 3 weeks.
- If the patient has had an immediate reconstruction and lymph nodes have been removed, for the first week encourage shoulder shrugs and rolls, short lever shoulder flexion, abduction and rotation, avoiding flexion/abduction above approximately 90 degrees.
- Normal use of the affected arm up to approximately shoulder height is encouraged from the first post-operative day, but avoiding shoulder extension, and heavy lifting.
- Once inflation commences, or from approximately 2 weeks, a gradual return to normal activities and increased use of the arm is encouraged, with progressive range of movement exercises, avoiding anything that feels very tight or painfully stretching.
- Tightness across the anterior chest secondary to pain/bruising can lead to a protective round-shouldered posture; treatment includes shoulder girdle exercises, posture advice, and stretching.
- Driving can be resumed at 3 to 4 weeks, assuming movement and confidence allow, or when advised by the surgeon.
- By 6 weeks, most normal activities can be resumed, whilst avoiding sudden heavy lifting or use of the pectorals.

Physiotherapy guidelines for reconstruction using latissimus dorsi flap

The latissimus dorsi is still innervated, and so any movement/activity that causes the muscle to contract, or stretches either the latissimus dorsi or the pectoralis major should be avoided until the wounds have healed.

FIRST 1-2 WEEKS:

- Shoulder shrugs and rolls, short lever shoulder flexion and abduction, and scapular protraction and retraction (arms by sides) are commenced from day 1 post-operatively, aiming for approximately 90 degrees (shoulder height) and continued for the first 2 weeks; avoid abduction/elevation above approximately 90 degrees, or shoulder extension.
- Normal use of the arm is encouraged for light activities up to approximately shoulder height.

AFTER 1-2 WEEKS:

- Progressive range of movement exercises including flexion, abduction and lateral rotation.
- Gradual return to normal use of the arm above shoulder height.
- Gradual return to normal activities, with almost all tasks being resumed from about 6-8 weeks, with very heavy lifting (weights, very heavy household tasks) avoided until 12 weeks post-op.
- Abduction with lateral rotation (hands behind head) is encouraged as this movement is often tight and restricted. This is particularly important if radiotherapy is planned.

- Scapular protraction/retraction exercises are commenced to keep the donor scar mobile and prevent it adhering: scapular protraction with bilateral horizontal shoulder flexion combined with deep inspiration (this stretches the scar around the serratus anterior/thoracic area), and scapular protraction in supine (fingertips towards ceiling).

AFTER 4 WEEKS, OR ONCE THE DONOR WOUND HAS HEALED:

- Once full active abduction is achieved, stretches into abduction combined with side flexion of the trunk away from the reconstructed side are encouraged to stretch the donor site over the lateral chest wall.
- Driving can be resumed at 4 weeks, assuming movement and confidence allow.
- Firm massage of the skin over the donor site and lateral chest wall is encouraged to prevent the scar adhering.
- A feeling of tightness, sometimes with pain/hyperaesthesia across the back and donor area can remain for months after surgery. The importance of continuing soft tissue massage, scapular exercises, thoracic expansion exercises, and end range stretches is stressed.
- Delayed donor wound healing can cause scar adherence, restricting scapular mobility and shoulder range of movement. Treatment includes all above, plus scapular mobilisations, soft tissue release techniques, thoracic and lumbar stretches, posture advice.

Note: The 1-2 week timescale is a guide; as the time of progression of exercises will vary on an individual case basis if the patient is being very protective of the affected arm, or demonstrates marked shoulder stiffness or faces imminent radiotherapy. It may also vary dependent on the preference of the surgeon.

