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## Development of a Prototype Shirt for Post Double Mastectomy Women Without Breast Reconstruction

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Running head: DEVELOPMENT OF A PROTOTYPE SHIRT

Development of a Prototype Shirt for Post Double Mastectomy Women  
Without Breast Reconstruction

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**Table of Contents**

Abstract.....2

Introduction .....3

*Background*.....3

*Statement of Problem* .....4

Literature Review .....5

*Living Flat* .....5

*Clothing* .....6

*Diversity and Inclusion*.....8

Development Plan and Design Process .....9

Results .....11

*Limitations* .....19

Conclusions and Implications.....19

References .....21

### **Abstract**

Breast cancer is a common cancer among women in the United States, with thousands of fatalities and hundreds of thousands of diagnoses every year. A common course of treatment for breast cancer is the surgical removal of all or some of the breast tissue; this is known as mastectomy. Mastectomy is invasive in nature and results in noticeable physical changes to the body and psychological effects in regard to self-image. However, it is becoming more common for breast cancer survivors to embrace their now flat chests following mastectomy, instead of opting for reconstructive surgery. This has become a lifestyle choice for many women and is referred to as “living flat” or “going flat”.

The purpose of this study was to identify the apparel needs of women who are “living flat” and address these needs by creating a prototype garment using a one dart bust block. The prototype garment was evaluated and modified, in order to ensure that garment fit, and comfortability are suitable for women who are post double mastectomy.

*Keyword: living flat, double mastectomy, clothing fit*

## Introduction

### Background

In the United States, breast cancer is the most common cause of death among Hispanic women and the second most common cause of death among Caucasian, African American, Asian/Pacific Islander, and American Indian women. In 2015, approximately 41, 523 women lost their lives to Breast Cancer (CDC, 2019). It is estimated that in 2019 alone, 286,600 new cases of invasive breast cancer will be diagnosed among women living in the U.S. (Breastcancer.org, 2019). One of the most common types of treatment for invasive Breast Cancer is mastectomy, which is the surgical removal of all of the diseased breast tissue or the breast in its entirety (BreastCancer.org, 2018). Post double mastectomy, women have three options as to how they can move forward (1) to reconstruct the breast by way of surgery; (2) wear a prosthesis; or (3) acceptance and adaptation to the flat, tender, and uneven breast and upper body area. Increasingly, more women are opting out of reconstruction post mastectomy, because of the burdens that often follow from more surgery. A few examples of the challenge's women face include financial costs, the need to resume daily activities quicker, the negative health impacts of undergoing additional surgery, and pain from the implants themselves (BreastCancer.org, 2015). Due to the high risk of reconstruction, more women are choosing to embrace a "living flat" or "going flat" lifestyle; "living flat" is a phrase that was coined by women who have chosen not to wear a prosthesis or rebuild their breast (BreastCancer.org, 2015). Based upon the aforementioned research for post double mastectomies, my research focused solely on women who have undergone double mastectomies without reconstruction.

Based on my research, women who are post mastectomy struggle to find adequate clothing for their changing apparel needs. They can no longer wear the same styles of clothing

they wore prior to mastectomy due to the change in their physical appearance, and struggle to find satisfactory options on the current market. As an attempt to meet the clothing and aesthetic needs, the process for testing and evaluating the one dart bust block is provided. Although there are different type of mastectomy and treatment plans, this study focused on only women who are post double mastectomy without breast reconstruction. The hopes for the one dart bust block is that it can become standardized within the apparel industry, providing designers and manufacturers the opportunity to expand their target market and creative landscape, while also addressing the clothing needs of a specific community of women.

### **Statement of Problem**

The loss of a women's breast due to mastectomy is extremely taxing both physically and psychologically. The sudden and drastic change in physical appearance most often results in post-mastectomy women feeling dissatisfaction with their own self-image and perceived loss of femininity (Koçan & Gürsoy, 2016). Adequate clothing is an essential resource for breast cancer survivors because of its affirming impact on self-image. The most common way we think about body image is in terms of physical appearance, however body image can also pertain to integrity, wholeness, and functionality (Carver et al., 1998). Post double mastectomy women do not have adequate clothing options within the current market; in return, this negatively impacts self-image, the desire to return to social situations, as well as overall quality of life.

