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Interns' perception of haptic virtual reality oral surgery simulator learning for impacted lower third molar extraction

Dental education emphasizes to comprise both theoretical and practical learning for students to develop the ability to treat patients clinically. Tooth extraction is established as a basic clinical skill for further general dental practice. However, a recent survey showed that more than 40% of two-year postgraduate year training program for dentists felt unconfident in invasive oral surgical procedures such as flap reflection, covering bone removal, and tooth sectioning.[1] It is not surprised that complicated tooth extraction is an advanced and aggressive dental treatment.

Simulation-based training is valued and emphasized in dental education.[2] It is expected to facilitate students' competence and promote the transition to clinic without compromising patients. Pre-clinical training on manikin is usually used to assist dental students for the development of their pre-clinical skills. However, wastewater, synthetic plastic teeth, or extracted human teeth will cause environmental damage.

Recently, the environmental sustainability is a hot issue in dentistry.[3] For achieving the United Nation Sustainable Development Goals (SDGs), the newly established haptic virtual reality oral surgery simulator Kobra® (Forsslund systems AB, Stockholm, Sweden) was first implemented into oral surgery curriculum, School of Dentistry, Chung Shan Medical University, since 2018. This immersive simulator can provide trainee learning and training in tooth extraction, osteotomy, and apicoectomy in the clinical relevant scenario without any consumable. In addition, this device could provide trainees unlimited practices of pre-clinical skill to promote patient safety, facilitate clinical experience, and enhance reflective practice under virtual reality environments.

Little is known about the students' perception of Kobra® for impacted lower third molar extraction learning and training. In this pilot project, 16 dental interns had the opportunity to perform impacted lower third molar #38 extraction in Kobra®. All of them were invited to take the survey. Four Likert scale rating questions were asked in Table 1. About 68.75%, 81.25%, 87.5%, and 100% of dental interns agreed that Kobra® could simulate the clinical scenario, enhance the clinical confidence, improve the hand-eye coordination, and protect the eco-environment, respectively.

Similar results have shown by Buchbender et al.[4] who reported that Kobra® might offer the benefits for oral surgery education compared to conventional learning by using plastic models. In this survey, the score of simulation of clinical scenario was relative lower as compared with other items. The reasons may be due to the shortcomings of Kobra® that anesthesia, incision, flap reflection, bleeding,

Table 1 Interns' perceptions on five-point Likert scale regarding the implementation of Kobra® for impacted lower third molar extraction learning.

	Strongly agree	Agree	Neutral
The simulation of clinical scenario	2 (12.5%)	9 (56.25%)	5 (31.25%)
The enhancement of clinical confidence	7 (43.75%)	6 (37.5%)	3 (18.75%)
The improvement of hand-eye coordination	5 (31.25%)	9 (56.25%)	2 (12.5%)
The protection of eco-environment	8 (50%)	8 (50%)	—

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and wound closure are not provided in the current model. It still needs to ameliorate the procedure of soft tissue management. In this report, the advantages of Kobra® could improve pre-clinical skill and the breadth of experience which may facilitate patient safety in future clinical practice. In addition, interns can also have unlimited practices without any consumables and waste production. By the implementation of Kobra® in oral surgery education, it could be beneficial for the achievement of SDGs including good health and well-being (SDG3), quality education (SDG4), reduced inequalities (SDG10), and responsible consumption (SDG12) as described previously.[5]

Taken together, the implementation of Kobra® for impacted lower third molar extraction learning could empower interns' learning experience as well as self-confidence and also promote the SDGs in dentistry. However, further improvement of current functions and more analytical studies of Kobra® are warranted.

Declaration of competing interest

The authors have no conflicts of interest relevant to this article.

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