Virtual reality simulation

Indications and perspectives for the technology in the field of dental education

By Dr Susan Bridges, Suzanne Perry &OUTH, Hong Kong & Australia

Virtual reality (VR) simulation inevitably conjures up images of futuristic technology, imaginary worlds or complex robotic devices. What it may not initially suggest is the use of virtual technology as a means of training dental students and dentists, facilitating the development of skills in a safe and relaxed environment.

An increase in demand for simulation units over the last ten to 15 years has indicated growing interest from dental schools, suggesting a certain confidence that simulation systems have potential as a recognised form of dental skills training in the future. Using technology inspired primarily from the flight simulation industry, dental simulators are now able to create an environment in which users can practise clinical procedures, such as restorative dentistry, orthodontics, periodontal assessment, implant placement and even dental extractions. These systems are a far cry from the first phantom head simulator created in the early 1900s that attempted to represent the oral cavity with a relatively primitive set of upper and lower dental casts mounted on a metal pole (Fig. 1). Although phantom head systems are now the mainstay for undergraduate training, educators are becoming more aware of the additional benefits of virtual technology.

Even if a dental practice has not embraced the digital age and all records and correspondence are ink and paper based, the practice still has a number of responsibilities regarding data security. As dental practices collect patient details, they must register with the Information Commissioner’s Office (ICO) here in the UK. Dental records must be stored safely and for a number of years (up to six years for the National Health Service, NHS) and kept for a maximum of 30 years (Department of Health). Records must also be safely and securely for a number of years (up to six years for the National Health Service, NHS) and kept for a maximum of 30 years (Department of Health). Records must also be

By Naz Haque, UK

At the heart of the relationship between a dentist and a patient lies trust and respect. Recent events, such as the Sony or, more currently, Ashley Madison, have brought to public awareness the importance of securing one’s data.

Recent events, such as the Sony or, more currently, Ashley Madison, have brought to public awareness the importance of securing one’s data. This also means that personal data cannot be compromised in the digital world. Dental practices have an obligation to ensure patient data is backed up, recoverable (in case of disasters), secure and protected. This applies during both storage and movement. If you are using one of the popular industry patient management systems, such as E-MTX Systems of Excellence, you should have features to support this in place, liaise with your account manager to verify this.

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For example, if you are using one of the popular US-based organisations for email, such as AOL, Hotmail and Gmail, and liaise with your patients via this email platform, you may have been inadvertently making you breach data security. The service provider you use for your email could also be inadvertently making you breach data security rules. For example, if you are using one of the popular US-based organisations for email, such as AOL, Hotmail and Gmail, and liaise with your patients via this email platform, you have to consider where the e-mails are being stored, most likely on servers outside your own country.

The UK’s Data Protection Act states that “personal data shall not be transferred to a country or territory outside the EEA (European Economic Area) unless that country or territory ensures an adequate level of protection for the rights and freedoms of data subjects in relation to the processing of personal data.” As a dental practice, you should reconsider if you are using a commercial e-mail provider to liaise with your patients, and determine whether your website communication tools and feedback portals are compliant and if not ensure your designated data policy controller addresses this as a priority. Here in the UK, the ICO can issue monetary penalty notices, requiring organisations to pay up to £500,000 for serious breaches of the Data Protection Act and provide guidance on keeping up to date and resolving these issues. Make sure your data is secured and protected before it is too late.

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Indian Dentists: 105 Members Only
Foreign Dentists Welcome

Understanding Passive Self-Ligation (The Damon System)
• From a published evidence of success through implementation of mechanics to treat even the most difficult cases of orthodontic malocclusion
• Evidence-based differences between Damon mechanics and traditional orthodontic mechanics.
• Understanding how the Damon System™️ passively ligates and efficiently releases orthodontic brackets.
• Instruction vs. Non-Instruction: making the proper decision with the ability to deliver the result for the individual patient.
• Restoring the rigor of extraction: how the Damon System can reverse the negative results of extraction.