Physiotherapy guidelines for reconstruction using TRAM/DIEP flaps

FIRST 6 WEEKS:

- Short lever shoulder rotation and flexion, plus standard respiratory care from first post-operative day.
- Avoid shoulder abduction above 90 degrees for first week to prevent stretching vascular pedicle where there has been an axillary vascular anastamosis – confirm this with operating surgeon if necessary.
- If flap viability is in question, confirm how much shoulder movement can be performed with the surgeon.
- Pelvic tilting commenced within the first 2 to 3 days, in sitting and crook lying, and is continued for at least 6 weeks post-operatively to ease/prevent back pain, encourage scar and lumbar spine mobility, and encourage sub-maximal contraction of the rectus abdominis muscle.
- Leg rolling side to side with knees together in crook lying within first few days to improve mobility and transfers.
- Abdominal hollowing in crook lying as soon as patient is able.
- Progressive shoulder range of movement exercise after the first 7 days (if flap stable).

FROM 4 TO 6 WEEKS:

- Once control of the movement has been achieved an abdominal hollowing contraction should be encouraged during lifting and functional activities.
- Curl-ups and oblique curl-ups can be commenced at 6 to 8 weeks, once a good abdominal hollowing contraction can be maintained.
- Progress abdominal exercises on an individual basis; pilates exercises are excellent.
- Once the abdominal wound is healed, gentle stretching of the abdominal wall can be commenced if required.
- Firm massage with moisturiser over the abdominal skin and scar is encouraged once the wounds are healed to keep the skin supple.
- Lifting or vacuuming should be avoided for at least 6 weeks, longer if there is a wound

infection or delayed wound healing.

- Driving can be resumed from 4 to 6 weeks, assuming movement and confidence allow.

Note: The type and speed of progression of abdominal exercises, the time-scales for resuming normal activities and the long-term functional outcome following surgery will depend on which variant of abdominal tissue transfer has been used (pedicled TRAM, free TRAM, DIEP or SIEA) and therefore the amount of rectus muscle and anterior rectus sheath that has been sacrificed with the flap.

Physiotherapy guidelines for reconstruction using TUG or I-GAP flaps

- As both these flaps are free flaps, the same advice applies for mobilising the affected arm as following a DIEP/TRAM flap.
- Avoid stretching the donor site until the wound has healed, usually 4 to 6 weeks. Depending on the exact site, this generally involves avoiding abduction or excessive flexion of the affected hip for the first approximately 4 weeks.
- For the first few post-op days try to have the patient sitting in a recliner type chair with the hip in as little hip flexion as possible.
- As the wound heals progress range/use of the affected leg/hip with specific stretches into flexion and abduction, and soft tissue massage of the donor area from 6 weeks onwards. Tightness around the hip is common and resolves with stretches.
- Can resume most sports from approximately 8 weeks. No long term functional/sport restrictions anticipated.

References:

Button J, Scott J, Taghizadeh R, Weiler-Mithoff E, Hart A. Shoulder Function Following Autologous Latissimus Dorsi Breast Reconstruction. A Prospective Three Year Observational Study Comparing Quilting and Non-Quilting Donor Site Techniques. *J Plast Reconstr Aesthet Surg.* 2010; 63(9):1505 – 1512

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Shamley DR, Barker K, Simonite V, Beardshaw A. Delayed versus immediate exercises following surgery for breast cancer: a systematic review. *Breast Cancer Res Treat.* 2005; 90(3):263-71

Todd J, Scally A, Dodwell D, Horgan K, and Topping A. A randomised controlled trial of two programmes of shoulder exercise following axillary node dissection for invasive breast cancer. *Physiotherapy.* 2008; 94(4):265-273

APPENDIX E: ESSENTIAL SKILLS FOR MEMBERS OF THE ONCOPLASTIC TEAM

Members of the oncoplastic team should have a range of skills which in combination facilitate the delivery of a high-quality, patient-centred OP service. Essential skills can be divided into generic skills which should be shared by all team members and specialist skills which are dependent on the individual's role within the team.

Generic skills

All team members should share generic core skills which should include:

- Core knowledge: i.e. proof of attendance at appropriate courses (see Appendix F):
  - An understanding of the oncological basis of breast disease
  - An understanding of the surgical management of breast disease including the full range of OPBS procedures and the complications that may arise from surgery
  - Awareness of the psychosocial impact of breast disease and how this may affect patients and their families
  - Awareness of the need for evidence-based practice and clinical audit
- Attitudes:
  - Exhibit a compassionate, empathetic and non-judgmental approach to patients with breast cancer and their families
  - Respect and value other team members
  - Desire to provide the best possible outcomes for patients seeking surgery
- Skills:
  - Effective communication with patients and colleagues
  - Ability to work as part of a MDT
  - Organisational skills as appropriate to their role

Specialist skills

Team members should also exhibit specific specialist skills dependant on their role within the team.

