Making of a Mixed Reality e-learning module for patients with spinal cord injuries

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Introduction

The human body is complex to understand, imagine the challenge for patients with spinal cord injury to understand the consequences of the injury to their bodies. Effective counselling is essential for long-term health. Conventional education methods, however, have barriers [1]. Interactive Mixed Reality e-learnings strengthen knowledge transfers with three-dimensional human-like visuals (holograms) and can be used at a convenient time for the patient and its caregiver.

Methods

Authors created a text-based script explaining the basic consequences of a spinal cord injury: focusing on locomotion of lower and upper extremities, sensation, problems with respiration, bladder, bowel, sexuality, temperature and blood pressure regulation. Patients, rehabilitation therapists and physicians of an inpatient rehabilitation setting in The Netherlands were questioned about requirements of an effective e-learning module. These requirements were prioritized in co-creation with patients and professionals. In cooperation with a Mixed Reality software developer company, and using agile scrum methods, we have developed a new Mixed Reality e-learning which deals with the basics of having a spinal cord injury.

Must-have requirements	
Content	Tailored information for subacute rehabilitation phase
	Etiology
	Completeness of injury
	Tailored to individual lesion level
Visuals	3D model
	Nerves and muscles
Usability/ controls	Usable in wheelchair and in bed
	Gaze and voice command
	Easy interface
	Usable with upper limb orthoses and/or wheelchair gloves
	Pause button
Other	Dutch language

Current version:
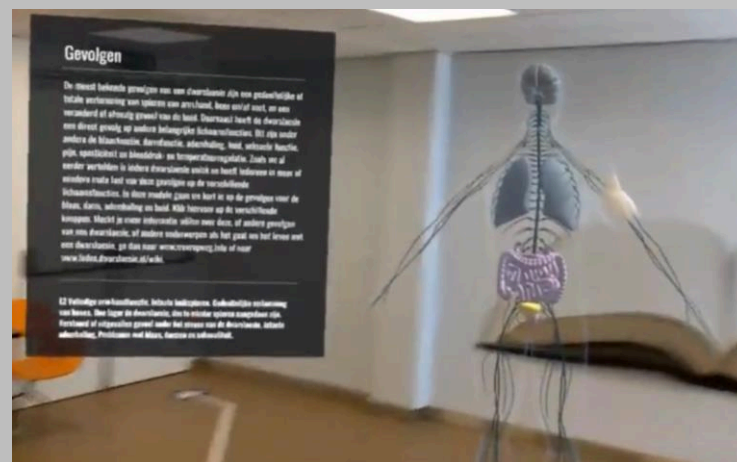
Demo?

Results and discussion

10 patients and 8 rehabilitation professionals were interviewed. Requirements about the content, visual aspects and usability of the e-learning were formulated and processed in the development of a new and interactive Mixed Reality e-learning, using a hologram to visualize the injury and its primary consequences. Not all requirements and ideas could be used in the basic e-learning module, there is potential for expansion (for example adding a detailed e-learning about the consequences for the respiratory system). Currently the use of the e-learning in our inpatient rehabilitation clinic is being evaluated in a research project with 25 participants.

Conclusions

Patients and professionals believe that interactive, visually supported e-learnings are beneficial in the knowledge transfer in the subacute inpatient rehabilitation period after spinal cord injuries. Mixed Reality can offer this. The next step is to evaluate the new-developed Mixed Reality e-learning and to expand it with modules about the consequences of spinal cord injury for other organ systems.

[1] van Wyk K et al. (2015). Top Spinal Cord Inj Rehabil, 21(1):49-60.