Letters to the editor

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The future of dentistry

Dental education in the metaverse

Sir, the use of artificial intelligence (AI) is now a reality in dentistry. A significant advancement is the use of haptic gloves that would let dental students feel virtual objects while practising suturing or giving a nerve block – this can significantly improve the students' technique over time and give them, for example, immediate feedback with respect to needle point insertion.^{1,2} While initial costs for such systems might seem high now, the hardware is proven to be cost-effective in the long term.

The metaverse is an extension of the internet that allows users to interact with each other and the environment around them. This is achieved using various types of technologies including virtual reality (VR) and augmented reality (AR). These scenarios may seem far from our daily teaching activity or segregated to research labs only. While virtual education spaces such as Zoom, Teams and Google Meet are the new norm, the creation of digital laboratories is also a reality: real online players are challenged to solve difficult scientific problems.^{3,4}

A PubMed search in January 2022 with the keyword 'metaverse' showed only 12 articles and none referenced dentistry. Currently, some medical schools have been trying out VR goggle setups or using anatomical models controlled via tablet; however, both have significant limitations compared to working directly within VR using haptic technology. Presence (the student's sense of being there) has always been considered necessary for successful learning and for appropriate patient care. In light of the last two years of forced social distancing, should we perhaps upgrade the 'old' telemedicine to a more immersive experience?

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References

1. Perry S, Bridges S M, Burrow M F. A review of the use of simulation in dental education. *Simul Healthc* 2015; **10**: 31–37.
2. Huang T K, Yang C-H, Hsieh Y-H, Wang J-C, Hung C-C. Augmented reality (AR) and virtual reality (VR) applied in dentistry. *Kaohsiung J Med Sci* 2018; **34**: 243–248.
3. Collaço E, Kira E, Sallaberry L H *et al*. Immersion and haptic feedback impacts on dental anesthesia technical skills virtual reality training. *J Dent Educ* 2021; **85**: 589–598.
4. Miller J A, Khatib F, Hammond H, Cooper S, Horowitz S. Introducing Foldit Education Mode. *Nat Struct Mol Biol* 2020; **27**: 769–770.
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Dentistry in the metaverse

Sir, it is predicted that within two to three years, most virtual meetings will move from 2D camera image grids to the metaverse, a 3D space with digital avatars. The metaverse is a virtual world wherein people will be virtually represented through avatars in their online interactions.¹ The health industry has now started using components like augmented reality (AR), virtual reality (VR) and artificial intelligence (AI). The Johns Hopkins neurosurgeons have performed the institution's first AR surgeries in living patients this year. This consisted of a headset with a see-through eye display that projects images of the patient's internal anatomy such as bones and other tissue based on CT scans – essentially giving the surgeons an x-ray vision.²

Dentistry too will evolve in the near future, taking a cue from medical health practices in their exploration of the metaverse. Soon, we might have dental telehealth conversations in a virtual metaverse with our avatars indulging in dental health consultation with patients. Imagine doing a root canal with x-ray or 3D images of canal morphology in your live view, placing an implant, seeing the exact position of implant and bone at the time of surgery, or removing a tumour growth with a live feed of anatomical tumour extension in your vision.

With more accessibility, no travel cost and the benefit of moving from different sessions

or booths being possible from anywhere in the world, there are endless possibilities – from dental health access for underprivileged people to using technological innovations to upgrade training models.³ Although technology is marching relentlessly forward, some things remain fundamental, and people-to-people communication will continue to be one of them.

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References

1. CNBC TV 18. Bill Gates: Office meetings in the metaverse only 2-3 years away. 15 December 2021. Available at: <https://www.cnbctv18.com/technology/bill-gates-office-meetings-in-the-metaverse-only-2-3-years-away-11799232.htm> (accessed January 2022).
2. Johns Hopkins Medicine. Johns Hopkins Performs Its First Augmented Reality Surgeries in Patients. 16 February 2021. Available at: <https://www.hopkinsmedicine.org/news/articles/johns-hopkins-performs-its-first-augmented-reality-surgeries-in-patients> (accessed January 2022).
3. Kurian N, Sabu A M, Subramaniam A, Isaac T K. Smart glasses. *Br Dent J* 2021; **231**: 532.
<https://doi.org/10.1038/s41415-022-4003-6>

Pharmaceuticals

A bruising suggestion

Sir, the recent letter by Z. Mehmood *et al*. entitled 'Bruising' raises the important issue of dental practitioners being aware of adverse drug interactions.¹

The authors pointed out such a case of miconazole and warfarin interaction to this effect.¹

While it is imperative to be aware of adverse drug interactions, it is perhaps equally important to be aware of what to prescribe alternatively.

While systemic azole therapy along with miconazole in an oral gel form have been documented to entail a significant rise in the international normalised ratio (INR) in warfarin users, there is evidence in the literature to support the use of nystatin as an oral solution.^{2,3}

This alternative has been touted to be the safest in treating warfarin users with oral candidiasis.³

There appears to be scarce epidemiological and indeed theoretical evidence to indicate the causation of derangement in warfarin anticoagulation with nystatin.⁴

A note here must be made of the fact that the nystatin oral suspension contains sugar; given this and its mode of delivery, the suspension generates conditions conducive to promote dental decay.⁵

Practitioners must advise and follow-up with the patient pertaining to this aspect of the prescription as well.

