


The Dental Mirror

The background of the cover is a dark blue space filled with vibrant, glowing lines in shades of blue, purple, and red. These lines form a complex, web-like pattern that resembles a digital network or data flow. In the center, a semi-transparent, glowing blue sphere contains a detailed 3D model of a tooth. The tooth is rendered with a fine mesh and is highlighted with bright green and yellow lines, giving it a digital, wireframe appearance. A realistic dental mirror is positioned above the sphere, with its handle extending upwards and its circular head reflecting the glowing tooth model. The overall aesthetic is futuristic and high-tech, emphasizing the theme of digital dentistry.





Digital Dentistry

Issue #10
February 2022
£FREE





Dentistry | Healthcare | Technology | Politics | Students

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Issue 10
February 2021

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Editorial



Welcome to the 10th issue of the Dental Mirror! This "Digital Dentistry" issue aims to recognise and celebrate the newest developments in the world of dentistry and the digitalisation of areas of the field.

It is safe to say that COVID-19 has brought one of the greatest challenges we've faced as a profession in the 21st century and I'm sure we have all spent enough time feeling disheartened by this harsh new reality. With that, this issue aims to bring a breath of fresh air in exploring some of the opportunities for technological growth that have ensued following the pandemic. With the demands for more distanced care where possible increasing, we are seeing an evolution in the way we deliver dentistry.

Our student writers have covered a wide array of topics, with an example being the use of artificial intelligence in dentistry and the prospects and challenges of having such technology integrated into patient care. Living in an increasingly digital world will leave us facing unfamiliar challenges and leaves us open to the idea that not everyone will be embracing these changes...

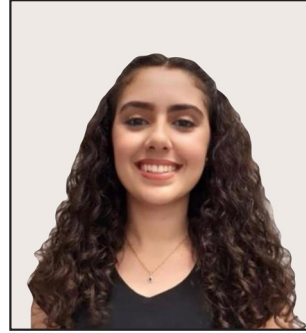
The Dental Mirror team have worked tirelessly to see this issue brought together in a seamless fashion and I hope that this issue succeeds in giving you a taster of what's to come for the future of dentistry!

*Yours, Demi Bains
Editor-in-Chief*

The rest of the DM Team!
From left to right:

Top row: Head News Editor, Head Features Editor, Head Social Editor, Artistic Editor

Bottom row: Deputy News Editor, Deputy Features Editor, Deputy Social Editor, Design Editor



In this ever evolving and changing field, Demi and I thought it would be fitting to dedicate this issue to "Digital Dentistry".

In this new way of life, where technology is embraced in every aspect of our day to day lives, we believe digital dentistry also plays a pivotal role in the future of the dental field.

I am sure many would agree that change and keeping up with constant advancements in the technology utilised can be quite daunting. However, in this issue we have tried to shed some light on the endless possibilities of how this technology can be readily used in everyday practice.

In this issue, we cover an array of topics, including the use of digital dentistry in orthodontics, a glimpse of the future of dentistry, and how same day crowns can be fabricated using the CAD/CAM technology.

I would like to take a moment to thank everyone on this team for spending countless hours putting together this issue, none of this would have been possible without all of our lovely editors and writers. I hope you enjoy reading this issue as much as we have enjoyed putting it together for you all, and we would love to hear your feedback on our first issue this year!

*Yours, Mariam Bqain
Deputy Editor-in-Chief*



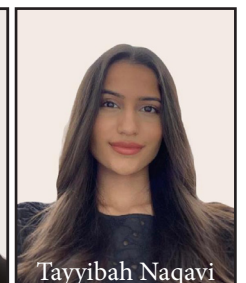
Sarah Park



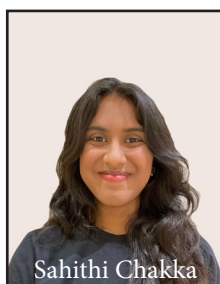
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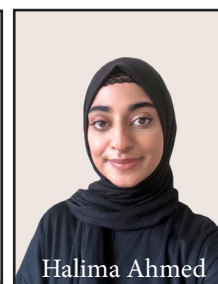
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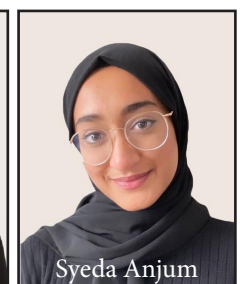
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DIY Dentistry-

The next big thing or straight in the bin?