Oncoplastic and reconstructive surgeons

Surgeons performing OPBS should possess the following additional skills:

- Knowledge:
  - Expert surgical knowledge of the evidence-based management of breast disease including the oncological management of breast cancer and other non surgical therapies, OP procedures and complications that may occur after surgery
  - Expert knowledge of factors which may affect outcome and influence decision making for particular procedure types and the interaction with subsequent adjuvant therapy
- Technical skills:
  - Demonstrate competency in performing core OPBS procedures appropriate to their experience, training and service provision, either as members of an OPU or an OPC
  - Newly appointed consultant surgeons should have completed an Oncoplastic Fellowship or equivalent and be able to demonstrate competence in performing core procedures
- Communication and team-working skills:
  - Be able to communicate and work effectively across specialities in joint OP clinics, lists and MDMs
  - Be able to collaborate to improve the patient's experience of care
  - Flexibility
  - Participation in research and audit

Breast Care Nurse Specialists

- BCNs should be trained to the level 2 standard and possess the full range of skills, defined by the Royal College of Nursing in guidance on working in a breast specialty, to enable them to inform and support patients undergoing OP procedures.

APPENDIX F: MEETING THE EDUCATIONAL NEEDS OF TRAINEES, CONSULTANTS AND THE MDT

Opportunities for trainees

- Nine pre-CCT Interface Oncoplastic Breast Fellowships in Regional Oncoplastic Centres appointed annually by the Training Interface Group in Oncoplastic Breast Surgery. Fellowships provide concentrated intermediate and advanced experience in all aspects of oncoplastic practice (www.jcst.org/training_interface_groups/breast_surgery).
- Interface Reconstructive Cosmetic Surgery Fellowships in 10 Regional Plastic Surgery Centres appointed by the Training Interface Group in Reconstructive Cosmetic Surgery (www.jcst.org/training_interface_groups/cosmetic_surgery).
- The Oncoplastic Masters Programme developed and administered by the University of East Anglia (UEA). Modular in design with e-learning, interactive, face-to-face and hands-on components leading to the award of a Postgraduate Diploma or Mastership (www.uea.ac.uk/med/medicine-policy-and-practice/ms-oncoplastic-breast-surgery-part-time).
- Core, intermediate and advanced level courses and practical workshops developed by the Education Department of The Royal College of Surgeons of England (RCSEng) in conjunction with the Association of Breast Surgery (ABS) and the British Association of Plastic, Reconstructive and Aesthetic Surgeons (BAPRAS) (www.rcseng.ac.uk/education).
- Breast surgery modules of the advanced educational course programme run by BAPRAS (www.bapras.org.uk).
- Theatre-based courses and masterclasses based on videolink demonstrations of OPBS supported by the ABS (www.associationofbreastsurgery.org.uk).
- Canniesburn 'hands on' flap courses and microsurgical workshops (www.canniesburn.org/courses.html).
- Nottingham Breast Institute Oncoplastic and Reconstructive Breast Surgery (ORBS) courses are held biannually (www.orbsmeetings.com).
- A new Oncoplastic Curriculum for the final years of training of Plastic Surgeons is based around the following design and components:
    - A modular approach to training
    - A description of the basic, intermediate and advanced levels of clinical and technical skill which a trainee is expected to achieve
    - A syllabus with 6 core components, including basic sciences, breast cancer, BBD, developmental abnormalities, reconstruction and aesthetic breast surgery.
    - A description of the modules and levels of competency for 'mono-specialty' trainees
    - A description of the modules and levels of competency for trainees completing an Oncoplastic Breast Fellowship
    - Details of the range of teaching and learning opportunities required to support each stage of the programme
    - An assessment framework based on ISCP workplace-based assessments, including case-based discussion (CBD) and procedure-based assessment (PBA), which inform the annual review of competence progression (ARCP)

