Groth, K et al 2016: Designing for interactivity in a tele-guidance setting. *International Journal of Integrated Care*, 16(5):S19. DOI: dx.doi.org/10.5334/ijic.2568

CONFERENCE ABSTRACT

Designing for interactivity in a tele-guidance setting

European Telemedicine Conference 2016, Oslo 15-16 November

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Purpose: A pilot study has shown that "teleguidance" in endoscopic retrograde cholangio-pancreatography (ERCP) is followed by an increased number of successfully completed procedures and can offer an enhanced level of competence at the local hospital [1]. We made three observations regarding the guiding endoscopist (teleguider). The teleguider verbally pointed at different parts of the endoscopy image at the same time as he pointed and drew on the screen. The teleguider gestured in order to explain details of the procedure. The teleguider had difficulties interacting with the video conferencing (VC) equipment. The physical and verbal interactions by the teleguider cannot all be easily transmitted through the VC call to the local hospitals, who, therefore, were not being able to follow the teleguider's interactions and explanations. We present an explorative study of introducing real time interaction through pointing and drawing on the VC screen with medical images during remote guiding in order to enhance the communication between the two sites.

Context: A number of Sweden's most experienced endoscopists within ERCP work at Karolinska University Hospital (Karolinska), mainly conducting more complicated surgery both within the Stockholm region and on patients referred from other parts of the country. Patients from outside the region need to travel to Karolinska, which is costly for society and an extra burden for the patient and relatives. VC technology is readily available and can offer the endoscopists' at other hospitals the skills of an expert from Karolinska. The teleguider at Karolinska can guide up to three local hospitals in parallel using three VC systems.

Methods: In addition to the original pilot study, extensive fieldwork has been conducted and is still on-going. Observations, in combination with formal and informal interviews with endoscopists, nurses and technical personnel, has been conducted 1-2 times respectively at five local hospitals and a large number of times at Karolinska. Guiding sessions have been video recorded, and parts have been transcribed. This preparatory fieldwork entailed a deep understanding of the different contexts, resulting in preliminary ideas of how the interaction technology could be designed and used, and has subsequently been documented in the form of, e.g., personas and scenarios. Early versions of the system set-up (high-fidelity prototypes) have been iteratively developed in a user-centered design process. Low-fidelity prototypes, which suggest more elaborate interaction and functionality, have

been developed in parallel, in order to concretize design ideas based on the teleguider's needs, and effectively evaluate them.

Results and discussion: Interactive *pointing and drawing* on the VC screen is considered a benefit by both the teleguider and the endoscopist at the remote site. It does not have to be drawings in live video streams, which means the technical solution will be less challenging. However, introduction of pointing and drawing functionality requires *yet another screen or several windows on a larger screen*, at the teleguider's site. Pointing and drawing functionality also requires an extra screen or window at the remote site. The large number of devices included when introducing the functionality of pointing and drawing requires a *steering system* that enables the teleguider to more efficiently manage the devices. Similarly, one steering system controlling the three VC systems provides a more usable interface in general for the teleguider. The pointing and drawing can *decrease the risk of misunderstandings*.

References

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Keywords: telemedicine; tele-guidance; control room, user centered design, interaction design