Written by **Karar Al-atia**

Edited by **Sahithi Chakka**

Schools shut, flights grounded, festivals cancelled, and schools moved online. COVID has been the greatest disturbance to our daily lives for decades. Despite all industries being affected one way or another, the UK's fragile healthcare industry faced one of its most suffocating challenges since its establishment in 1948. Amidst all the uncertainty around COVID, patients began to develop fear and would miss their appointments in fear of contracting the virus. Since March 2020, almost thirteen million adult appointments have been missed (Booth, J., 2020) and as a result people are taking matters into their own hands causing a rise in DIY dentistry. The surge of DIY dentistry cases includes, and is not limited to, patients themselves performing emergency extractions, filling their own teeth and using homemade whitening treatments. Despite patient health being at the fore-front of dental care, an increasing number of people are beginning to seek cosmetic and aesthetic treatment. With appointments being cancelled, the public have been more inclined to research ways to improve their smiles themselves.

One of the most notable practises being the increased use of charcoal toothpaste. Many articles emphasise that charcoal does have temporary stain removing effects and suggests that charcoal toothpaste can help mitigate the staining effect of drinks like tea and coffee (Santos-Longhurst, 2019). However, there is no evidence to suggest that it has a natural whitening effect. Instead,

“He decided to act himself using pliers and bamboo skewers to remove his infected tooth.”

charcoal toothpaste is said to have abrasive features that weaken the tooth itself by wearing down the enamel (Sahi, 2018).

With the rise of social media platforms such as TikTok, misleading information about these products is often spread to boost company sales. (Dewshi, 2021). This is an example of how an increase in false advertising can lead to people experimenting with different products and often end up worsening their oral health. Therefore, highlighting

the importance of patient education as well as ensuring the public is exposed to accurate and reliable information. However, the pandemic made it nearly impossible for patients to contact a dentist. For those seeking medical attention, there was an increased sense of urgency when trying to find a solution.

During the lockdown, Jamie from Huddersfield suffered from a tooth infection. With no available appointments and a lifelong fear of the dentist, finding a dentist was almost impossible. After the pain became unbearable, he decided to act

himself using pliers and bamboo skewers to remove his infected tooth. He immediately had to see an emergency dentist at the local hospital, straining dental services further (Anxiety UK. 2021). Jamie – a prime example on why the surge of DIY dentistry occurred during the pandemic lockdowns and its domino effect on health services.

Understandably, the internet is a difficult place to find accurate information. With the lack of barriers on false advertising, it is a minefield of misleading texts

and claims, so finding accurate sources is a challenge itself. Unfortunately, it is common for patients to have a phobia of dentists, and these are usually developed from bad experiences at a younger age. However, with correct education and exposure to accurate information (especially from a younger age), more people will understand the importance of dental appointments. Addressing unverified websites and social media platforms may be the first step in reducing the prevalence of dangerous DIY dentistry.

This introduces an interesting idea. Patients want to see their dentist but during the pandemic many faced the reality that they could not contact a dentist as freely as they did before due to the restricting regulations. (Booth, J., 2020). If the pain is unbearable, should we have expected people to wait months for an appointment?

Unable to go to the dentist, DIY dentistry was the solution for many, with the aim of resolving their oral health issues. Another example is Deb. After breaking her tooth while chewing, she reached out to her dentist but was unable to schedule an appointment. As she was uncomfortable seeing an emergency dentist, she came to the decision to use putty and mould it into the crack in her tooth, using a rod to push it in and cement it into the crack. This DIY filling resulted in an infection and therefore having the tooth extracted (Anxiety UK. 2021).