Damon System & Mini-screws: Optimised Mechanics – Sophisticated Simplicity – Spectacular Results
• Diagnosis and treatment planning that combines the dynamic Damon System with non-complicated mini-screws in all cases.
• How to extract and yet respect bone tissue and teeth.
• How to optimise the attachment movement in orthodontic Class I cases.
• Committee in place to help class III treatment.
• Vertical control in long height patients and edentulous spaces.

Clinical Evaluation of Self-Ligating Damon System
• Objectives: to determine the clinical performance of the Damon System and the Damon brackets in teeth movement.

Managing Class III with Damon, The Passive Self-Ligating System
• Objective: to determine the clinical performance of the Damon System and the Damon brackets in teeth movement.

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VR simulation, such as the ability to repeat the same task many times, providing real-time feedback leading to a reduction in supervision, and the benefits of students being able to practise in their free time without laboratory supervisors. Other benefits of VR simulators include the reduction of consumable costs incurred with plastic teeth and the elimination of water system management issues, reducing the possibility of water-borne infections such as Legionella.

Undoubtedly, the initial cost of the VR simulators is a major deterrent and, with additional concerns regarding possible lack of realism to the clinical situation, it is natural that many suggest the need for more evidence-based research prior to committing to such an investment. In the limited literature on VR dental simulation, studies have been mixed but, in general, are positive about the use of the technology for dental training.

Research has shown that procedural learning on VR simulators may be more effective than with the traditional phantom head and may reduce the number of staff-student interactions without a reduction in the quality of the practical work. In contrast, other research has shown that dental performance may be no more effective than with the traditional phantom head and may reduce the number of laboratory supervisors. Other studies have shown that the addition of haptics may improve overall performance of surgical skills and may be beneficial when a trainee is first exposed to a clinical situation in dentistry, small-scale studies of haptic VR simulators suggest that they are at least as good as phantom heads in training undergraduates.

The future of VR simulation in dentistry

Currently, exciting research involving the universities of Hong Kong and Melbourne is looking into gaining solid evidence concerning the use of haptic VR simulation in the dental undergraduate curriculum. By utilising neuroimaging techniques, identification of the traits an expert usually displays can occur, which in turn can be built into training pathways to enhance the effectiveness of procedural learning. Dental findings have suggested that distinct differences may be apparent in the brains of dental experts and novices during a simulated clinical task when using a dental haptic VR simulator. Further work in this area is to be carried out, with additional investigation into the positioning of haptic VR simulators within a curriculum and considering its effectiveness compared with traditional phantom head training techniques.

Study finds fundamental misconceptions about dental implants among patients

By DTI

HONG KONG, China: Investigating patients’ knowledge and perceptions regarding implant therapy, a Chinese study has found that an alarming number of participants had inaccurate and unrealistic expectations about dental implants. Moreover, the study determined that only 18 per cent felt confident about the information they had about the treatment.

In the study, the researchers investigated preoperative information levels, perceptions and expectations regarding implant therapy via a questionnaire. Responses from 277 patients were obtained during 2014 and 2015 in three different locations in China (Hong Kong, Shanghai and Jiangsu).

The analyses established that about one-third of the participants had mistaken assumptions about dental implants. According to the researchers, common misconceptions were that dental implants require less care than natural dentition, implant treatment is appropriate for all patients with missing teeth, dental implants last longer than natural dentition, and there are no risks or complications with implant treatment.

Overall, younger respondents (< 45) and those with higher education (bachelor’s and postgraduate degrees) tended to have more realistic perceptions and lower expectations of the treatment outcome.

When asked about their level of knowledge, 65 per cent of the participants said that they were generally informed about implants, but only 16 per cent felt confident about the information they had.

The study, titled “What do patients expect from treatment with dental implants? Perceptions, expectations and misconceptions: A multicenter study,” was published online ahead of print on 23 March in the Clinical Oral Implants Research journal.