

**BREAST
CANCER
INITIATIVE^{2.5}**
Making breast health a global priority

TREATMENT

Locoregional Therapy: Surgery for Breast Cancer

Knowledge Summary



Locoregional Therapy: Surgery for Breast Cancer

INTRODUCTION

Surgical care is one of the primary treatment modalities for locoregional breast cancer; radiotherapy and systemic therapy are the other primary modalities. Surgical care for breast cancer requires expert surgical training and coordination of care. The type of surgery will depend on the disease stage, tumor characteristics, patient preferences and resources available for neoadjuvant (preoperative) and adjuvant (postoperative) treatments. A breast tumor can be removed by mastectomy (removal of the breast) or lumpectomy/breast conserving surgery (removal of only the tumor or lump and some surrounding tissue). A modified radical mastectomy (removal of the breast and most of the axillary [under the arm] lymph nodes) is most often performed when breast conserving surgery is not an option. In low-resource settings, modified radical mastectomy is the standard surgical treatment. As more resources are available, breast conserving therapy (BCT), which includes breast irradiation after surgery, becomes an option. Systemic therapy is usually administered after surgery as adjuvant therapy, but it may also be given before surgery as neoadjuvant therapy (see *Systemic Therapy: Chemotherapy and Systemic Therapy: Hormonal Therapy and Targeted Agents*).

Breast cancer can spread to the regional lymph nodes and lymph node surgery is required to correctly stage a cancer and may achieve regional control of disease. In low-resource settings, this is most often performed with a complete axillary dissection (removal of the tissue under the arm that contains the lymph nodes) at the time of the definitive surgery. As more resources become available, a sentinel lymph node biopsy (SLNBx) is performed when there is no clinical evidence of tumor involvement in the axilla. A SLNBx is a minimally invasive procedure that uses blue dye and/or a radioactive tracer to locate one or more lymph nodes most likely to contain cancer. Although this procedure is less invasive than complete axillary dissection, it requires a higher level of resources and training of surgeons. If cancer is demonstrated in the lymph nodes, a more extensive surgical procedure, the complete axillary lymph node dissection (ALND) may be required. Because SLNBx only removes the initial lymph nodes to which cancer would spread from the breast, it is not a recommended procedure for more extensive or biologically aggressive cancers in which significant disease might be left behind in the axilla.

KEY SUMMARY

Surgery for breast cancer treatment

- Surgical services are essential for prompt diagnosis (biopsies), staging (identifying spread beyond the breast to lymph nodes and other sites) and definitive surgical treatment (e.g., mastectomy, lumpectomy, node dissection) of breast cancer.
- Although needle biopsy (fine needle aspiration or core needle biopsy) is preferred because it is minimally invasive, surgical

biopsy is the gold standard for definitive cancer diagnosis.

- Surgical treatment choices depend on breast cancer stage—smaller cancers can undergo breast conserving therapy (lumpectomy followed by radiation treatment)—whereas larger cancers require a mastectomy.
- For surgery to be effective, the cancer in the breast must be completely excised. Debulking (incomplete tumor removal) is generally ineffective because the tumor grows back.
- Cancers that are deemed “inoperable” (i.e., cannot be completely excised) may benefit from preoperative chemotherapy to shrink extensive tumors; some inoperable cancers become operable after initial drug treatment.
- Mastectomy may not be culturally acceptable for some women, leading to increased fear, delays in presentation and refusal to accept treatment.
- Breast reconstruction (implants or tissue flaps) can improve quality of life for women who undergo mastectomy and should be made available when possible and therapeutically appropriate.

Health systems and coordination of care

- Communication between members of a multidisciplinary team of providers is key to treatment planning. Successful surgical outcomes require multidisciplinary coordination, which may include systemic therapy prior to surgery and/or after surgery.
- Radiotherapy is required for breast conservation therapy. Surgeons performing lumpectomy need to know that the patient can receive it after surgery.
- Specialized training, experience and volume of breast surgeries improves quality and outcomes. Poorly performed operations can increase the percentage of locoregional recurrence.
- Quality care requires safe operating conditions, appropriate operative procedures and systems for quality control.

Resource-stratified pathways across the continuum of care

- Follow a defined resource-stratified pathway to allow for coordinated incremental program improvement across the continuum of care.
- Resource stratification provides for the most effective use of existing resources at any resource level.
- Program design and improvements should be based on identified needs and barriers, outcome goals and available resources.