The purpose of this study is to examine and identify the apparel needs of post double mastectomy women that are currently absent from the fashion industry. This could be achieved by using a one dart bust block to draft patterns and construct prototypes, which will be tested, modified, and evaluated, in order to meet the demand for suitable garments for post double mastectomy women without reconstruction. Furthermore, the focus on comfort and fit will result

in dress shirts that are more appealing than options that are currently on the market. There is a rapidly increasing demand for diversity in clothing for women who are “living flat.”

### **Literature Review**

Breast cancer is without a doubt one of the most common diseases among women in North America. Since 1999, reports of breast cancer have increased by almost 50,000; from 196,600 to 245,299 in 2016 (CDC, 2018). Surgical removal of the breast (mastectomy) is frequently a part of the treatment plan for women who have been diagnosed with breast cancer. If a survivor chooses not to reconstruct her breast tissue, she then has to learn to live with a lopsided, concave chest area. This presents problems with clothing fit, fabrics, and social inclusion.

### **Living Flat**

Within their lifetime, approximately 1 in 8 U.S. women (about 12%) will develop breast cancer, making it the second most common type of cancer among women (BreastCancer.org, 2015). It is estimated that in 2019 alone, 286,600 new cases of breast cancer will be reported, and of those cases, about 41,760 women will die due to the severity of this disease (U.S Breast Cancer Statistics, 2019). There are a handful of viable treatment options for women who have been diagnosed with breast cancer; to name a few, surgery, radiation therapy, hormonal therapy, chemotherapy, and targeted therapy (American Cancer Society, 2019). Of the treatments listed, surgery is one of the most common. The American Cancer Society indicates “most women with breast cancer have some type of surgery as part of their treatment plan”. This form of surgery is technically known as undergoing a mastectomy. Mastectomy can be defined as “a surgery in which the entire breast is removed, including all of the breast tissue and sometimes other nearby tissues” (American Cancer Society, 2019). Because of the invasive nature of a mastectomy, women are left with large scars, tenderness in the chest and breast area, and often serious

psychological consequences (Gao, 2016). When taking the next steps in the recovery process, breast cancer survivors will move forward in one of three ways (1) undergo breast reconstructive surgery; (2) wear a prosthesis or specially made bra; or (3) accept and adapt to the uneven or flat chest shape (Gao, 2016).

Breast reconstruction surgery gives post mastectomy women the opportunity to rebuild their breast tissue, which can be done by way of saline, silicone, or autologous tissue (tissue from elsewhere in the body) (National Cancer Institute, 2017). Reconstructive surgery can be performed immediately after a mastectomy or delayed for up to 12 months or longer (Cure Today, 2017). According to Cure Today, in 2014 approximately 41% of post mastectomy women opted for breast reconstruction, while others chose to wear a prosthesis, magnets, or special bra. However, in recent years breast cancer survivors are more frequently opting out of both reconstruction and wearing a prosthesis, instead embracing a breast-free lifestyle. This decision has been titled “living flat” or “going flat” (BreastCancer.org, 2015).

### **Clothing**

Undergoing a mastectomy not only changes a woman’s body physically, but also takes a toll psychologically. A mastectomy can severely impact self-esteem, sex drive, and how a woman perceives herself in general (Rodriguez, Craig, 2009). After surgery, most post mastectomy women are provided merely surface level information about clothing products that are available on the current market, however these garments are predominantly functional, not fashionable. These products are helpful and necessary for recent post double mastectomy women, but as the healing process continues, most women are limited to clothing options such as men’s cotton t-shirts, tanks, and large button-downs (Breastcancer.org, 2017). While dealing with the trauma of their diagnosis, breast cancer survivors also have shifting apparel needs;



comfort, fit, and aesthetics are of optimal importance, however outside of these requirements, there are seldom clothing options for post double mastectomy women (Gao, 2016). According to a study conducted by Feather and Lanigan (1985), of the 40 post mastectomy women (without reconstruction at the time) they interviewed, approximately 50 percent felt that they could not wear the same styles of clothing worn prior to diagnosis, due to their surgery. Another significant aspect of the rehabilitation process is accessibility to appropriate clothing (Wilkerson, 1977). When searching for appropriate garments, there are a multitude of characteristics to take into consideration. Post double mastectomy women most often look for garments with design elements such as vertical and horizontal lines, prints, and dark colors. These design aspects are appealing to post double mastectomy women because they help to conceal the texture and shape of a flat chest, as well as divert the eyes to another part of the body. Based on a study conducted by Carol Beard of Western Michigan University (2011) and basic design principals, solid colors, vertical lines, curving lines, and random design motifs complement women with short, wide statures. Whereas larger prints, plaids, or horizontal type designs are more suiting for women with tall, lean statures.