Similar DIY treatments were seen up and down the country

with many people regretting their actions after realising the damage they inflicted on themselves.

It is no doubt that COVID has been accountable for a sharp rise in DIY dentistry over the last year and is clear that the damage of DIY dentistry is greater than its benefits. Despite being heavily impacted by the pandemic; the healthcare industry has learnt to adapt and is slowly but surely becoming easier to find a dentist. Throughout the pandemic, clinics have come up with solutions to see patients for example, increasing the fallow time and a reducing the number of patients seen in a day. One clinic even opted to treat patients in their cars to prevent the possible spread of infection within the clinic.

It is developments like these that have made it possible for dentists to reach their patients and provide them with optimal care. This, along with monitoring and addressing inaccurate online content, will help reduce DIY dentistry and in turn, the negative impacts that are included as well.



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The Transition from Labs to Clinics:

How Immersify Education is Bridging the Gap

Written by **Jathursha Suresh**
 Edited by **Demi Bains**



Figure 1 – Charting Practice using the Immersify dental app (Immersify Education 2020)

The jump from clinical skills labs to patient facing clinics is always daunting, especially after months off for a global pandemic following reduced contact hours and a lack of catch-up lab sessions. It is safe to assume that the vast majority of the dental school were overwhelmed and the greatest challenge I found myself facing was

the transition from clinical skills labs in second year to our own patient clinics in third year. The spike in COVID-19 infection rates in early 2021 meant that the clinical skills labs we had scheduled in January were pushed to March and we now had 5 months to catch up on a whole year's worth of valuable clinical teaching. Unfortunately, the lab sessions ran once a week and after the massive gap we felt as though we had forgotten how to hold a dental mirror and chart teeth.

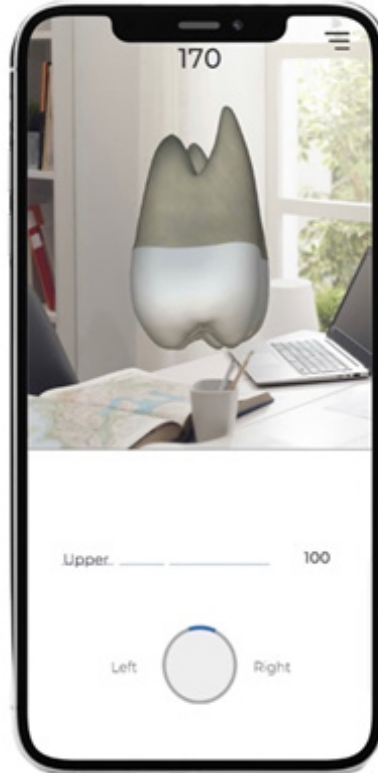


Figure 2 - 3D model of a maxillary tooth as seen in Immersify Dental app (Immersify Education 2020)

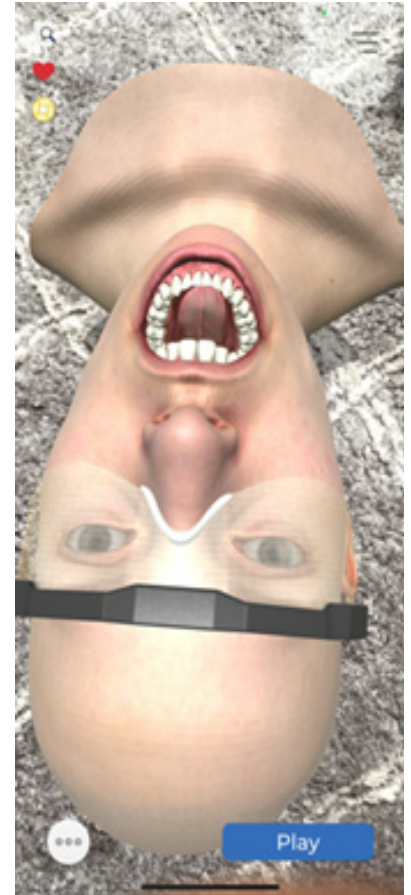


Figure 3 - Augmented reality as seen in the app (Immersify Education 2020)