POINTS FOR POLICYMAKERS:

OVERVIEW

Preplanning

- Identify data sources to estimate disease burden and surgical demands.
- Identify who will lead the process as well as other stakeholders, key decision-makers and champions.
- Identify available resources.

Planning Step 1: Where are we now?

Investigate and assess

- Evaluate existing surgical practices and training programs.
- Evaluate patient access to surgical services.
- Identify barriers to participating in surgical treatment (e.g., structural, sociocultural, financial, personal).
- Identify barriers to improving surgical practices.

Planning Step 2: Where do we want to be?

Set objectives and priorities

- Identify gaps in surgical capacity and define steps to improve acceptance of surgical treatment.
- Match the type of surgical procedures offered to available

expertise and resources (equipment and supplies).

- Define steps to improve surgical capacity.
- Define steps to overcome patient barriers to surgical treatment.
- Survey access and referral to systemic therapy and radiotherapy services for comprehensive multidisciplinary treatment.

Planning Step 3: How do we get there?

Implement and evaluate

- Partner with and engage appropriate stakeholders and resources.
- Follow a surgical care resource-stratified pathway that most effectively utilizes the resources available.
- As resources become available, invest in surgical training and surgical supplies to facilitate the introduction of more advanced surgical techniques such as breast conserving therapy and sentinel lymph node biopsy.
- Implement quality assurance measures and monitor surgical outcomes.
- Cancer treatment plans at all resource levels require continuous re-evaluation and development.

WHAT WE KNOW

Most women diagnosed with breast cancer will require breast surgery. In high-resource settings where most women present with early stage disease, the majority of women receive multimodality therapy that includes surgery (lumpectomy or mastectomy) with or without radiation therapy and systemic therapy. In some low-resource settings, where the majority of women present with locally advanced cancer, surgery may be the only therapeutic option if radiation therapy and/or systemic therapy are not available. Evaluation for surgery begins with a complete history and physical examination, confirmation of tissue biopsy with conclusive proof of malignancy and a review of available staging studies [see *Diagnosis: Biopsy, Pathology and Subtypes*]. If available, histologic subtype, hormone receptor status and HER2 status should be determined. Treatment plans should involve multidisciplinary team coordination of care and include surgeons, radiation and medical oncologists, radiologists and pathologists. If specialists are not available, coordination of care includes a smaller multidisciplinary team – a surgeon, primary care clinician and nurse.

Locally advanced breast cancer can be categorized as operable or inoperable (see Table 1). Chemotherapy prior to surgery can render inoperable tumors operable by causing regression of existing tumor and aiding in the tumor resection. For treatment purposes, breast cancer is characterized using the Tumor, Node, Metastases (TNM) system of UICC-AJCC and classified as early stage (clinical stage I, IIA or a subset of IIB [T2N1]) or locally advanced (clinical stage IIB [T3N0], IIIA-IIIIC) [see *Diagnosis: Clinical Assessment, Diagnostic Imaging and Staging*].

Types of Breast Surgery

Breast surgery involves both management of the primary breast tumor (e.g., mastectomy, partial mastectomy, lumpectomy) and evaluation and management of the axilla (area under the arm). Lumpectomy or partial mastectomy is removal of the tumor and an area of normal tissue surrounding the tumor. This procedure can be done together with SLNBx for axillary staging (in higher resource settings), or can be combined with a complete axillary dissection. Mastectomy is the removal of the entire breast tissue. There are multiple types of mastectomy procedures.

Radical (Halsted) mastectomy is the full removal of the breast, the overlying skin, the pectoralis major and minor muscles and the entire axillary contents. It is rarely used today because the survival outcomes are equivalent to those of modified radical mastectomy, and it has a much higher morbidity.

Modified radical mastectomy is the complete removal of the breast and underlying fascia of the pectoralis major muscle along with removal of the axillary lymph nodes.

Total (or simple) mastectomy is removal of the entire breast and fascia of the pectoralis major with preservation of pectoral muscles and axillary content. This procedure can be done together with SLNBx for axillary staging (in higher resource settings).

Skin-sparing mastectomy is the removal of the entire breast and fascia of the pectoralis major through a smaller incision than a total mastectomy and with preservation of the majority of breast skin envelope.

Nipple-sparing mastectomy is removal of the entire breast and fascia of the pectoralis major with preservation of the breast skin envelope together with the skin of the nipple and areola.