It is also of importance to take into account the fit of a garment and fabric that is used to produce it. The comfortability of the chest and arm area are often of concern when finding suitable garments; these areas are directly and severely impacted by treatment. Garment designs may be based on a close or loose fit, although a looser fit is most often desired (Beard, 2011). A form-fitting design can be restrictive, increase post mastectomy pain through rubbing and limited movement, and raise concerns of Lymphedema (Beard, 2011). Lymphedema can be defined as the localized swelling of the body caused by an abnormal accumulation of lymph fluid; this is common in post mastectomy patients (Mayo Clinic, 2017). In contrast, a looser fit encompasses

the ability to disguise or mask body irregularities, which is usually appealing to post double mastectomy women. While the fabric content is not the primary concern, it is of importance. A common treatment plan for women diagnosed with breast cancer is the combination of surgery (mastectomy) and chemotherapy. As a result of chemotherapy, breast cancer survivors often experience early onset drug-induced menopause (Beard, 2011). This creates a need for fabrics that are temperature controlling and breathable; these fabrics consist of cotton, rayon, lyocell, linen, silk, and wool (Beard, 2011).

### **Diversity and Inclusion**

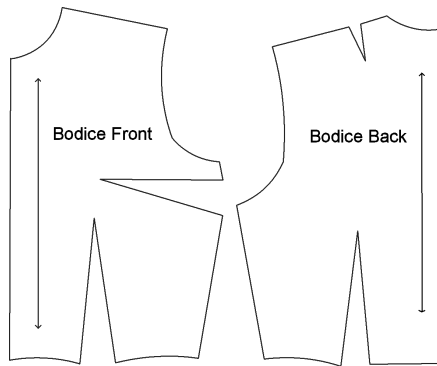
Although breast cancer is more common than most realize, there is still much stigma circulating the disease and its aftermath. In their lifetime, 1 in 8 US women, or 12 percent, will develop invasive breast cancer (U.S. Breast Cancer Statistics, 2019). As defined by Goffman in 1963, a stigma can be described as a “special kind of relationship between attribute and stereotype.” Breast cancer can be especially stigmatizing because post mastectomy women often feel that they have lost the attribute that defines them as female (Feather, Rucker, & Kaiser, 1989). Of course, there are negative physical consequences during and subsequent to treatment, however there are also prominent psychological effects. Post double mastectomy women are often faced with feelings of isolation, low self-esteem, discrimination in the workplace due to medical related absences, loss of femininity, and stress related to strained familial relationships (Feather, Rucker, Kaiser, 1989).

For centuries, clothing has been an integral part of society. It allows us to enhance outward appearance, shield from environmental factors, and achieve societal acceptance and psychological satisfaction (Chowdhary, 2017). As mentioned previously, breast cancer survivors regularly feel a loss of femininity however, appropriate apparel availability can aid by increasing

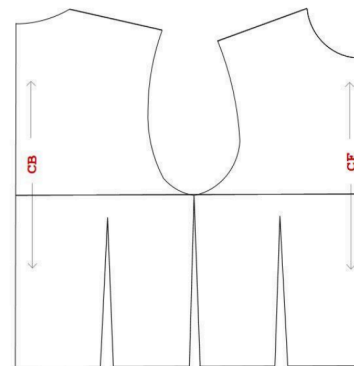
self-esteem and procuring feelings of being “whole” (Chowdhary, 2017). As Gao (2016) indicated, “there is a very intimate relationship between bodies and their clothing. Clothing is a necessity of human life and one’s social environment.” Post double mastectomy women often experience feelings of exclusion and face social tensions or avoidance from the people around them because of the stigma surrounding breast cancer and the awkwardness of addressing the trauma. Appropriate apparel items can assist in an easier transition back into a daily routine and increase overall well-being.

