

FDGA Project Final Report

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This report presents the outcomes of my FDGA sponsored new protective medical clothing design research project. The purpose of this project is to create the FIT's fashionable versions of medical clothing designs needed by healthcare workers. The project was executed in the five-steps as follows: First, to identify clothing needs of healthcare workers, the IRB application to conduct the research was approved by FIT's IRB committee on June 1, 2021, then, an online survey and video interviews were conducted from June 2, 2021 to June 6, 2021. 27 healthcare professionals including registered nurses currently working in the large hospitals in New York City participated in the survey and the interviews. Second, before making physical garment prototypes, new clothing design ideas were simulated in 2D digitized patterns and 3D virtual garments fitted in avatars by using CLO 3D garment visualization software program, then the initial design evaluations on the virtual garments were received from the medical professionals. Third, based on the survey and design evaluation results, three physical garments were created: One was mainly made out of disposable PPE (Polyphenylene Ether) materials donated by Fabscrap, a non-profit organization dedicated to sustainability and two were created by using reusable medical barrier fabrics (99% polyester, 1% carbon fiber) and various functional trim-materials. Fourth, from June 23, 2021 to June 26, 2021, the completed garments were shipped to the home addresses of three registered nurses who participated in the survey for physical fitting and evaluations on the new design features, then the final evaluations on the garments and the garment fitting photos and videos were received from the models. And finally, according to the evaluation results, the garment designs were corrected in 3D virtual garment formats, then fitted in the avatars. This design study's outcomes will be published in one of the peer reviewed journals, the wix website (a portfolio publication website), and presented at conferences.

The new design features of the completed garments:

According to the survey and interview results, the seven clothing features listed below were emphasized in the completed new medical clothing designs.

1. **Fitting and sizing:** The garments' fitting and sizing were designed to be transformable through the use of expandable drawstrings, elastic bands, and velcro. So the garments can be better fitted in different sizes and body types of wearers.
2. **Wrist and arm areas' comfort and protection:** To improve bulky sleeve features of the current medical gowns available in the market, the wrist areas' fitting was improved by incorporating flat (Height: ½ inches) elastic bands. The lower part of the sleeves were designed to be tightened by velcro or elastic bands.
3. **Neck areas protection:** Most of the medical gown frequently used in hospitals don't include neck area protection features. The completed garment includes high-neck covers with elastic drawstrings at the neck opening for extra protection.
4. **Garment opening and closing convenience:** To reduce the time to wear and take off a garment, the completed garments' opening plackets are finished with velcro instead of tied straps that are frequently used in the current medical clothing. For easier body movement, especially when a wearer's body is bent, the garment opening plackets were constructed in a diagonal direction

instead of a straight direction. The diagonal velcro opening plackets were tested at both front side and back side of the completed garments.

5. **Utility pockets:** Most of the study participants addressed the needs of utility pockets attached to the outside of medical clothing. Most of the currently available medical gowns don't have any pockets in the garments. In the completed clothing, multiple utility pockets were patched at different locations outside of the garments such as chest area, front side, and back side.
6. **Chest ID Pocket:** Due to the limited face exposure while being covered by face masks and protective glasses, many study participants mentioned how important it is to show the picture and the name of medical professionals when interacting with patients. An ID holding pocket with a transparent cover was added on the left side chest of each completed garment.
7. **Garment design aesthetics:** The aesthetics of clothing are one of the most important aspects of medical clothing identified in this study. Most of the study participants felt that the clothing aesthetics can aid to improve job performance and are helpful to work with patients. The completed clothing designs were focused on the improvement of clothing aesthetics. For example, the feminine looking puff and pleats sleeves were added instead of regular set-in sleeves. The digital printed fabrics with bright colored flower patterns were trimmed in the pockets and arm design details. The bright neon colored trims such as drawstrings and velcros were used. The overall garment silhouettes were inspired by windproof sportswear jackets.

After the completion of the project, my achieved outcomes include the enhancement of my 3D garment visualization techniques, design research capacity and pedagogical skills on 2D and 3D computer-aided product development for our students. My experiences and knowledge gained from this FDGA sponsored project are enormous. In particular, I learned a lot about the clothing needs of medical professionals who have been saving so many lives in our large community amid the global pandemic. I would like to express my special thanks to professor Elaine Maldonado and Celia Baez at the Center for Excellence in Teaching for helping me make this research project possible.

Garment #1: A Medical Gown with back opening (PPR Material material)





Model: Destinee Castillo, Nursing Student (New York, NY)



Model: Mary Mensah, Registered Nurse (New York, NY)

Garment #2: A Medical Gown with back opening (Medical Barrier Fabrics)



Model: Destinee Castillo, Nursing Student (New York, NY)



Model: Mary Jane Gali, Registered Nurse (New York, NY)

Garment #3: A Medical Gown with Front opening (Medical Barrier Fabrics)





Model: Mary Jane Gali, Registered Nurse (New York, NY)