Surgery for metastatic disease: Once breast cancer has spread to distant sites [stage IV metastatic cancer], patients generally do not require surgery. Removal of tumor in the breast in patients with stage IV has not consistently shown a survival benefit. However, surgery may help with palliative control of an ulcerated tumor on the chest wall. The excision of a bulky breast tumor may leave a significant tissue defect that requires coverage with rotational or free flaps or skin grafts, which make the operation more extensive [see *Palliative Care for Metastatic Breast Cancer*].

Axilla involvement, biopsies and surgery: Breast tumor cells generally migrate from a primary tumor through the bloodstream and lymphatic system and may be detected in one or more sentinel lymph nodes before spreading further. In the case of nonmetastatic cancer, identifying breast cancer cells in the axillary lymph nodes is one of the most important prognostic factors for determining the need for adjuvant radiation therapy and/or chemotherapy. Women presenting with breast cancer must have their axilla examined for clinically suspicious axillary adenopathy [see *Early Detection: Breast Health Awareness and Clinical Breast Exam*]. A woman shown to have cancer in the lymph nodes should in general undergo ALND. If there is no suspicious lymph node on exam or imaging, SLNBx may be done at the time of surgery.

Pathology analysis: In high-income countries, intraoperative pathology analysis may be performed during surgery on lymph node biopsy samples to determine if a complete ALND should be performed. If a node is positive for cancer, the surgeon proceeds with ALND, preferably in the same setting. If there is no evidence of tumor cells on immediate review, the lymph nodes are then carefully evaluated after surgery.

Sentinel lymph node biopsy: SLNBx requires perioperative dye and/or radiolabeled colloid injection to mark SLNs for resection and palpating the axilla for abnormal lymph nodes after removing the SLNs. Combining both dye and radioactive colloid may increase the identification rate of SLNs. SLNBx is not recommended for women with locally advanced, large tumors (> 5 cm), other T4 lesions (e.g., chest wall invasion) and inflammatory breast cancer. When a SLNBx is not successful or when clinically suspicious lymph nodes are encountered, a complete ALND should be performed.

Axillary lymph node dissection: Complete ALND is removal of the lymph nodes in the axilla. The apex of the lymph node bed only needs to be removed if palpably abnormal lymph nodes are present. In low-resource settings, complete ALND is routinely performed because patients generally present with locally advanced disease, and often have palpably abnormal (“clinically positive”) lymph nodes, which excludes the use of SLNBx [see



above). When resources are available to properly perform SLNBx, and in correctly selected patients with clinically negative axillary nodes, women should be counseled on the benefit of the less invasive SLNBx, which has a lower likelihood of short- and long-term complications, such as lymphedema (arm swelling) and nerve injury, compared with ALND.

Preoperative imaging: Preoperative imaging can define the extent of disease and identify multifocal or multicentric cancers, which will affect surgical decision making (see *Diagnosis: Screening Mammography Programs*). Preoperative imaging generally consists of bilateral mammographic evaluation, but may also include breast and axillary ultrasound. If patients have locally advanced disease or symptoms of metastatic disease, staging studies of the chest and abdomen (or chest, abdomen and pelvis) and bones may be performed.

Systemic therapy: Systemic therapy (chemotherapy, hormonal therapy, and/or targeted therapy) reduces the likelihood of cancer recurrence and is most often given after surgery once the pathologic stage is known. In some settings, chemotherapy is given before surgery to reduce tumor size, allowing breast surgery for some previously inoperable cases and improving breast conservation outcomes for borderline candidates (see *Systemic Therapy: Chemotherapy and Systemic Therapy: Hormonal and Targeted Agents*). Clip (metal marker) placement in the tumor bed should be performed before neoadjuvant treatment to ensure localization of the tumor bed after chemotherapy. Even if there is a complete clinical response to neoadjuvant therapy, and the tumor can no longer be felt in the breast and lymph nodes, surgery to remove any residual microscopic disease is important to decrease the risk of locoregional tumor recurrence.

Radiation therapy: Postoperative whole breast irradiation is a cornerstone of BCT, eradicating sites of clinically occult disease in the ipsilateral breast. Multiple prospective randomized control trials of BCT with and without radiation therapy (RT) have demonstrated the significant reduction of in-breast recurrence without RT (26–40%) compared to with RT (7%–19%). There is also an associated decrease in deaths due to breast cancer with RT after lumpectomy. The survival

benefit is in excess of what could be provided by hormonal therapy alone. Recent studies have shown radiation therapy to the axilla for regional control may have similar outcomes to ALND (see *Treatment: Locoregional Therapy: Radiation Therapy for Breast Cancer*).