### **Development Plan and Design Process**

This research analyzed the clothing design necessities of post double mastectomy women without reconstruction and executed construction of prototype garment to address precise comfortability, fit, and overall aesthetic. The analysis included obtaining comments from social media sites, specifically designed for women who are currently “living flat”. In addition, a fit analysis was conducted on the developed prototype shirt. The traditional bodice block (See Figure 1) includes both a bust dart and waist dart giving three-dimensional space for breasts. The traditional bodice block does not meet the needs of women who are currently “living flat”. The prototype shirt pattern was drafted using the content analysis performed on the collected statements. The method used to test the design included drafting patterns using a previously developed one-dart bodice block (See Figure 2) and constructing muslin prototypes. The fit of the prototype was analyzed and modified through live fit sessions with a subject who is currently “living flat”. The fit iterations consisted of modifying specific areas of the garment and evaluated for aesthetic appeal.



*Figure 1.* Traditional Bodice Block. This Figure illustrates a traditional pattern drafting block that is used in the apparel industry.



*Figure 2.* One Dart Bodice Block. This image represents the altered bodice block used to draft the patterns for the prototype garment (Gao, 2016).

**The following steps were used to draft the prototype dress shirt.**

1. Draft Patterns using one dart bodice block
  - a. For this project, a one dart bodice front block was used to draft the original patterns.
  - b. Garment 1 is an asymmetrical white button-down shirt, where the buttons have been manipulated and placed three inches to the left of traditional placement, also including an asymmetrical collar. One large ruffle was placed on top of the closure site. Additionally, a ruffle was placed on each individual cuff. The garment is designed to have two bodice front darts, and two bodice back darts located at the waist. The traditional bust dart has been eliminated so that fit and comfort is optimized.
2. Construct Prototype of Professional Shirts
  - a. A professionally inspired dress shirt will be constructed in order to provide a unique type of garment fit, aesthetic, as well as granting the opportunity to experiment with different silhouettes and materials.
  - b. The garment prototype will originally be constructed of muslin.

- c. To construct the prototype, measurements were acquired from a woman who has decided to live flat post double mastectomy.
3. Analyze and Modify the Fit of the Prototypes
  - a. Once the first prototype has been created based on the given measurements, we will then proceed by analyzing and adjusting the fit of the garment in order to perfect the fit and optimize comfortability so that we may begin construction of the final prototype.
4. Construct Finished Prototypes
  - a. After evaluation, we began constructing the final prototype of Garment 1.
  - b. White Poplin was purchased to complete the final deliverable garment.
5. Evaluate Garment Fit and Aesthetic Appeal
  - a. Fit and comfort was evaluated on a woman who is “living flat”. From her recommendations and our visual cues, we completed a final evaluation of Garment 1 and adjusted as needed.

### **Results**

Content analysis can be defined as an analysis to determine the meaning, purpose, or effect of any type of communication, such as literature, newspapers, or broadcasts (Dictionary.com, 2019). The content analysis consists of statements from women who have undergone a lymph node removal, partial, radical, and double mastectomy (Bartosiewicz-Hamilton, & Ritzco, 2019). These statements were acquired from a Facebook group, Flat & Fabulous, which is a private group dedicated to women who have undergone intensive breast cancer treatment. The group is inclusive to any woman who has been diagnosed with breast cancer at any point and serves as a means to create a sense of community and understanding among this specific population. The other sources used to gather information for the content analysis include flatandfabulous.org (2019) and the Cancer Survivors Network Breast Cancer Forum (2019).

Four broad categories were recognized and used for content analysis from the comments; Body Cathexis, Functional, Dissatisfactory Design Elements, and Positive Perspectives (See table 1). Body Cathexis can be defined as the degree of satisfaction or dissatisfaction one feels towards various parts and processes of the body (Secord & Jourard, 1953). This section analyzes comments relating to the negative associations breast cancer survivors have with their bodies post-treatment. A few examples of common words and phrases includes “loss of femininity”, “concave”, “traumatic”, and “hide/disguise.”