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References

1. Mehmood Z, Mahmood S, Oktseoglou V. Bruising. *Br Dent J* 2022; **232**: 4.
2. Iversen D B, Hellfritsch M, Stage T B, Aabenhus RM, Lind B S, Pottegård A. Antimycotic treatment of oral candidiasis in warfarin users. *Am J Med* 2021; doi: 10.1016/j.amjmed.2020.10.018.
3. Hellfritsch M, Pottegård A, Pedersen A J *et al*. Topical antimycotics for oral candidiasis in warfarin users. *Basic Clin Pharmacol Toxicol* 2017; **120**: 368–372.
4. Pemberton M N. Nystatin and miconazole: pharmacological and clinical evidence regarding interactions with warfarin. *Oral Dis* 2016; **22**: 761–765.
5. Donaldson M, Goodchild J H, Epstein J B. Sugar content, cariogenicity, and dental concerns with commonly used medications. *J Am Dent Assoc* 2015; **146**: 129–133.

<https://doi.org/10.1038/s41415-022-4004-5>

Paediatric dentistry

PROMs in AI patients

Sir, we read with interest the recent well-reported prospective multi-centre specialist-setting paper by Lyne *et al.*¹ detailing the patient-reported outcome measures (PROMs) of a young population with amelogenesis imperfecta (AI) when transitioning to definitive dentition. This comment is focused on the need for discussing the study limitations and validation of the newly introduced PROM questionnaire.

Indeed, this was a very ambitious project since AI, a rare genetic disorder typified by faulty enamel development, can be difficult to diagnose and treat in young people. Additionally, AI presents with varying degrees of severity. However, there were six participants with an ‘unknown’ or ‘unclassified’ phenotype. How does the inclusion of these participants affect the results of this study? As treatment plans are likely to be patient-specific, this presents yet another variable with unknown effect. Furthermore, 40 participants (67%) were

recruited from a single institution, whereas between six and seven participants were recruited from each of the remaining three institutions. Thus, it is unknown if the Eastman dataset was affected and diluted in the combined results as has been shown in multi-centre trials.

Interestingly, given that participants with all AI clinical phenotypes experienced a range of concerns, the personalised and multidisciplinary specialist strategy seems to be the safest option. Despite the young patients with AI in Ohrvik and Hjortsjö² stating a high satisfaction level with aesthetics and function of their restorations, all-ceramic bonded restorations were superior to indirect or direct composite-resin restorations in terms of clinical success criteria, anatomy and marginal integrity.²

This demonstrates the disparity between our assessment as clinicians and that of patients as reported elsewhere.³

The PROM questionnaire has not been validated. Consequently, recommending it for daily practice or future studies might not be the current best suggestion. Moreover, some questionnaire items may require revision. Three categorical answers were available in eight of the ten questions. Thus, it is not surprising that three-quarters of the sample mentioned that they ‘often’ or ‘sometimes’ felt dissatisfied, with the appearance of their teeth becoming the most common concern.

We were glad to see that Lyne *et al.*¹ took the analysis one step further, and found that 81%, 41% and 33% of the ‘post-treatment’, ‘mid-treatment’ and ‘pre-treatment’ patients, respectively, were happy with their teeth. Once again, the encouraging positive outcome of their ‘post-treatment’ patient satisfaction implies that UK specialist centres are delivering effective personalised care to young patients with AI. Finally, we would like to congratulate the authors despite the caution discussed in this comment letter.

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Dr Alexandra Lyne responds on behalf of the authors: The authors would like to thank the readers for their letter highlighting the complexities of providing care for patients with amelogenesis imperfecta (AI) and their helpful comments. The AI patient-reported outcome measure (PROM) described in our recent paper was developed as a service

evaluation tool to improve AI care and communication within the participating paediatric dentistry specialist units in the UK. This simple questionnaire was not developed with the rigour required for a research tool, but it did benefit from the invaluable input of young patients themselves. Our findings demonstrated the range of responses received but were not intended to be applied to the AI population in general, or to determine what treatment modalities are most successful in this group.

The readers highlighted the challenges of reaching a correct classification and diagnosis for the different types of AI, which were also noted in our paper. They also commented on the fact that the PROM had not been validated for wider use which is something we hope to address in future studies.

The intention of this paper was simply to demonstrate how a PROM can be developed with children and young people to help communicate their individual concerns and needs at various stages of their treatment.

References

1. Lyne A, Parekh S, Patel N *et al*. Patient-reported outcome measure for children and young people with amelogenesis imperfecta. *Br Dent J* 2021; doi: 10.1038/s41415-021-3329-9.
2. Ohrvik H G, Hjortsjö C. Retrospective study of patients with amelogenesis imperfecta treated with different bonded restoration techniques. *Clin Exp Dent Res* 2020; **6**: 16–23.
3. Afrashtehfar K I, Assery M K A, Bryant S R. Aesthetic parameters and patient-perspective assessment tools for maxillary anterior single implants. *Int J Dent* 2021; doi: 10.1155/2021/6684028.

<https://doi.org/10.1038/s41415-022-4005-4>

Cosmetic procedures

Botox hidden dangers

Sir, the indications for the use of botulinum toxin (BT) in the head and neck region include hypersalivation, migraine, masseteric hypertrophy, hemifacial muscle spasm and for the treatment of rhytids.^{1,2} Although widely accepted as a safe drug, there are many side effects and interactions, and we hope this summary serves as a quick yet essential guide.

There are no absolute contraindications except a history of allergy to constituents of BT product. It should not be injected directly into infected skin or skin with psoriasis or eczema. Relative contraindications include avoiding injecting BT in patients who are breastfeeding, on contraceptives or pregnant unless clinically highly indicated. The evidence suggests that botulinum does not