Postsurgical complications: Postsurgical complications following breast conservation surgery and mastectomy can affect quality of life and may include seroma formation (fluid accumulation), wound infection, skin flap necrosis, chest wall pain, phantom breast syndrome and arm morbidity. Symptoms such as swelling, pain, numbness, stiffness or nerve injury should be taken seriously as they represent quality of life issues for the patient. While seroma is common after every breast-cancer surgery procedure, clinically significant cases and major side effects, like skin flap necrosis, are more often seen after mastectomy than after breast conservation surgery. As with all surgical procedures, there is a risk for wound infection that can be elevated by smoking, obesity, age and other chronic diseases. Most postoperative cellulitis can be treated with oral antibiotics, while post mastectomy pain should be treated following clinical guidelines for pain-management (see *Palliative Care During Treatment*.) Rare complications include pneumothorax (collapsed lung) or brachial plexopathy (a type of peripheral neuropathy) related to positioning in the operating room.

Postoperative management: Postoperative management includes pain control and wound and drain management. In low-resource settings it is common to keep a woman hospitalized until fluid production ceases and the drain is removed. Effective drain management and the earliest safe removal of a postoperative drain can facilitate efficient use of resources and improve a woman's experience. A closed passive drain method may reduce length of hospital stay and be more favorable in low-resource settings. Minimizing hospital length of stay can reduce the risk of infection and encourage early physiotherapy. Women should also be referred for postoperative physical therapy to maintain function of the arm and shoulder. The surgical team should be informed and participate in any postoperative concern, particularly within the first thirty days.

WHAT WORKS

Effective operative care requires thorough preparation, including appropriate surgical consultation that considers preoperative, operative and postoperative steps and a clear process for patient decision making and coordination of care.

Matching surgical procedures to available resources: Modified radical mastectomy is the mainstay of locoregional treatment in low-resource settings when radiation therapy and/or advanced systemic therapy are not available. As radiotherapy and systemic therapies become available, surgical options become less morbid and can offer improved cosmetic outcomes. Most women in low- and middle-income countries present with larger tumors at a more advanced disease stage and are not candidates for BCT, but can benefit from mastectomy or palliative surgery. BCT is often the preferred treatment when resources are available, and ideally requires access to radiation therapy and necessary follow up care [see Table 2]. BCT can only be performed for smaller tumors or early disease stage but requires surgical expertise.

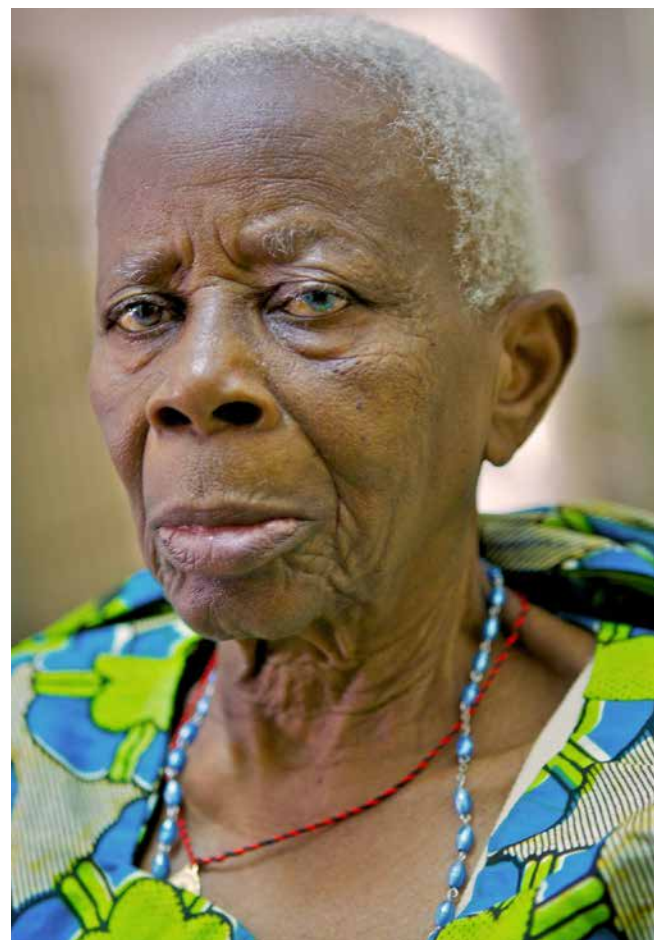
Psychosocial aspects of breast surgery: The fear of breast removal can be a barrier to women seeking breast cancer care. Offering surgical treatments favorable to a woman is a core objective of breast cancer programs and can improve patient presentation for diagnosis and treatment. Appropriate preoperative counseling of women diagnosed with breast cancer should include a discussion of surgical options, possibility of metastatic disease, need for additional therapy, cost of care, psychosocial implications and prosthetic and available reconstructive options. A patient-centered approach to care can improve patient participation in surgical decisions. The use of visual decision aids can enhance a woman's understanding of treatment options.