**Table 1***Content Analysis of Post Mastectomy Women's Perspectives of Body and Clothing*

Comment Example	Body Cathexis	Functional	Dissatisfactory Design Elements	Positive Perspectives
Right now I'm still in underarm pain, can't do anything with my arm and the last of six tubes are being removed Wednesday.	Concave	Underarm pain	Loose clothing	Happy
Anyone know of a place you can buy shirts / blouses that fit us ?	Self-image	Uncomfortable prosthetics	Hard to find apparel	Self-love
And for me, it's like part of my womanhood was ripped away...I am one step away from finally feeling normal after 8 surgeries.	Loss of femininity	Loss of comfort	Low scoop neckline	Grateful
I am 11 years out and didn't do reconstruction. I don't wear prosthetics either. Occasionally, I struggle with my appearance and with what to wear. Layers work well, scarves, what else? Thanks!	Hide/disguise	Chronic pain	Not knowing what to wear	Proud
Does anyone know of an online site with clothing made specifically for women who have had mastectomies? Many of the regular summer clothes are cut too low in the front, and forget the bathing suits.	Traumatic		Other low necklines	Looking forward
I would appreciate suggestions on how to shop for casual clothing as well as professional clothing. I return to work next week. My right breast was removed and I will be ordering the breastform this Friday. I'm at high risk for lymphedema as well (I have all 4 risk factors).				Liberating
I have been flat for a year, never wanted any type of reconstructions. Best decision ever. I don't regret my choice at all. And I don't try to disguise being flat.				Best decision ever
Been flat for 25 years. Never a regret.				No regrets
So happy to see the word spreading that going flat is an option. It's the best decision I've ever made.				Increasing awareness

In the Functional category, the purpose was to examine the pain-causing aspects of recovery for post double mastectomy women. They often have an overall loss of comfort; this pertains to discomfort in regard to clothing and discomfort with general motion. According to extracted comments, some women have found that they do not have a full range of motion in the underarm area for months after surgery, and that many garments feel too heavy to be worn after surgery. From the information gathered, Cotton is seemingly the most lightweight, breathable fabric option for post double mastectomy women.

The next section in the content analysis classifies Dissatisfactory Design Elements. This category is important because it represents the undesirable design elements that are present in garments that are currently on the market, from the perspective of post double mastectomy women. The primary design flaw that was mentioned was the inability to wear low-cut or scoop neck tops. This is because there is a higher chance that their scars, or tubes if they still have them, could be revealed in a public setting. Therefore, post double mastectomy women shy away from those style of garments in order to avoid embarrassment and increased discomfort in social situations. Women also expressed their discontent with apparel items that are currently on the market. The majority of women who have decided to “live flat” initially buy and wear a prosthesis; however, we can infer that this changes quickly based on reports claiming that prosthesis is heavy and uncomfortable. “Living flat” women also expressed feelings of frustration because adequate clothing options are “hard to find,” and that they eventually no longer want to wear loose clothing. Loose clothing is very beneficial post-surgery because of the allotted space between the garment and the body, however, at some point loose clothing is no longer suitable.



The fourth and final section is the Positive Perspectives section. This category presents positive statements and comments pertaining to the choice of breast cancer survivors choosing to live flat, and how in their perspective, this has improved their overall quality of life. Many women claimed that going flat was the “best decision of their life”, and that not having breasts is “liberating” from societal norms and expectations. This category serves as authentication that a large majority of the women who decide not to reconstruct their breast tissue are satisfied with their overall quality of life and express contentment with their decision to live flat. This type of affirmative feedback also reinforces the idea that more and more women will choose not to reconstruct their breasts in the future because of previous satisfaction with the decision, and that “living flat” will become more common and normalized in U.S. society.

The results of this study were based upon the fit iteration of the prototype garment and the content analysis that was performed. The content analysis provided valuable insight into the perspectives of post double mastectomy women in regard to their physical satisfaction, clothing functionality, dissatisfaction with design elements of garments that are currently on the market, and how “living flat” has positively impacted their lives. See Table 1 for categories and comments.