Opportunities for consultants and the MDT

- The educational needs of consultants and other surgical members of the oncoplastic MDT mirror those of senior trainees in many respects, but the availability of appropriate training opportunities for established team members is currently limited.
- Useful courses include those listed above developed by the RCSEng, the ABS, BAPRAS, the Canniesburn Plastic Surgery Unit and the Nottingham Breast Institute.
- OPBS symposia constitute a significant component of the national meetings of the Specialty Associations (ABS Conference and AGM, ABS Trainees Meeting, BAPRAS Winter Scientific Meeting, BAPRAS Summer Meeting, BAPRAS Breast reconstruction for nurses Meeting).
- Courses are available for other healthcare professionals in the MDT who provide information, support and advice for patients considering OPBS, including breast care nurses, breast care

practitioners and breast nurse specialists. These are available at the RCSEng (www.rcseng.ac.uk/education/courses/speciality-skills-in-oncolpastic-and-breast-reconstruction-surgery) and through other organisations (www.breastcancercare.org.uk).

- The needs of the MDT and the skills and aspirations of the Consultant Oncoplastic Breast Surgeon or the General Surgeon with an interest in Breast Surgery will determine the scope of their clinical practice which will include:
    - Functional membership or chairmanship of the breast and oncoplastic MDM
    - Assessment and management of symptomatic and screen-detected cancers
    - Risk assessment and risk management
    - Diagnosis and management of benign breast conditions
    - Diagnosis and management of breast cancer in the context of the MDM framework and national guidelines
    - Limitation of aesthetic problems following breast surgery in the context of the MDM framework and national guidelines (www.iscp.ac.uk)

15. GLOSSARY

ABS

Association of Breast Surgery

Acellular dermal matrix (ADM)

A product used in breast reconstruction which is derived from human or animal skin

Adjuvant therapy

Treatment given after surgery such as radiotherapy, chemotherapy or hormonal treatment

ASA

The ASA physical status classification system is a system for assessing the fitness of patients before surgery. In 1963 the American Society of Anesthesiologists (ASA) adopted the five-category physical status classification system; a sixth category was later added. The following four point scale was used in the NMBRA

1. A normal healthy patient
2. A patient with mild systemic disease that does not limit activity
3. A patient with severe systemic disease that limits activity but is not incapacitating
4. A patient with incapacitating systemic disease which is constantly life-threatening

Autologous breast reconstruction

Reconstruction of the breast mound (or shape) using only the patient's own tissue (without any prosthesis or implant)

BAPRAS

British Association of Plastic, Reconstructive and Aesthetic Surgeons

BBD

Benign Breast Disease

BCN

Breast Care Nurse - A healthcare professional providing supportive psychological and physical nursing care for patients with breast disease

BR

Breast Reconstruction

Breast conserving surgery

A surgical procedure to remove an abnormality from the breast, preserving the remaining breast tissue

BMI

Body Mass Index - BMI is a measure of whether an adult is a healthy weight for their height

Caldicott guardian

The December 1997 Caldicott Report identified weaknesses in the way parts of NHS handled confidential patient data. The report made several recommendations, one of which was the appointment of Caldicott guardians, members of staff with a responsibility to ensure patient data is kept secure

CCT

Certificate of Completion of Training

Chemotherapy

Drug therapy used to treat cancer. It may be used alone, or in conjunction with other types of treatment (e.g. surgery or radiotherapy)

Comorbidities

One or more illnesses in addition to the primary disorder

CT scan

Computerised tomography scan - scan involving Xrays which may be used to identify blood vessels involved in reconstruction and check the rest of the body for breast cancer

DBR

Delayed breast reconstruction - Reconstruction of the breast mound (or shape) after a mastectomy has already been performed. This is undertaken as a separate operative procedure

