Cognitive Task Analysis – a relevant method for the development of simulation training in surgery

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Abstract

The insufficient amount of adequate practical experience for German surgeons in training has been criticised (Schröder et al., 2009). Realistic haptic simulations are needed to enhance the training and to improve the patients' safety. Initial research of the literature and several observations in operating rooms indicated the relevance of discectomy simulation training for neurosurgeons. A Cognitive Task Analysis (CTA) was performed to define a realistic and helpful scenario-based simulation. Important technical skills, cognitive aspects (e.g. strategies of decision-making), and implicit behavioural knowledge essential for performing high-quality surgery were analysed. The CTA was done in iterative cycles based on the results of the interviews with surgical experts and the progress of the developmental process. The results of the CTA are used as the basis for the development of a simulation system for surgical training. The relevance of analysing cognitive processes (especially evaluation of the surgical steps) has been proven and the important elements of a realistic surgical simulator (i.e. bleeding) were analysed. Due to the close interdisciplinary cooperation of engineers and psychologists, together with surgeons and the CTA-based user-centred design, the first validation showed that the concept of the simulator is highly relevant for surgical training.

Introduction

The German Medical Association points out that there is a shortage of young professionals in the surgical disciplines (Bundesärztekammer, 2009). Today, surgical training is mainly based on learning by doing, i.e. trainees are supervised by experienced surgeons during their first interventions based on the principle „see one, do one ..." (Lossing et al., 1992). In this process the responsibility and autonomy of the resident slowly progresses over years. Many interventions are needed (Jost & Klar, 2008) before the learning curve is flattened and complications are minimized (Kim et al., 2005). The training in the OR is not risk-free for the patients. Another problem is that, based on surveys of the Professional Association of German Surgeons (BDC), 63% of the surgeons in training do less than three interventions a week with supervision and 20% perform less than one surgery a week (Schröder et al., 2009). Training on human cadavers is cost-intensive, the properties of tissue may change post-mortem and their availability is not always sufficient – in addition to the

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