The results of the fit iteration proved to be a positive experience. Our participant whose measurements were initially used to draw and construct the prototype was ecstatic to be able to fit the garment and give us her perspective as a woman who is post double mastectomy and “living flat”. From the fit iteration, we were able to conclude what modifications will need to be made to the original patterns so that a second prototype garment can be constructed and evaluated. The modifications include adding an inch and a half of length to the armhole area so that it is longer but not necessarily wider, increasing the amount of fabric on the right side of the

garment by four inches, modifying the side seams to have an A-line curve in order to produce a more fitted shirt, and decreasing the amount of fabric in the sleeves by two and three-fourths inches to construct a more fitted sleeve. The original pattern (See Figures 7 and 9) and the modified pattern (See Figures 8 and 10) are displayed below, and side-by-side so that the changes to the pattern can be easily identified and compared. In contrast to these changes, our participant was very satisfied with the overall aesthetic appeal of the prototype shirt; she felt that it was comfortable, functional, and provided details that aided in distracting the eye from the breast area without having to wear layers.



Figure 3. Prototype Shirt Front



Figure 4. Shirt Front, Left Armscye



Figure 5. Shirt Front, Left Waist Dart

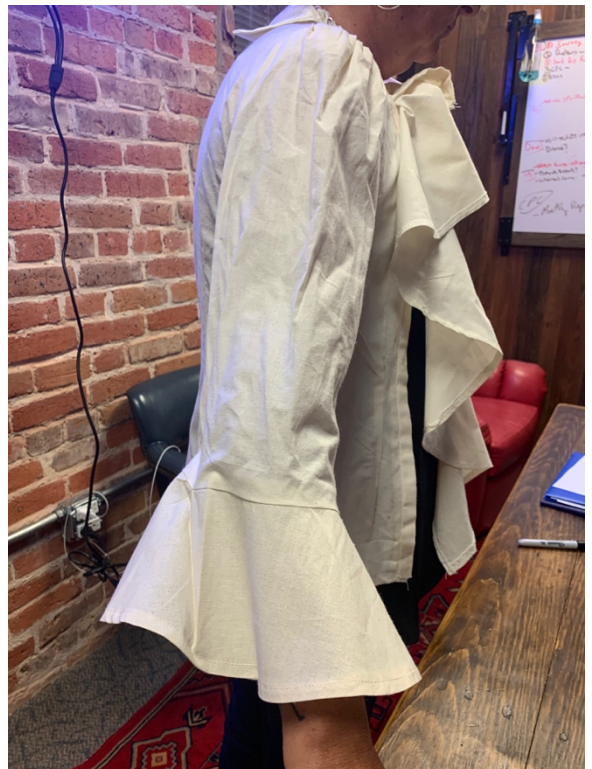


Figure 6. Prototype Shirt Right Side View

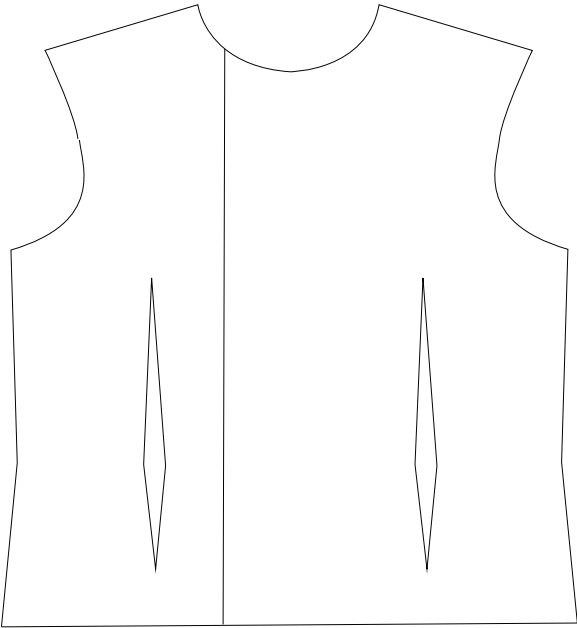


Figure 7. Original Prototype Shirt Pattern

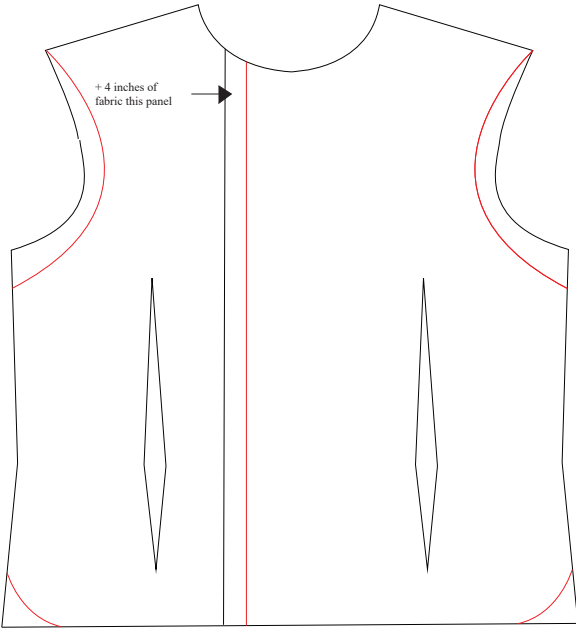


Figure 8. Modified Prototype Shirt Pattern

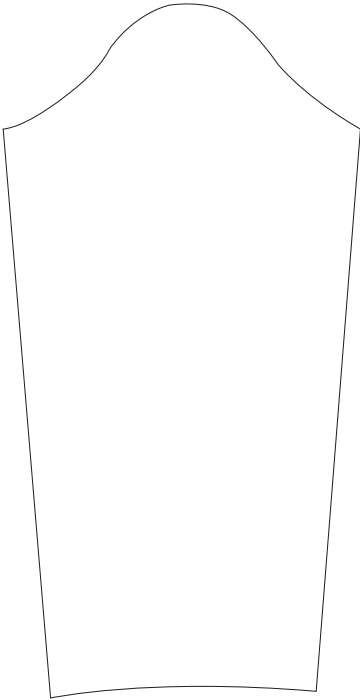


Figure 9. Original Sleeve Pattern

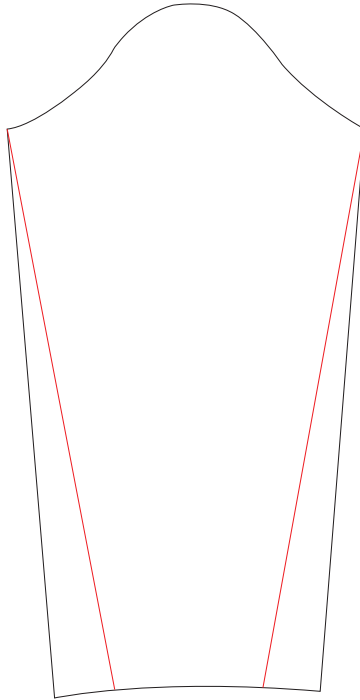


Figure 10. Modified Sleeve Pattern

### **Limitations**

For this study, our scope was limited to breast cancer survivors who are post double mastectomy without breast reconstruction; those who had undergone a partial or bilateral mastectomy, or breast reconstruction were not considered at this time. However, the opportunity to conduct more in-depth research remains because of the potential for this topic to further address the clothing needs of post double mastectomy women, but also take into consideration the needs of other populations.

