# Basic suturing training using Microsoft HoloLens

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**INTRODUCTION**: Suturing is an essential skill across specialties. The most common method of teaching basic suturing is workshop format with a faculty instructor. However, many medical students do not reach proficiency due to lack of exposure[1]. It can be expensive and time-consuming to supply these sessions with a sufficient number of faculty-experts, thus there has been increased interest in self-directed learning. This often entails the use of computer-based video instruction. A video-tutorial based curriculum for suturing training has been shown to be effective for training to proficiency[2]. Furthermore, augmented reality is an emerging tool for effective medical education. This involves the projection of virtual instructional material in the user's real environment. The usage of a voice-commanded headset with projected virtual content can help trainee's maintain their flow of practice when interacting with instructional content. Our aim was to combine augmented reality with video-based instruction using Microsoft HoloLens to determine if the two methods combined would be accepted as an educational tool and if it is an effective method of training.

**METHODS:** Suture Tutor was developed using Unity for use on the HoloLens. This module includes four videos, outlining the steps of the running locking suturing skill. Voice commands are used to play, pause, skip, and slow videos. Thirty six participants in their second year of medicine were split into two groups, the HoloLens group or the control group. The HoloLens group practiced the suturing technique using the Suture Tutor module while the control group used the same four videos on a laptop (Figure 1). Each participant's first and final attempts at the technique were video recorded and assessed by experts using a previously validated global rating scale[3]. The participants were given seven minutes to practice between the first and last attempts. The time spent interacting with the video during practice was recorded. At the end of the session, the HoloLens group was given a survey evaluating the usability and realism of Suture Tutor.

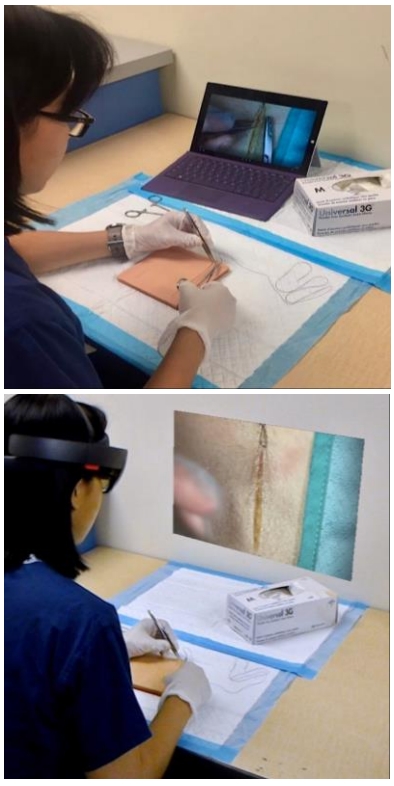

**Fig 1.** Setup of the control group (top) and the HoloLens group (bottom).

**RESULTS:** 85% of the participants who used Suture Tutor agreed or strongly agreed that it is useful in the training of medical students. Furthermore, 95% of respondents agreed or strongly agreed that the instructional material used was realistic. We were unable to determine the effectiveness of Suture Tutor. However, the HoloLens group watched the instructional videos significantly more than the control group (7 [5.75 – 9.25] *views* vs 4.5 [3.75 – 6] *views*, P = 0.0175).

**CONCLUSION:** Participants found the Suture Tutor to be a user friendly and helpful adjunct. The study suggests that Suture Tutor improved accessibility of training material.

**REFERENCES:** [1] Wongkietkachorn *et al., J Surg Educ.,* 2016.
[2] Mashaud *et al., J Surg Educ.,* 2013.
[3] Moorthy *et al., BMJ,* 2003.