This is where the mobile app “Immersify Dental” (Developer: Immersify Education 2020) was a giant help in reinstalling some of the confidence I had lost. I was first made aware of the app through a friend, but I soon discovered the company’s established social media presence, making it a largely recognised name amongst dental students across the country. The

unique selling point of the app is that it uses accessible technology with expert content, 3D visuals and interactivity to create an Augmented Reality (AR) experience for the modern-day dental student facing modern-day challenges.

Augmented reality (AR) is defined as an enhanced version of reality, created by using intelligent display technology, 3D registration technology and intelligent interaction technology to overlay digital information onto live camera feed. Essentially, it allows digital content to look like part of the physical world, creating a blended perspective between the real and the fabricated (Devereaux, 2017). This is not to be confused with Virtual Reality (VR) however, which transports the user into a completely digital world (Chen, 2016).

The app contains a variety of games from “Chartistry” to “3D Dental Practical” and “Instrument ID”. Alongside these AR games, there are also quizzes that you can solve which allow you to compete with other dental students around the globe. The Chartistry game uses AR to project a patient’s head and mouth in front of you and you can use your phone as a mirror to look around the surfaces of the teeth in order to practice charting them. For each correct charting, you earn points that put you on the leaderboard, giving the experience a competitive edge. In the 3D Dental Practical, an entire set of permanent or deciduous teeth can be viewed and studied. It displays the complete anatomy

of each tooth and allows you to rotate them to your chosen view. This practical allows you to greatly increase your knowledge of tooth morphology and identify the roots and cusps of all teeth. Instrument ID is a game that will put your knowledge of dental equipment and materials to the test. It presents you with 3D AR images of dental handpieces or other tools and asks you to identify the correct fact about the projected image. Once again, the points you earn place you on a global leaderboard against other dental students. This is one of my favourite features because it motivates you to strive for higher scores each time. The quizzes that are currently available are on Restorations, Dental Diseases and Endodontics but Immersify have promised more exciting releases in the coming year!

These are just a few of the brilliant innovations that Immersify has released so far and with more content promised, it’s definitely an app worth keeping. Given the unpredictable nature of COVID-19 and its habit of limiting the valuable in-person teaching of dental students, it is worth holding onto a valuable learning tool such as this app. It’s ease of use and flexibility mean you can play along in the luxury of your own room (or even bed) without having to change into scrubs or travel all the way into uni. This app will no doubt revolutionise the way we study in the current digital age...for the better.

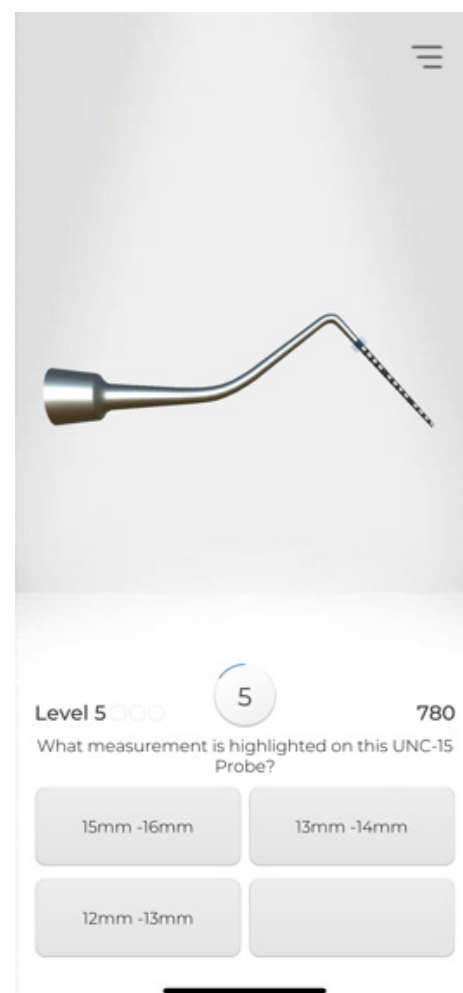


Figure 4 - Immersify dental quiz screenshot (Immersify Education 2020)

