Using Participatory Design to Create and Test the Aesthetics and Functionality of an Adaptive Bra and Blouse

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Introduction: Many people live with residual physical limitations after a stroke. Hemiparesis or partial paralysis is one such result of a stroke. Persons with hemiparesis often have difficulties with gross and fine movements in their arms and hands. Women experience greater post-stroke disability than men (Petrea et al., 2009), creating gender-specific issues with dressing. Routine actions such as buttoning a bra or zipping up a garment are difficult for many women stroke survivors. A possible solution to this issue is to design the opening on garments so as to allow the fastener to be easily accessible to the wearer and within range of the functioning hand (Hoffman, 1979). The purpose of this study was to use participatory design to create an easy to don and doff bra and a blouse for female stroke survivors who have hemiparesis.
Objective: There are two key objectives:1. Use Participatory Design methodology to engage women with chronic hemiparesis in designing, testing and evaluating a bra and a blouse. 2. Develop an easy to don and doff bra and blouse that combines style with function, whilst catering to the participants needs.
Methodology: The project was designed in three phases: Phase 1: Interviews and Observations. Phase 2: Prototype Design, Phase 3: Fittings and Field Testing.
Phase1: Interviews and Observations: Thirteen female stroke survivor participants were recruited from community agencies and support networks. All the participants had restricted use of one of their upper extremities following stroke. Participants consented to the collection of demographic information and interviews conducted by Occupational Therapy (OT) and Fashion students. The participants brought their own garments to demonstrate donning and doffing during a "think aloud" process. They were encouraged to describe challenges and concerns while donning and doffing their garments. Fabric samples were also created with twelve types of fastening systems. Each participant tried all the fasteners and provided feedback on the ease of using them. All sessions were video and audio recorded for analysis. Data collected was transcribed and thematically analyzed to develop design criteria for the clothing prototypes.
Phase2: Prototype Design: Clothing designs were created using design criteria from participant data, principles of Universal Design and concepts from the Functional, Expressive, and Aesthetic Consumer Needs Model. Ten categories were identified based on the participants needs and clothing preferences. Participants commented more than once on a category. 71% comments were on the need for soft, light weight fabric, 54% wanted the garment to be easily laundered, 73% wanted a loose fit, 83% felt that the garment should be stylish, 75% commented on the need

for warmth in the upper extremities, 90% said zippers were hard to use, 70% said pockets were essential, there was no real preference from the participants for the bra opening and 84% wanted bra straps with a strong grip and support. A calculation was arrived at by establishing a weighted average of participants' comments on each feature. Participants from Phase 1 were included in Phase 2 to confirm and rank design criteria and consult on design ideas. Preliminary sketches using the analyzed data were shared with the participants to co-create the designs.

Bra Design: The bra (Figure. 1), had adjustable straps with hooks and eyes instead of sliders for easier manipulation of strap tightness. The occurrence of strap slippage due to changes in body form was solved by attaching them as a racer back for greater support. The front opening had magnetic snap closures. There were three elastic loops at the front of the bra, two at the opening and one on the bra band. The band loop was to hold the bra in place by slipping in the fingers with the weak hand. The front opening loops on the bra were to slip in the fingers with the mobile hand and snap the bra close. The fabric used was a soft polyester / spandex which was easy to launder and had stretch for ease.

Blouse Design: The blouse (Figure.2) was of an easy to launder soft polyester knit fabric. It had a minimal number of seams for comfort, was loose-fitting with a boxy silhouette, dolman sleeves and a boat neckline, making it easy to don and doff. Zippers running down the sleeve length provided accessibility to the arm for medical procedures, such as Botox injections, eliminating the struggle of rolling or pushing up the sleeve. This also made it easier to slide in the weak arm while donning the blouse. The blouse was styled with a hi-low hem line with a detachable pocket in the front to hold change, a cellphone or a wallet. The pocket was of a contrast fabric held up by big buttons and could be interchangeable with another colour pocket. The fashion team also designed a dickie with magnets as front openings to give the participant the option of wearing it with the blouse for a more formal look or removing it to appear more casual.

Phase 3: Fittings and Field Testing: Once the prototypes were ready, participants field-tested the bra and the blouse (Figures. 1 & 2). Participants wore the blouse for four weeks and the bra for two weeks and were asked to record their experiences of wearing the garments. Participants' were contacted twice during the field-testing phase to enable them to voice concerns they had with the garments. At the end of this phase, a questionnaire was administered by OT and Fashion students to record feedback. Donning and doffing of the bra and blouse was audio and video recorded.

Discussion and Results: Bra -The option of being able to modify the strap to a racerback design was welcomed and magnetic front closure and elastic loops for easy donning and doffing were appreciated by participants. However, changes to increase the bra support and minor changes to the hooks on the bra strap were recommended.

Blouse – While suggestions were made to make the dickie longer, most of the participants liked the design of two different garment appearances with the dickie. The zippers on the dolman sleeves and easy access to the pocket were
acknowledged and valued by the participants.
The next phase of this project is to collaborate with a not for profit to develop affordable adaptive clothing.

