

Reoperation Realities in Breast Cancer Care: An Analysis of the Impact on Patients and Healthcare Systems

Summary

Breast cancer ranks as the second most frequently diagnosed cancer in women, highlighting the importance of less invasive breast-conserving surgery (BCS) as a standard treatment. Advances in early detection, treatment modalities, and personalized medicine have improved outcomes. However, for a subset of patients, the journey through breast cancer is marked by the necessity for a repeat surgery to achieve clean margins. This profoundly impacts the lives of patients and also poses a complex set of challenges for healthcare systems and providers. This article comprehensively analyzes current reoperation rates and their associated implications, underscoring the need to address this problem.

1. Introduction

Breast cancer accounts for about 30% of all new female cancers in the United States each year and is the second leading cause of cancer deaths in women.¹ In 2023 alone, almost 300,000 women were diagnosed with invasive breast cancer (IBC) and more than 55,000 were diagnosed with ductal carcinoma in situ (DCIS) in the United States.¹

Breast-conserving surgery (BCS), also referred to as lumpectomy, is a commonly utilized surgical technique for treating breast cancer. BCS aims to remove malignant tissue while preserving as much of the breast as possible. While it has been found to be superior to mastectomy in terms of complication rates and patient satisfaction, close or positive margins in BCS can necessitate additional surgical intervention, such as a re-excision or conversion to mastectomy.² While advances in early detection, treatment modalities, and personalized medicine have improved the prognosis, recent studies show that national re-excision rates still range from 18%-23%.^{2,3,4} Re-excision rates have been named an ‘epidemic’ in breast cancer care by The American Society of Breast Surgeons, as additional surgeries burden patients psychologically, physically, and monetarily.^{4,5}

2. Reoperation Rates

Reoperation rates vary widely by health system, institution, and surgeon.⁶ The risk of reoperation can be attributed to larger tumor size, lobular and DCIS histology, and younger patient age.^{3,7,8}

2.1 Trends in Reoperation Rates

In a recent study conducted at MD Anderson, overall reoperation rates for BCS were 21% in females between 18-64 years old and 15% in females 65 years and older. Compared to women with IBC, DCIS patients had even higher reoperation rates: 18% vs. 31% (age 18-64) and 13% vs. 24% (age 65+). Women aged 18-44 with DCIS and commercial insurance had the highest reoperation rate at 40%.³

This discrepancy strongly suggests that achieving clear margins can be challenging in cases of DCIS. Conventional intraoperative imaging techniques rely on the interpretation of microcalcifications, which can be difficult since DCIS presents without calcifications in 10%-20% of cases.⁹

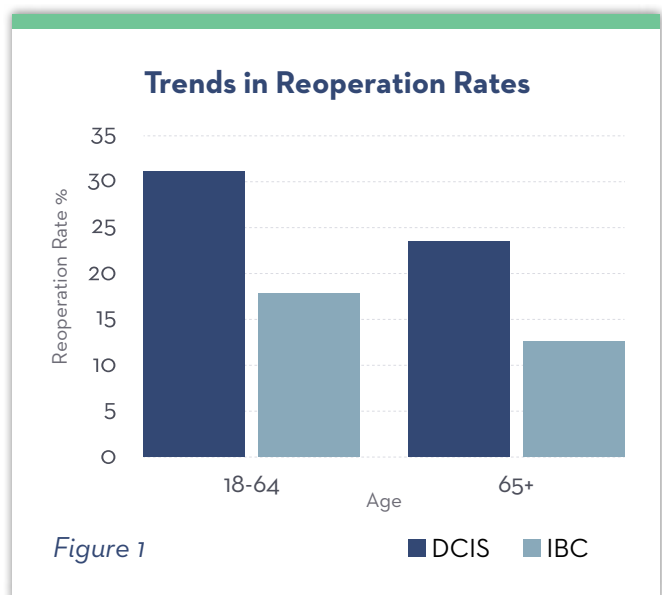


Figure 1

A recent MD Anderson analysis of over 17,000 women showed a trend that reoperation rates decreased as age increased, which suggests that older patients with DCIS are less likely to undergo re-excision.³ This emphasizes the importance of getting clean margins during the primary surgery.

3. Implications of Reoperations

The decision to undergo a BCS reoperation is fraught with uncertainties, requiring patients and their healthcare teams to navigate a multitude of clinical, emotional, and logistical considerations. Understanding the implications of this experience, both from the patient's perspective and within the broader healthcare system, is paramount to providing comprehensive, patient-centered care and improved outcomes.

3.1 Financial Implications

Reoperation rates in breast cancer care contribute to increased financial burden on the healthcare system. Previous estimates showed that U.S. reoperations cost an additional \$16K for BCS and \$26K for the 10%-36% of patients who convert to mastectomy.⁴ However, MD Anderson's recent analysis shows that

these costs have risen. Reoperations were associated with a 24% increase in one-year healthcare costs, with incremental commercial payer costs of \$21K for BCS and \$45K for those who converted to mastectomy.³