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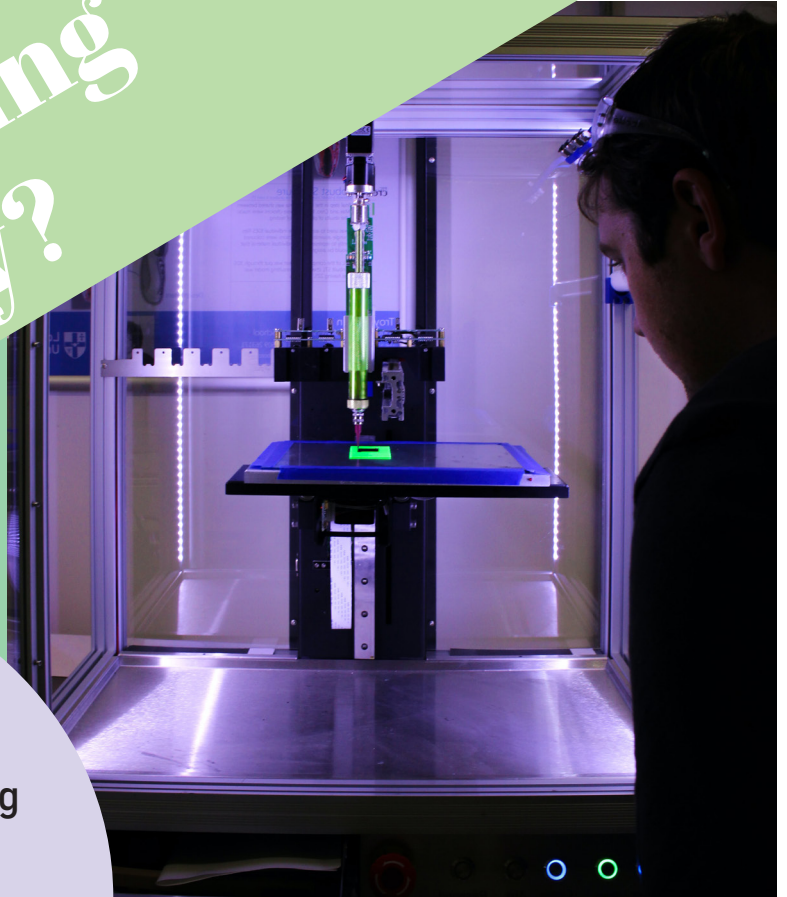
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Is 3D Printing Revolutionising Dentistry?

The use of 3D printing in dentistry has been hailed as revolutionary, advancing various aspects of the profession. However, can this innovative yet costly and skill-demanding technology be adopted in everyday practice?



Written by **Sarah Park**
Edited by **Sahithi Chakka**

3D printing is a manufacturing method, first developed in the late 1980s, involving building three-dimensional objects layer by layer and thus forming objects by adding multiple layers (Strub, Rekow & Witkowski, 2006). It has been hailed as a revolutionary technology, receiving much interest from various fields such as art and design, aerospace and engineering (Gross et al., 2014).

3D printing has been used for years in dentistry and in Oral and Maxillofacial surgery. Objects such as dental models, drill guides and implants are designed virtually through computer-aided design (CAD) software and manufactured using 3D printers, simple robotic devices (Dawood et al., 2015). CAD software is common in dental laboratories and increasingly seen in many dental surgeries. Volumetric image data in the form of cone beam computed tomography (CBCT)

data, computed tomography (CT) data and intraoral or laboratory optical surface scan data is available in dentistry for CAD software use (Adibi et al., 2012).