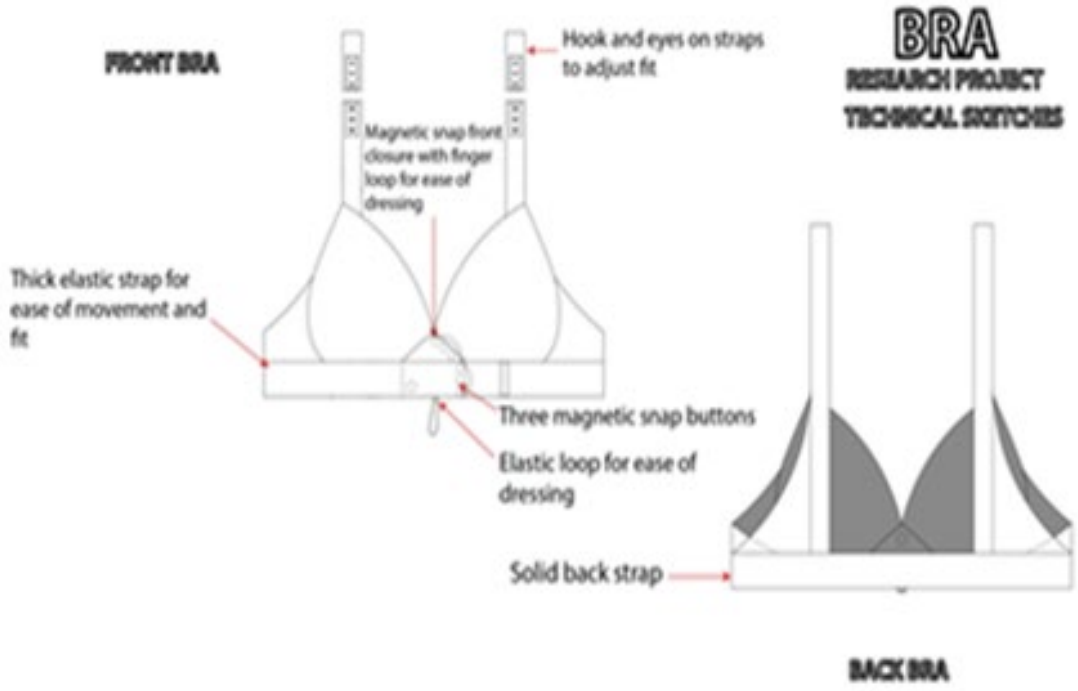

Figure. 1

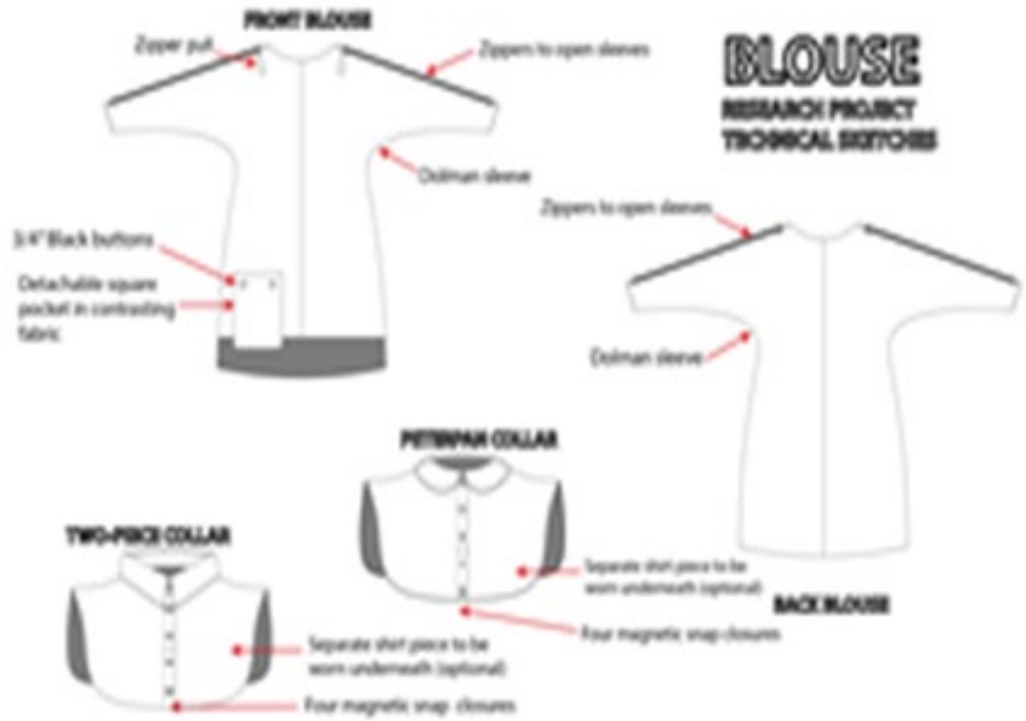

Figure.2

Reference:

Hoffman, A. M. (1979). Clothes for the Handicapped, the Aged and Other People with Special Needs. Springfield, IL, USA.

Petrea, R. E., Beiser, A. S., Seshadri, S., Kelly-Hayes, M., Kase, C. S., & Wolf, P. A. (2009). Gender differences in stroke incidence and poststroke disability in the Framingham heart study. Stroke, 40, 1032-1037. doi: 0.1161/STROKEAHA.108.542894

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