Specialized breast surgeon training: Training programs in breast cancer surgery add specialized skills to general surgical capacity and improve surgical expertise. Experience and volume of breast surgeries improves quality and outcomes.

Surgical safety: Patients should be reexamined in the immediate preoperative holding area to confirm the correct breast is selected for surgical management. The surgical site should be marked with a water-soluble pen and a surgical checklist should be completed. Surgical preparation of the patient includes infection prevention and venous thromboembolism prophylaxis strategies. Infection prevention includes sterile operating procedures. Preoperative antibiotics should be administered intravenously within one hour before skin incision to reduce risk of infection. Prolonged, empiric postoperative antimicrobials are not indicated in the absence of an active infection. The mode of anesthesia depends on available resources and can include local, regional [paravertebral block], or general anesthesia. A mastectomy should be done under general anesthesia. Regional or local anesthesia can decrease postoperative pain.

Surgical margins: A core tenet of all breast surgery is to achieve negative margins [no tumor cells abutting the cut surgical edge]. The surgeon can use multicolored inks to mark the margins and orient the sample for pathologic evaluation. A positive margin is associated with a two-fold increase in local recurrence and, therefore, re-excision is recommended. A reoperative rate of 20% is considered high; an adequately trained surgeon's reoperative rate can be as low as 5%. Strategies to minimize a second operation should be followed.

Oncoplastic surgery and breast reconstruction: In addition to minimizing local recurrence, a goal of BCT is to produce a cosmetically acceptable breast as this may lead to improved emotional wellbeing. All women undergoing breast surgery should be counseled on the use of prosthesis and available reconstructive options before surgery (i.e., oncoplastic reconstruction, tissue expanders and autologous tissue transfer). Selecting the appropriate procedure depends on many factors [location of the tumor, surgical expertise] and should include multidisciplinary team consultations that recognize a patient's central role in decision making. Reconstructions can occur at the time of the definitive cancer surgery or be delayed until a later time, depending on tumor variables.



PLANNING STEP 1: WHERE ARE WE NOW?

Investigate and assess

Assess the burden of disease and surgical needs

- Information on the incidence and stage of disease at diagnosis obtained from cancer registries or hospital data can be used to estimate the demand for breast surgical services.

Assess existing surgical practices

- Evaluate existing surgical services for both availability as well as quality. Determining the appropriate procedure for a woman undergoing breast surgery requires careful consideration of the extent of disease, available resources for neoadjuvant or adjuvant therapy, patient preference and reconstructive options.
- Engage the target population, survivors, advocacy groups and other stakeholders in a health system review of surgical options (including insurance coverage/ payment options) to ensure available surgical procedures are those preferred by breast cancer patients.

Assess barriers to surgical interventions

- Identify barriers to surgical interventions (e.g., structural, sociocultural, financial, personal)
- Assess the psychosocial aspects and barriers to selecting breast surgery. A woman's decision to proceed with surgical care may be influenced by the sociocultural consequences associated with having her breast removed (see *Planning: Improving Access to Breast Cancer Care*).

Assess health system capacity

- Surgical services are feasible in any setting with basic surgical equipment. In regions where trained breast surgeons are not available, assess the capacity of non-surgeons to provide safe, quality surgical services.
- Assess availability of imaging and diagnostic capacity to appropriately stage patients so the best surgical management decisions can be made.

PLANNING STEP 2: WHERE DO WE WANT TO BE?

Set objectives and priorities

Define target population

- Nearly all breast cancer patients are candidates for operative therapy.
- The type of surgery performed will depend on the disease stage, quality of imaging and diagnostics, available systemic therapy and radiotherapy and patient preference.

Identify gaps in surgical services

- Address health system capacity and limitations, including available surgical expertise, diagnostic and imaging capacity and patient support services, such as psychosocial support.
- Address patient barriers to surgical care. Low participation in surgical services may be related to patient concerns about surgical breast removal, disfigurement or cost.