Medical modelling, the production of an anatomical 'study' model, has been one of the earliest applications of 3D printing in dentistry. The use of CBCT and CT scanning to acquire image data for 3D printing has allowed production of detailed replicas of patients' jaws. This is especially useful for surgical planning for complex and unusual anatomy. Consequently, new surgical approaches have been developed (Dawood et al., 2013) and, along with the use of 3D printed drilling and cutting guides, have helped make procedures less invasive and risky (Sanna, Molly & van Steenberghe, 2007).

Crown copings and partial denture frameworks have also benefited from the use of 3D printing. Using intraoral and laboratory optical scanners, precise models of the prepared tooth, dental arch and implant position can be made (Akyalcin et al., 2013). In fixed and removable prosthodontics, CAD software can be used

for treatment planning and designing restorations. This scan data and CAD design may be used to mill or print crown or bridge copings, bridge structures and implant abutments. 3D printing can also be used for producing metal structures either indirectly by printing in burn-out resins or waxes for a lost-wax process, or directly in metals or metal alloys (Venkatesh and Nandini, 2013).

In orthodontics, the Invisalign system has adopted the use of 3D printing to manufacture a series of aligners which realign the patient's teeth over a period of time. Orthodontic CAD software can also print indirect bracket-bonding splints for precise bracket placement. Furthermore, a digital workflow using intra oral or laboratory optical scanning or CBCT to capture patient data can be harnessed to plan treatments, create appliances and bend wires robotically (Dawood et al., 2015).

With the use of CAD technology, intra oral and CBCT scanners becoming more common in dental practices, 3D printing offers another form of 'output' device for dental CAD software and innovative use of scanned digital data. In doing so, also simplifying the complex workflow related to the production of dental appliances. The true asset of 3D printing lies in its ability to manufacture intricate objects and components in a variety of different materials (Dawood et al., 2015).

However, CAD technology still poses a barrier for dentists with no prior training, but new generations of operators who are more receptive to digital dentistry, and software becoming more user-friendly, can combat these issues. The cost of purchasing, running, materials, maintenance of 3D printers, though steadily decreasing, must also be taken into consideration, as well as the need for post-processing and adherence to strict health and safety protocols (Dawood et al., 2015). Moreover, 3D printing in dentistry is still a novel technology requiring further research. For example, a recent study has shown that the fit of crowns fabricated using 3D printing is lower than that using the plaster model (Jang et al., 2018). Despite these concerns, the compatibility of already well-adapted dental scanning, visualisation, CAD and milling technologies with 3D printing, along with the professions innate curiosity and creativity suggests that 3D printing will have an increasingly important role in dentistry (Dawood et al., 2015).

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The Use of Artificial Intelligence in Dentistry

Written by **Gaeun Oh**

Edited by **Sarah Park**

Artificial intelligence (AI) is a fascinating topic that popularly appears in science fiction. It is a branch of computer science involving a sequence of operations designed to perform human tasks (Schwendicke, 2020). Even if you may think you might not know much about AI, surprisingly the concept of AI is very familiar to us. I'm sure you've heard of Alexa, Siri, J.A.R.V.I.S from Iron Man; not only that but even Google maps, facial recognition, media recommendations all utilise AI to help us go about our day to day. If it is used so frequently in our daily life, how can we also apply it to the world of dentistry?