DIEP

Deep inferior epigastric artery perforator flap. Skin and fat taken from the lower abdomen (like a 'tummy tuck') to provide autologous reconstruction

Doppler

Real time, audible signals of blood vessels

Free flap breast reconstruction

The breast mound (or shape) is reconstructed using the patient's own tissue (e.g. skin, fat, muscle) from another part of the body (donor area). The tissue is completely detached from the donor area before it is moved, and microsurgery is used to re-join its arteries and veins to those in the breast area. This means that tissue can also be taken from areas distant to the breast, such as the buttock or thigh

GAP flap (I-GAP, S-GAP)

Gluteal Artery Perforator flaps - Skin and fat taken from the buttock region to provide autologous reconstruction

GP

General Practioner

HDU

High Dependancy Unit

IBR

Immediate breast reconstruction - Reconstruction of the breast mound (or shape) at the same time as the mastectomy, undertaken as part of the same operative procedure

Implant

A prosthesis, usually made of silicone, used to replace breast volume in breast reconstruction

Implant-only breast reconstruction

The breast mound (or shape) is reconstructed using a tissue expander (the volume can be increased by injecting saline through a port placed under the skin) or a definitive implant (the volume is fixed). The expander or implant is placed under the pectoral (chest) muscle. A tissue expander may be exchanged for a definitive implant or left in place after expansion, depending on the type of device used

ISCP

Intercollegiate Surgical Curriculum Programme

ITU

Intensive Care Unit

Laminar flow

A specialised theatre air conditioning system which directs air flow down and out over the operating table and which has been shown to reduce infections in prosthetic joint surgery, also known as Ultra Clean Ventilation (ACV)

LD

Latissimus dorsi flap - muscle from the back taken with skin and fat for breast reconstruction

Lymphoedema

Swelling due to the build up of protein-rich fluid in the tissues. In breast cancer patients this occurs when the lymphatic drainage system that normally removes this fluid is damaged by surgery or radiotherapy to the armpit. The swelling usually affects the arm on the treated side

MDM

Multidisciplinary Meeting - A regular timetabled meeting for members of the MDT

MDT

The Multidisciplinary Team is a group of professionals from different disciplines that works to optimise breast cancer diagnosis and treatment throughout the patient pathway

MHRA

Medicines and Healthcare products Regulatory Agency

MRA

Magnetic Resonance Angiography - See MRI

MRI

Magnetic resonance imaging - scan using magnetic fields to provide detailed images of breast tissue or the blood vessels involved in reconstruction

MRSA

Meticillin resistant Staphylococcus aureus - a cause of wound and implant infection

MSSA

Meticillin sensitive Staphylococcus aureus - a cause of wound and implant infection

NAC

Nipple Areola Complex

Neoadjuvant

Administering chemotherapy or hormonal treatment prior to surgery

NICE

National Institute for Health and Clinical Excellence is an independent organisation responsible for providing national guidance on the promotion of good health and the prevention and treatment of ill health

NMBRA

National Mastectomy and Breast Reconstruction Audit

OPBS

Oncoplastic breast surgery - Techniques which combine mastectomy or wide local tumour resection with reconstruction of the defect to optimise oncological and cosmetic outcomes

OP

Oncoplastic Procedures

OP BCS

Oncoplastic Breast Conserving Surgery

OPC

Oncoplastic Centre

OPU

Oncoplastic Unit

Pedicle flap breast reconstruction

The breast mound (or shape) is reconstructed by moving a 'flap' of skin, muscle and fat from the patient's back or abdomen to the breast area, which is kept alive by a 'pedicle' or tube of tissue containing its supplying arteries and veins

PROM

Patient reported outcome measure - a questionnaire that allows a patient to report their experience of different aspects of their treatment

Psychological Support Level 2 (NICE Guideline N0474. 2004)

Assessment
Professionals operating at this level should be able to screen for psychological distress at key points in the patient pathway, including

- around the time of diagnosis
- during treatment episodes
- as treatment ends
- at the time of recurrence

