Executive Summary

Ostomy surgery is a life-saving process that alters the patient's digestive tract. The bodily waste is rerouted and now exits the body through an opening in the abdomen. In Canada alone, 13 000 people become ostomates annually [1]. Among them is Himesh Patel, an active man with a physically demanding job. Unfortunately, Himesh's current two-piece system colostomy cannot withstand the frequent twisting and bending of the abdomen as the connection between the skin barrier and the pouch often breaks, resulting in the pouch falling off. Such occurrences in the workplace will lead to significant inconvenience, not to mention the possibility of getting an infection.

Based on this problem, our team was tasked to design a colostomy bag for Himesh that provides a durable connection between the drainable pouch and the skin barrier. In addition, the device should maintain comfortability for long periods of physical activity. We also wanted the patient/user to be as comfortable as possible in their environment and not feel self-conscious because of their ostomy.

Adhering to these guidelines, we went through multiple rapid prototyping stages before arriving at the idea of Vestomy, the heavy-duty ostomy belt built for durability. Vestomy has four main components: The skin barrier, the press-and-twist cap, the belt, and the vest. The skin barrier remains mostly the same as an average ostomy pouch, but the press-and-twist cap provides a secure connection, making it near impossible to unintentionally remove. The stool is then sent through a funnel to arrive at the belt, which is separated into two parts; the inner and outer layers. The inner layer is where the stool is evenly distributed around the waist, while the outer layer exists to protect the inner layer and make it resemble an actual belt. Lastly, the suspender goes around the user's shoulder and anchors the belt at several connections. The purpose of the whole system is to support the weight around Himesh's waist area, therefore, minimizing the impact of belly movement on the durability of the connection between the skin barrier and the belt. We used various available resources and materials to implement our ideas into an actual prototype. The belt was made of a series of connecting plastic bags, and the suspender was modified based on a vest. Moreover, we designed the model of the press-and-twist cap, and 3D printed it. Although we made numerous iterations throughout the prototype building and assembly processes, the final result still accurately demonstrates the form and function of the Vestomy.

Looking ahead to the future, we can incorporate several materials to improve the solution further. For instance, thermoplastic polyurethane can be added to the outer layer of the belt to make it water-proof, odourresistant, and aesthetically pleasing [2]. Moreover, a new material called hydrogel ostomy adhesive can be applied to enhance the adhesion of the skin barrier [3].

In conclusion, the Vestomy proposes a new solution for ostomy patients like Himesh since its durability and comfortability ensure the safety of the user's working and living conditions.

References

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