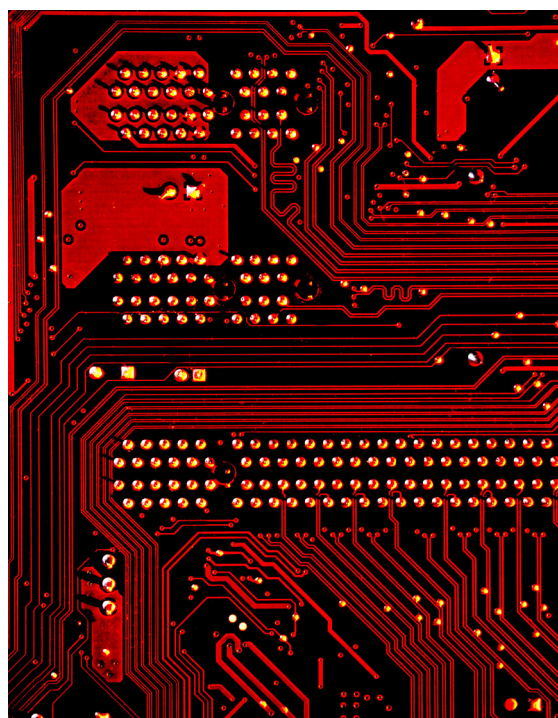
In fact, AI is already widely applied in dentistry; the most promising use of AI is in the orthodontic field. Orthodontic treatment requires a significant amount of precise planning, measuring and calculating, starting from diagnosis and continuing to several follow up monitoring. This complex process is revolutionised with the application of AI through using genetic algorithms to predict the size of the unerupted teeth, analysing the potential need for extraction, using virtual models and three-dimensional scans to assess dental abnormalities and even cranial abnormalities, and aiding to produce further precise aligners. This allows orthodontics to save a lot of time and increase the overall efficiency of treatment.

Moreover, AI is proving to be promising in Oral Pathology as well. One of the crucial stages in oral pathology is the detection and diagnosis of oral lesions, as earlier detection significantly improves prognosis. One study used an AI algorithm to distinguish between two maxillary tumours: keratocystic odontogenic tumours and ameloblastomas. The clinical specialist scored 81.1% and 83.2% for specificity and accuracy respectively, and a similar score of 81.8% and 83.3% was achieved by the algorithm. The scores may be similar but a significant difference was observed in diagnostic time. While the specialist took an average of 23.1 minutes to conclude with the diagnosis, the algorithm took 38 seconds to achieve a similar result (Poedjiastoeti, 2018). Additionally, CAD/CAM is frequently used in prosthodontics to design onlays, inlays, crowns and bridges. AI installed in CAD software allows the dental practitioner to design with greater accuracy and customise appliances to each particular case (Susic, 2017).

By implementing, AI in the dental setting, patients

and dental professionals can benefit from the new system. Using AI as voice commands to allow hand-free note-taking can be as simple as 'hey, Google'. This not only improves efficiency in practice but also reduces the risk of contamination as well as operative time in one sitting. AI-based software could further extend to the point where the patient can have access to emergency dental services before reaching the dental clinic. Through this system, a detailed history including presenting complaint, medical history, dental history, social and family history can all be recorded prior to the appointment. This would allow dental professionals to have the full picture before seeing the patient and therefore guide the dentists to structure more patient-centred holistic care (Tandon, 2020). Clinical dentistry is filled with judgment and decision making by individuals hence there is always a possibility of subjectivity. This can be further tackled with the use of a consistent and reliable system; consequently, leaving less room for human errors.

As much as AI is beneficial, challenges also exist, including the need for ongoing training, validation and improvement. Integrating AI into clinical settings requires a system and regulation which will protect patient confidentiality and privacy. Hence, careful



measures should be implemented to anonymise any personal data before wider use (Char, 2018).

Another concern of using the AI system is ambiguous accountability. If a patient is facing an accidental consequence resulting from an error of AI technology, who would be held responsible? Would it be the dental professional's fault who used the technology or would it be the developer's fault who built the algorithm? Abruptly substituting humans with autonomous machines raises numerous legal and ethical concerns.

Multiple studies and research show potential applications of AI in the dental field, and the use of AI should be viewed as a complementary asset that can further assist dental professionals. Once the limitations of AI are thoroughly explored and valid solutions are established, we can soon hope to see AI being utilised in all fields of dentistry.

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Orthodontics Goes Digital...

A brief look into the use of digital dentistry in orthodontics for the patient- from virtual treatment planning to monitoring compliance via the apps.

Written by **Carmen Dhesi**
Edited by **Parsa Aghamohammadi**

Introduction

The use of technology within dentistry marks a shift from the previously traditional methods to a digital workflow which can make treatment more effective and efficient. Figure 1 shows the difference between the traditional and digital workflow for orthodontic treatment (Jain and Gupta, 2021).

