

CraniCare

Designing concepts for an improved head protection recovery experience after a craniectomy

- Public summary - Bachelors assignment Industrial Design Engineering
- E. M. Vogelezang – s2283395
- 14-1-2024



Figure 1: CraniCare

Introduction

Every year there is a group of patients who undergo a craniectomy after they were victim of an accident. A craniectomy is the removal of a part of the skull to decrease brain pressure. These patients have to wear a helmet to protect the craniectomy site for several months while it recovers. The helmets currently on the market are often plaster helmets that are hot, uncomfortable and stigmatising (figure 2). The lack of suitable head protection led to the aim of the assignment: developing innovative head protection to improve the recovery experience of craniectomy patients.

The research incorporated desk research, interviews, observations and mock-up evaluation. All used to get a clear picture of the experiences and needs of the patients and stakeholders.



Figure 2: Plaster helmet

Research findings

The findings of the research led to three main design directions for improvement of the head protection experience. A redesigned helmet including several new features, a neutral positioning device and rewritten legislation for the nurses and family regarding the usage of the helmet. Chosen was to follow-up on the first design direction, which included a list of requirements regarding the functionalities, appearances and ergonomics.

Design process

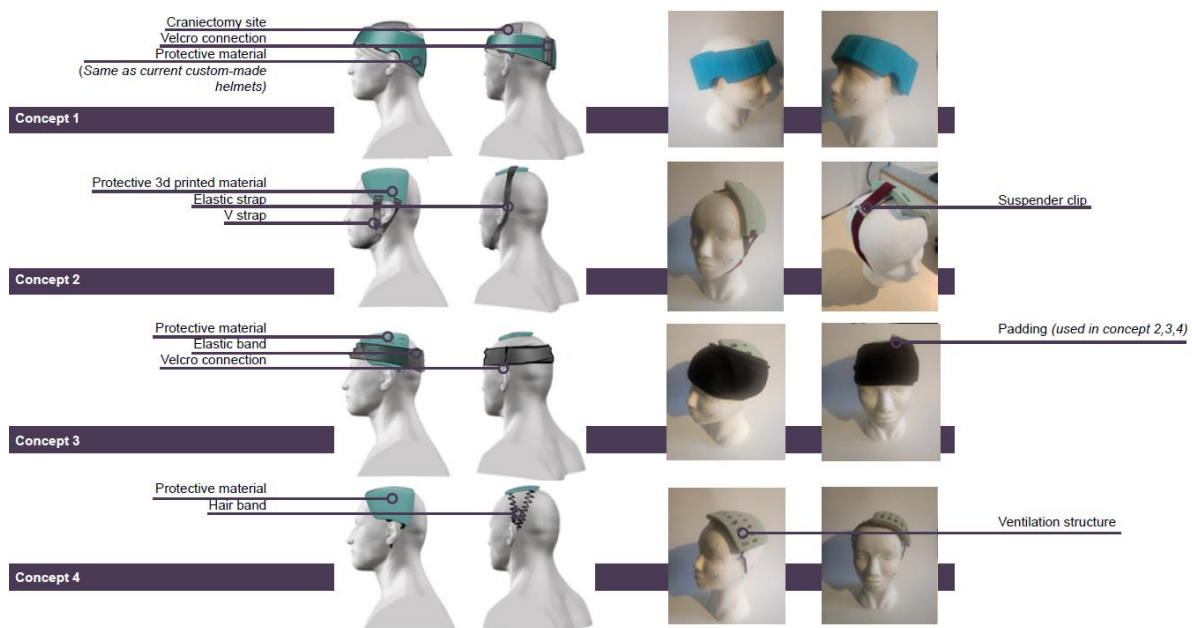


Figure 3: Four functional concept sketches and models

For the idea generation, inspiration was gathered from existing helmets and solutions. Also sketches were drawn for each requirement to eventually merge them to four different functional concepts (figure 3). From these concepts, mock-up models (figure 3) were created to test the functionality with the users.

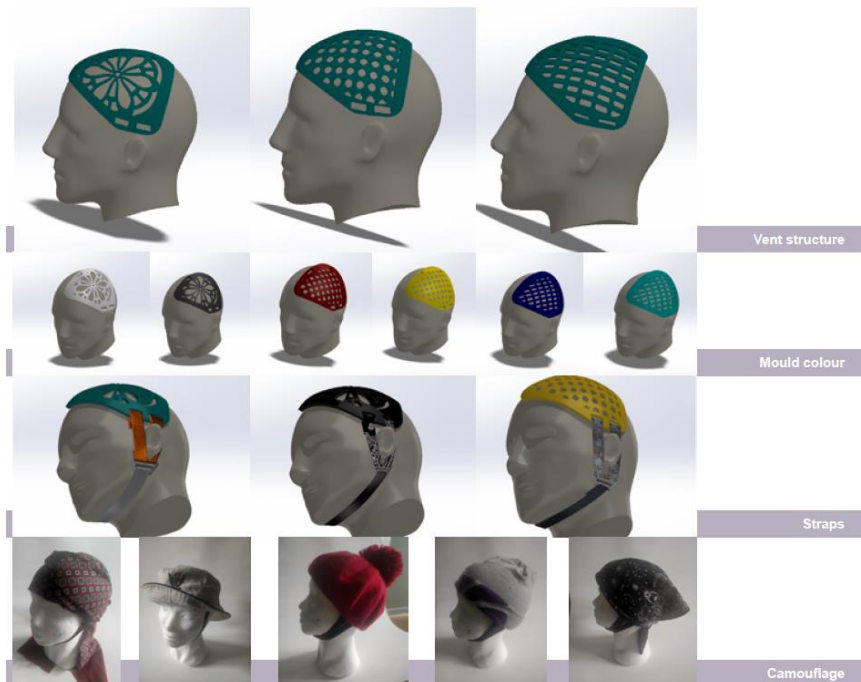


Figure 4: Styling options CraniCare

In the finalisation phase, a usability test was used to test the mock-up models. It showed that a combination of 2 concepts would meet the previously set-up requirements. A 3d printed cover-up, with enough ventilation and a certain strap positioning which does not make the cover-up shift over the head. The concept is also as thin as possible, which makes it unobtrusive and easy to disguise. After the final functional concept was chosen different variations on styling options were created (figure 4). Also the production with a step-by-step plan was created so that it can be reproduced easily by the hospital.

Conclusion

So the final concept, the CraniCare (figure 1), is a concept with different styling variations that improves the head protection experience by being more comfortable and less stigmatising than the current head protection on the market.

Recommendations

However there are a still a few recommendations that need to be taken in account for future research:

- » The other design directions could still be designed to further improve the recovery experience even more;
- » The material and vent structure of the helmet can be tested and optimised to make the helmet even more comfortable;
- » The design still requires an implementation plan on how to implement the production in hospitals around the world.