DESIGN OF A MICROWAVE DEVICE FOR PREHOSPITAL STROKE DIAGNOSIS

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1. Introduction

Medfield Diagnostics AB are currently developing a device for stroke diagnosis using microwave technology that can differentiate a haemorrhagic stroke from an ischemic stroke [1]. The aim of thus study was to create a concept product for how this technology could be implemented in prehospital care with focus on usability, functionality, and flexibility in order to enable use in ambulances.

2. Method

The development of the concept product was an iterative process. It started with a study of anthropometric data in order to set the span of the head sizes the device needed to be adapted for. This was followed by user studies where several paramedics from different counties and other stakeholders were interviewed and observed in order to explore the needs set by the user and the use environment. The gathered information resulted in four concept ideas which were evaluated from a user perspective by revisits to the paramedics. The paramedics were shown the different concepts and gave their input and opinions regarding ease of use, possible user errors, and functionality. This was the foundation for the choice of one of the four concepts to further develop. The chosen concept was further refined and developed by function and user tests with mock-ups.

3. Results & Discussion

The final concept product (Figure 1) is a portable stroke diagnosis device designed to work for a vast majority of the Swedish population in terms of anthropometrics. It consists of eight antennas placed on the head that are adjusted to the patient with three adjustments wheels. It has clearly marked interaction areas (in blue) that enable an intuitive usage and the large and sturdy handle makes it easy to handle and carry. A quick-release button facilitates to release the patient from the device in emergency situations. The product has been designed to work in any of the rough environments where the paramedics operate and considerations have been taken in order to fit it into an ambulance. The end result is an intuitive and easy to use product which by prehospital implementation has the potential to save both lives and costs for the healthcare by reducing the time to treatment for stroke patients.

References

[1] Persson M, Fhager A, Trefna HD, Yu Y, McKelvey T, Pegenius G, Karlsson J and Elam M, Microwave-based stroke diagnosis making global pre-hospital thrombolytic treatment possible, *IEEE Transactions on Biomedical Engineering*, DOI: 10.1109/TBME.2014.2330554 (2014).

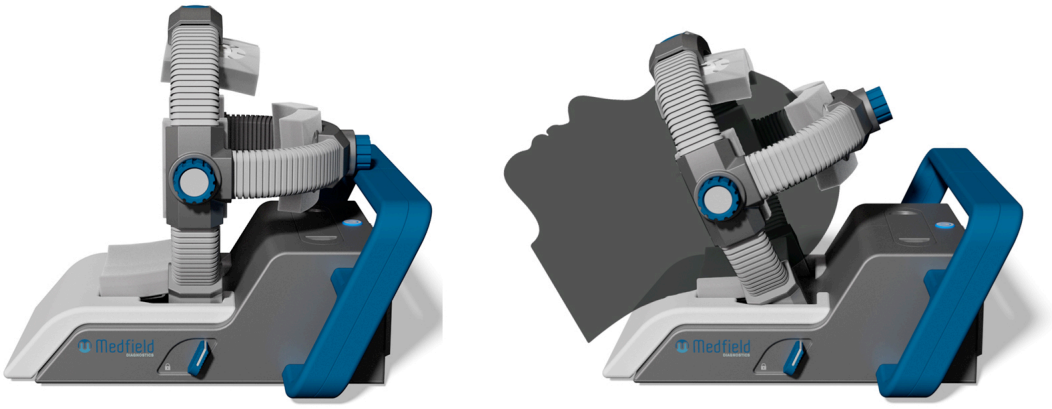

Figure 1: CAD-model of the concept product.