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CORRESPONDENCE
Remote supervision for simulated cataract surgery

TO THE EDITOR:

Simulation in cataract surgery is established as a validated tool in developing surgical ability and reducing complications [1, 2]. Supervision of trainee surgeons is fundamental to ensure the development of correct techniques and to prevent bad habits from being formed. This principle extends to simulated cataract surgery using the Eyesi surgical simulator (VRmagic Holding AG, Mannheim, Germany).

The use of Eyesi surgical simulators has been associated with a significant decrease in the rate of posterior capsular rupture amongst trainee surgeons [3]. It has been reported that access to Eyesi surgical simulators is highly varied [4]. Trainees often need to travel to other hospitals in order to use a simulator.

We present a novel method of interfacing teleconferencing software with the Eyesi surgical simulator that can allow trainees to be remotely supervised by their trainers from anywhere in the world (Fig. 1). The technical configuration consists of a short series of widely available and low-cost adapters. The analogue video from the Eyesi is converted to a digital signal and then split into two feeds. One feed goes back towards the Eyesi after being converted back into an analogue signal. The other feed is output as a digital video signal through a USB connection which is recognised by computers as a webcam. This gives the flexibility for users to stream the audio and video from the Eyesi surgical simulator via a teleconferencing application of their choice in real time in order to receive remote supervision. Video output and touch screen controls of the Eyesi's monitor are retained as per normal. Configuration is required once only after which cables, except for the USB connector, can be discretely hidden away with ease.

A detailed overview of this system including how to set this up in one's own department and what equipment is required is detailed in Supplementary Video 1. In our department we chose to further enhance remote supervision by joining teleconferencing calls with an additional mobile phone whose camera was pointing towards the trainee and their hands. This was mounted on top of the Eyesi's monitor. This allowed the supervisor to give additional feedback about positioning and posture as well as allowing the trainee to converse more naturally with their trainer.

As a result of the COVID-19 pandemic and the restrictions related to social distancing, trainees are unlikely to be able to be able to have face to face supervision when using the Eyesi surgical simulator. Our method of remote supervision offers trainees an option to be supervised by their own local trainers even if they need to travel to another hospital to use a simulator.

Remote and internet based surgical supervision democratises training by connecting experts with junior surgeons, potentially from all over the world, to ensure the highest standard of training. This will ultimately lead to the best possible outcomes for patients.
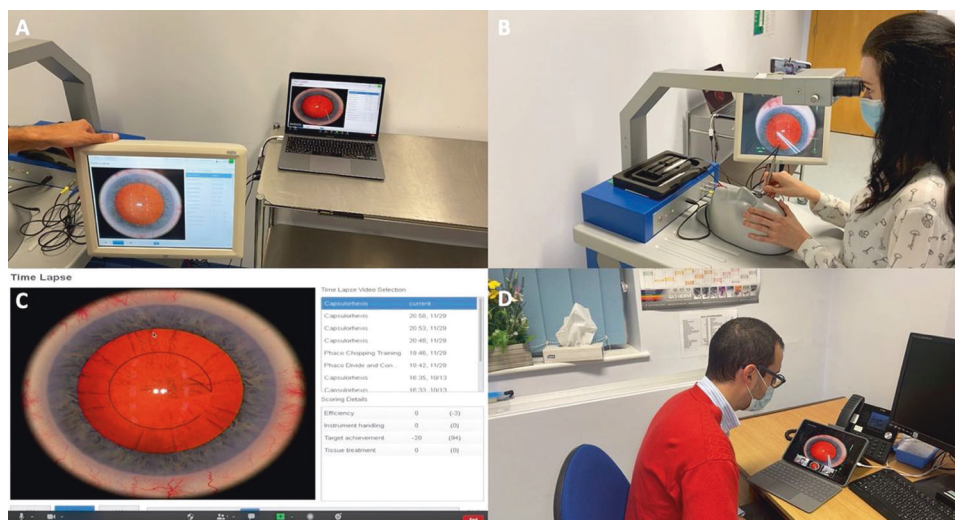
Fig. 1 **Remote supervision of simulated cataract surgery.** Laptop computer connected to Eyesi (**A**), **B**—Trainee surgeon receiving remote supervision of simulated cataract surgery, **C**—Eyesi interface as seen through teleconferencing software, **D**—Experienced trainer providing remote supervision.

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AUTHOR CONTRIBUTIONS

Conception and Design – SM, RJ, GMS, JDF. Technical demonstration and media production - SM, AR, RJ. Manuscript drafting – SM. Manuscript reviewing – RJ, AR, GMS and JDF.

COMPETING INTERESTS

The authors declare no competing interests.

ADDITIONAL INFORMATION

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