Furthermore, this was also the first attempt at utilizing the one dart bust block, created by Shan Gao (2016), in order to create a garment. The block was made previously in completion of a graduate thesis, however until now it had never been tested and executed. The prototype garment created from the one dart bust block was also a made-to-measure (MTM) product. The pattern for the prototype, and the prototype itself, were all created using the measurements from one particular individual who is post double mastectomy without reconstruction.

### **Conclusions and Implications**

In the United States, breast cancer is one of the most common types of cancer among women. Although in recent years we have seen an increase in the number of women who are choosing to live flat, there is still little information regarding viable clothing options for post mastectomy women.

Based upon the conclusions of the fit iteration, our subject who is currently post double mastectomy without reconstruction was completely satisfied with the design features of the prototype garment. The results of the fit iteration and content analysis reinforce the notion that “living flat” women desire a wider selection of clothing options to choose from. In order to make one dart garments a feasible option for “living flat” women, more research needs to be conducted

on how this type of modification can be standardized to fit a wide range of body shapes, and how these garments positively or negatively impact self-image. Another implication of this research is that more shirt designs could be introduced into the market. This would give “living flat” women more options to choose from and allow them express their own personal style. This community of women holds the potential for current and future designers and manufacturers to broaden their target markets, while addressing the needs of a specific group of people that have previously been overlooked.

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