Set achievable objectives

- Ensure all women have access to surgical services as a core component of breast cancer care.
- Match surgical procedures to available resources.
- Consider opportunities and interventions that will reduce barriers and improve participation.
- Facilitate active patient participation in surgical care decision making and follow up care, which can be enhanced by counseling and other educational programs and outreach.
- Ensure quality standards are in place for all surgical services.
- The cost of surgical services, including prosthesis and reconstruction (where available), should not be prohibitive to patients, and, as such, requires insurance and other subsidized programs.

Set priorities for surgical services:

- Follow a resource-stratified pathway for incremental program improvement that includes evaluation of available resources across the continuum of care (see Table 2).
- Priorities should be coordinated with the advancement of other treatment services, such as the availability of radiation therapy and systemic therapy.

PLANNING STEP 3: HOW DO WE GET THERE?

Implement and evaluate

Establish financial support and partnerships

- Health insurance coverage or health system subsidization of breast surgery, including breast conservation and reconstruction, can improve access and to and utilization of surgical options.
- Survivor support groups can play a central role in informing women about breast cancer treatment options, provide survival messages and support women during postoperative care.

Implement and disseminate

- Implement policies and programs that reduce barriers and support equitable access to surgical care.
- Address gaps in diagnostic capacity to improve surgical options.
- Provide training and education for surgeons on breast-specific surgery.
- Train health professionals in management of postsurgical care including physiotherapy and psychosocial effects.
- Efficient referral systems, multidisciplinary teams and comprehensive cancer centers can help reduce fragmentation in care.

Monitor and evaluate

- Surgical safety and quality should be emphasized in the implementation of advanced surgical services. Centers of excellence that increase surgical volume can improve quality control.
- Quality assurance programs should evaluate operative care and include measurable indicators, such as number of women receiving BCT, number of lymph nodes removed, surgical complication rates, or locoregional recurrence.



CONCLUSION

At all resource levels, women in need of treatment for breast cancer should have access to surgical services. At the most basic level, the modified radical mastectomy is the treatment of choice, given the absence of less invasive axillary staging studies, readily accessible pathology for margin assessment and radiation therapy to facilitate BCT. Even at the basic level, a significant investment must be made in the quality of surgical care, including the use of surgical safety checklists, quality controls to reduce the frequency of complications and appropriate presurgical patient counseling and postoperative surveillance and care. As more options and resources become available, perioperative decision-making becomes increasingly complex, requiring the active participation of multidisciplinary teams. Programs to facilitate quality perioperative care should be developed at all levels.

Table 1. Locally advanced breast cancer (LABC): operable and inoperable categories

Operable or inoperable	Stage category
LABC that may be operable at presentation	Stage IIIA: T3 with N; N2 with any T1-T3
LABC that is inoperable at presentation	Stage IIIB: T4, skin; T4b, chest wall; T4c [a+b] Stage IIIC: N3 with any T
Inflammatory breast cancer	T4d

Abbreviations: **T**, tumor, **N**, lymph node.

Source: El Saghir NS, Eniu A, Carlson RW, Aziz Z, Vorobiof D, Hortobagyi GN. Breast Health Global Initiative Systemic Therapy Focus Group. Locally advanced breast cancer: treatment guideline implementation with particular attention to low- and middle-income countries. *Cancer*. 2008 Oct 15;113(8 Suppl):2315-24.

Table 2. Breast Health Global Initiative resource-stratified surgical treatment recommendations

Disease stage	Basic	Limited	Enhanced	Maximal
Stage I	Modified radical mastectomy	Breast conserving surgery Sentinel lymph node biopsy [SLNBx] with blue dye	SLNBx with radiotracer Breast reconstruction surgery	
Stage II	Modified radical mastectomy	Breast conserving surgery Sentinel lymph node biopsy [SLNBx] with blue dye	SLNBx with radiotracer Breast reconstruction surgery	
Locally advanced	Modified radical mastectomy		Breast conserving surgery Breast reconstruction surgery	
Metastatic disease and recurrent breast cancer [palliative]	Total mastectomy for ipsilateral breast tumor recurrence after breast conserving surgery			

Source: Eniu A, Carlson RW, El Saghir NS, et al. Breast Health Global Initiative Treatment Panel. Guideline implementation for breast health care in low- and middle-income countries: treatment resource allocation. *Cancer*. 2008 Oct 15;113(8 Suppl):2269-81.

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