RecoveryPlus: Post-surgical mastectomy recovery bra

Dawn Michaelson, Ph.D., Auburn University, Auburn, AL

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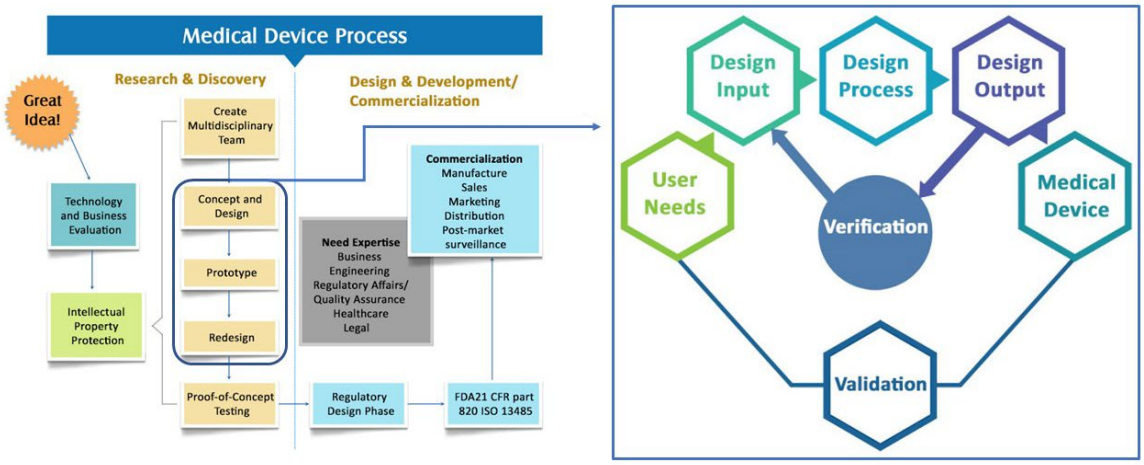
Introduction and Purpose Statement – Worldwide, 2.3 million women are diagnosed with breast cancer yearly (World Health Organization, 2021). For many women, mastectomies are a necessary part of their breast cancer treatment regimen. However, there are limited studies in English on the complications experienced with mastectomy bras in the post-surgical mastectomy recovery period. Most mastectomy studies were on improving bras after recovery, not during recovery (Dhawan et al., 2022; Wroblewski et al., 2020). Mastectomy recovery bra studies reported an inability to secure the drainage tube and bulb, unsatisfactory sizing, fit, comfort, and closures (Bradbury et al., 2014; Wheeler et al., 2023). Additionally, Hagans III MD (2022) stated improvements were needed for accidental drainage tube removal, ability to properly secure the tubing and bulb, tubing discomfort, inadequate sizing options for obese women and larger busts, along with compression for better chest wall adhesion with unilateral mastectomies. Backman et al. (2023) study reported that compression during recovery reduced pain and increased patient mobility and comfort. Based on these needs, a collaborative team was formed between an apparel designer and a surgical oncologist to design a new post-surgical recovery bra. The project utilized a user-centered design approach (U.S. Department of Health & Human Sciences, n.a.) along with the medical device development process model, figure 1, focusing on the verification and validation (V&V) section during prototyping (Borad, 2021). The project aimed to design a new post-surgical recovery bra worn during the mastectomy recovery period. The project followed the abovementioned approach and model, the expertise of the collaborative team, prior literature, and the experiences of 35 mastectomy patients.

Figure 1

Medical device process model with verification and validation (V&V) call-out (Borad, 2021)



Aesthetics – Mastectomy patients may opt for reconstruction, but many patients opt for no reconstruction and recover with one breast or none (Backman et al., 2023). It is crucial to have a level of normalcy for patients (Dhawan et al., 2022), so this prototype applied symmetrical design elements to keep both sides as visually balanced as possible. Note: photography was set up to feature a unilateral mastectomy with a drainage tube and compression straps on the mastectomy side only. The cup features princess lines for a feminine style. Strap hooks, bulb pockets, and tubing enclosures are atypical for a bra but may be needed for surgical recovery, so symmetry and balance were important for visual appeal and normalcy. A nude color was ideal because it is an undergarment, although lab dips for color matching of all materials and different nude tones would be needed for production. ProCool® Dri-QWick™ Pique Mesh Silver CoolMax knit fabric was chosen due to its silky hand, thermal comfort features, and being CPSIA certified, latex-free, anti-microbial, and hypo-allergenic, which made it ideal for medical usage (Wazoodle Fabrics, 2023).

Process, Technique, and Execution – Prototype designs followed the V&V process after assessing patient and surgeon needs. Several ideations of the bra were done before the collaborative team was satisfied. Initially, the team decided on a plus size with larger cups as this demographic is highly needed (Dhawan et al., 2022). The bra needed to lay flat and have an easy front closure for the post-operative nursing team to don on the unconscious patient. Additionally, the surgeons needed an opening to feed the drain tubing and bulb through, bulb pouches needed to be a part of the bra, tubing secured to the bra to avoid accidental removal, and the ability to compress one or both sides of the chest after the mastectomy (Backman et al., 2023; Bradbury et al., 2014; Hagans III MD, 2022). Lastly, the team reviewed mastectomy bra literature and their study results from 35 mastectomy patients to ensure patient needs were also addressed.

This post-surgical mastectomy recovery bra, size 40D, was made from ProCool® Dri-QWick™ Pique Mesh Silver CoolMax knit fabric, stretch mesh, Velcro® stretch loop, fold-over elastic, 1” elastic compression bands, and lingerie J-hooks. Only the cups and under-bust band had seams sewn on the wrong side and covered to avoid seam irritation. Shoulder straps were designed vertically and broader to aid in breast weight distribution and comfort (Coltman et al., 2015). The bra wing, under the arm and extending upward towards the straps, was raised to hold more breast tissue, which is common in plus-sized women (Coltman et al., 2017). Velcro® stretch loop was used as it has comparable stretch to the fabric, allowing for better bra movement. It was used for the front and shoulder closure, tubing enclosure, and band adjustment. Pouches, made from stretch mesh, are under the bust and allow for easy bulb insertion/removal. All bra edges are encased in fold-over elastic. The sides have a cut-out for drainage tubing and bulb pass-through, so patients do not experience tube irritation under the bra band (Bradbury et al., 2014). There is a

Velcro® hook and loop enclosure to hold the tubing close to the body, while the pouch holds excess tubing and the bulb. Lastly, elastic compression straps can be attached for better compression, chest wall adherence, and comfort after the mastectomy.

Design Contribution – This post-surgical mastectomy recovery bra contributes to the lack of literature and creative scholarship on the surgical and patient needs of a mastectomy recovery bra. Once testing of this prototype is completed, it will also add to the limited mastectomy recovery bras options available to surgical oncologists at hospitals and medical centers worldwide. This bra addresses surgical oncologists' and patients' bra needs during the mastectomy recovery through design, fabric, materials, closures, compression, and thermal comfort. Future steps will be wear trials to confirm the needs were significantly improved. Once future testing is confirmed, this recovery bra would benefit patients having a lumpectomy, breast enhancement, breast reduction, and other chest surgeries requiring chest compression.

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