These assessments should be undertaken by designated professionals (such as nurse specialists, social workers and GPs), appropriately trained in screening for psychological distress. They should include the impact of cancer on people's daily lives, mood, family relationships (including sexual relationships) and work. Those undertaking an assessment should elicit worries and other feelings by establishing trust and listening in a permissive and non-judgemental manner. The assessment process itself may lead to the resolution of concerns; if not, it should result in an offer of appropriate psychological support. Patients experiencing significant psychological distress should be offered referral for specialist psychological support/intervention

Intervention
Level 2 Intervention involves psychological techniques such as problem solving delivered by trained and supervised health and social care professionals to manage acute situational crises at key points in the patient pathway. Clinical nurse specialists, among others, might be trained and supported to undertake assessments and to deliver relevant interventions

Psychological Support Level 3 (NICE Guideline N0474. 2004)

Assessment
Trained and accredited professionals should be able to differentiate between moderate and severe levels of psychological need and refer those with severe needs to mental health specialists

Intervention
Level 3 involves specific psychological interventions such as anxiety management and solution-focused therapy, delivered according to an explicit theoretical framework by a trained, accredited and supervised counsellor. It aims to manage mild to moderate levels of psychological distress including anxiety, depression and anger. Specific psychological interventions at this level are also appropriate for responding to mild to moderate cancer-related concerns such as worries about treatment, personal relationships (including sexual relationships), relationships with hospital staff and spiritual issues

Psychological Support Level 4 (NICE Guideline N0474. 2004)

Assessment
Mental health specialists should be able to assess complex psychological problems including severe affective disorders, personality disorders, substance misuse and psychotic illness

Intervention
Level 4 involves specialist psychological and psychiatric interventions delivered by mental health specialists to manage moderate to severe mental health problems. These include severe depression and anxiety, organic brain syndromes, severe inter-personal difficulties (including severe psychosexual problems), alcohol and drug-related problems, personality disorder and psychotic illness

RCN

The Royal College of Nursing is an independent professional body that represents nurses and nursing

RCS England

The Royal College of Surgeons of England is an independent professional body committed to enabling surgeons to achieve and maintain the highest standards of surgical practice and patient care. As part of this it supports audit and the evaluation of the clinical effectiveness of surgery

SIEA Flap

Superficial Inferior Epigastric Artery Flap - skin and fat taken from the lower abdomen (like a 'tummy tuck') to provide autologous reconstruction

SLN

The sentinel lymph node is the hypothetical first lymph node or group of nodes reached by cancer cells as they spread from a primary tumour

SLNB

Sentinel Lymph Node Biopsy

TEDS

Thrombo Embolus Deterrent Stockings

Therapeutic mammaplasty

A breast reduction incorporating removal of a breast cancer

TRAM

Transverse rectus abdominis muscle flap. Muscle, skin and fat taken from the lower abdomen (like a 'tummy tuck') to provide autologous reconstruction

TUG Flap

Transverse Upper Gracilis flap - A skin fat and muscle taken from the upper inner thigh to provide autologous reconstruction

Visual analogue scale

A simple scale allowing patients to describe their pain using a scale of 1-10

VTE

Venous thromboembolism - blood clots in the leg (deep vein thrombosis) or lung (pulmonary embolus)

DEFINITIONS OF COMPLICATIONS

- **Implant infections:** Post-operative infection involving the implant, often presenting as redness of the overlying skin, pain and swelling and usually requiring return to theatre, washout and replacement or removal of the implant
- **Partial flap failure:** Death of part of the transferred tissue (either skin, fat or muscle) requiring removal of part of the flap in theatre
- **Mastectomy skin envelope necrosis:** An area of skin which has died off requiring removal by chemical or surgical means
- **Total flap failure:** Death of the entire flap requiring return to theatre and removal of the whole flap used in the reconstruction
- **Return to theatre**: Unplanned reoperation to treat major complications of BR which is documented in the reconstructive database
- **Systemic complications:** Such as DVT and PE, cardiac events are rare following breast reconstruction but should be recorded along with admission to HDU due to complications and blood transfusion

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