3.2 Surgical Complications

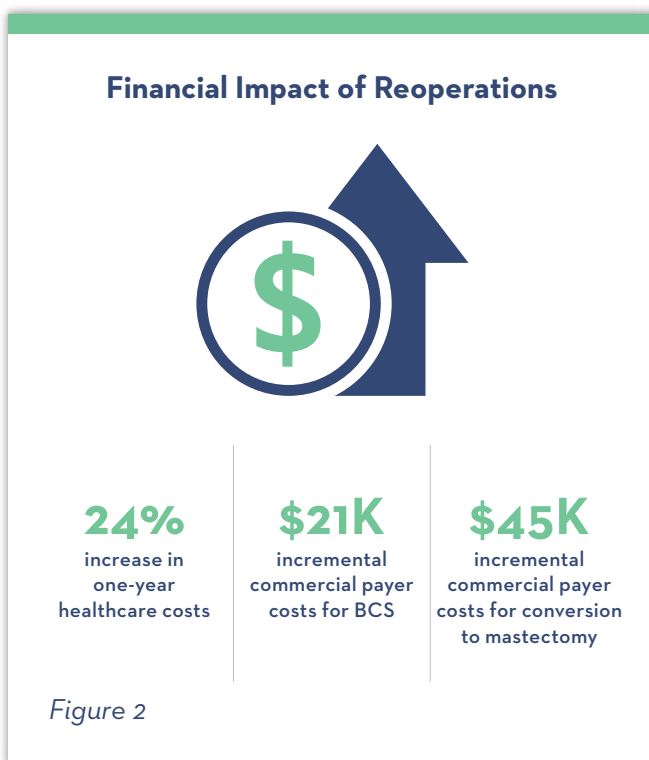
Additional surgery can come with additional complications for patients. Infection, hematoma, seroma, and fat necrosis are all potential complications associated with BCS that can negatively impact the patient.⁴ When compared to women who only had one operation, reoperation has been associated with a 54% increased risk of complications in women aged 18-64 and 89% in women over 65. In some instances, women convert to mastectomy for their second procedure out of fear of having multiple reoperations. This conversion was associated with a 30% increased risk for complications.³

3.3 Delayed Treatment

Adjuvant therapy is commonly used after primary surgical treatment for breast cancer to lessen the chance of the cancer returning. While other factors may contribute, repeated surgery has the potential to delay adjuvant treatments such as chemotherapy or radiation therapy. In cases of reoperation, women waited 24 days on average for the additional procedure.⁴ A delay in the time to chemotherapy initiation past 40 days is believed to decrease the benefit of the therapy. Delays of more than 61 days have been shown to be detrimental for patients with mid and late stage cancer as well as specific pathologies.¹⁰

3.4 Patient Satisfaction

The goals of BCS are achieving negative margins and an acceptable cosmetic result.¹¹ The correlation between the removal of larger volumes of breast tissue and the negative impact on patient satisfaction has been well documented, but fewer studies have looked at patient satisfaction and repeated BCS or mastectomy. A 2022 study of 163 patients reported that re-excisions have been shown to have a negative impact on patient satisfaction and on cosmesis of the breast. Compared to patients who underwent one BCS, patients with repeated BCS have been shown to have lower average breast satisfaction immediately postoperatively and lower breast satisfaction and



sexual well-being scores at 2 years follow-up.¹²

4. Strategies to Reduce Reoperations

The American Society of Breast Surgeons created a toolbox of best practices that are targeted at lowering reoperation rates.⁷ While these techniques are useful, they have their limitations.

4.1 Preoperative Imaging

There are advantages and disadvantages of pre-operative imaging modalities.⁵ While ultrasound plays an important role in determining tumor characteristics and locating seeds and clips, it has been shown to underestimate tumor size in 79% of cases. Similarly, mammography has underestimated disease size in 50% of patients.¹³ Neither of these modalities have the resolution to visualize margins at the microscopic level. Understanding these limitations is crucial for surgeons to optimize their surgical planning.

4.2 Cavity Shaves

Taking routine cavity shaves is the surgical technique of removing extra tissue on all six margins. Removing more tissue is often negatively associated with cosmetic appearance,¹² as well as physical and psychosocial well-being for the patient.¹⁵ Cavity shaves are also associated with higher hospital-related costs due to the pathologic evaluation of additional specimens.¹⁶

4.3 Intraoperative Pathology

While previous reviews have shown that utilizing frozen sections in BCS has the greatest accuracy, the technique still has shortcomings. It requires additional pathology staffing, extra time in the OR, and is cost intensive, making it untenable for many healthcare systems.⁵


4.4 Neoadjuvant Therapy

Neoadjuvant therapy (NAC) has been found to help achieve higher rates of breast conservation, lower rates of reoperation, and improvement in cosmetic

outcomes. However, not all patients are eligible for this treatment.⁵

4.5 New Technologies

In recent years, significant strides have been made in technologies focused on minimizing re-excisions. One innovation is Optical Coherence Tomography (OCT), a non-invasive imaging technique that provides high-resolution, real-time visualization of tissue microstructures. By generating detailed cross-sectional images, OCT has the potential to provide surgeons insights to assess tissue margins during surgery with precision, in efforts to reduce the likelihood of leaving cancerous cells behind.^{5,17}



The frequency of breast cancer reoperation remains high, highlighting the importance of evolving strategies in patient care.

Additionally, technologies using electromagnetic waves to assess tissue surfaces, and molecular imaging techniques utilizing fluorescent dyes, have emerged as potential tools in minimizing re-excisions. These technologies may enhance the surgeon's ability to differentiate between cancerous and healthy tissue but can interfere with surgeon workflows and have contraindications.

5. Conclusion

The frequency of breast cancer reoperation remains high, highlighting the importance of evolving strategies in patient care. Multiple breast cancer surgeries have harmful effects on patients, strain healthcare resources, and escalate costs. Thus far, much of the reduction in re-excisions can be attributed to changing margin guidelines, which has proven to be limiting.¹⁸ Therefore, incorporating new strategies and technologies is essential in the quest to reduce reoperations.

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