Digitisation of orthodontics for the patient

Going virtual

Many aspects of orthodontics have already switched or are switching to a digitised workflow from diagnosis and treatment planning to orthodontic appliances and monitoring.

Examples include digital intra-oral scanning replacing impressions and casts. The scanning process can be more accurate and comfortable for patients. They are also easily stored, shared, and can eliminate errors with regards to storage and handling of different impression materials. Virtual planning also allows for better communication with patients in terms of understanding the process and helps to visualise the treatment results (Tarraf and Ali, 2018).

CAD/CAM has also been used in orthodontics via 3D printing of models, aligners, brackets, and wire bending which enables visualisation of tooth movement for the patient. This illustrates the before and after results prior to starting any orthodontic treatment (Tarraf and Ali, 2018).

Remote Monitoring and Utilisation of Apps

In this day and age, it is more convenient for people to utilise online access – whether it be visualising treatment plans or monitoring their progress. For

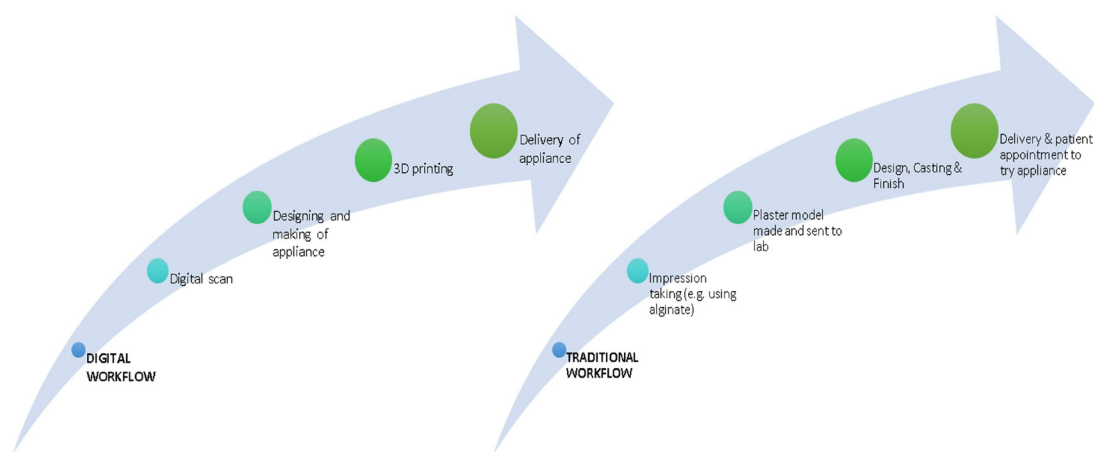


Figure 1: The difference between a traditional versus digital workflow for the orthodontic treatment process (adapted from Jain and Gupta, 2021)

patients who are busy, this can save time by minimising the number of in-person appointments required.

One of the main and least predictable factors which determine the success of orthodontic treatment, especially in the retention phase, is patient compliance. The key purpose of orthodontic retention is to maintain the teeth after treatment in their ideal aesthetic and functional positions (Schott et al., 2013). The issue which arises is that the responsibility for using the removable retainers lies with the patient, hence their success is heavily dependent on the patient's compliance (Pratt, Kluemper and Lindstrom, 2011). Low compliance has the potential to undermine the effectiveness and efficiency of a treatment plan, which can lead to an increase in treatment time and costs, to both the patient and orthodontist.

Many ways to improve compliance have been found. A particular method of interest is the use of mobile applications to improve patient compliance with removable appliance retention. The implementation of applications in orthodontics has not yet achieved widespread popularity despite the apparent importance and success mobile applications have achieved in people's daily lives. In 2019, there were 305 orthodontic apps available, either patient or clinician focused with varying objectives (Vaid, Hansa and Bichu, 2020). The most research was done for applications which included reminder tools as this has been shown to improve compliance, reduce treatment times and missed appointments (Vaid, Hansa and Bichu, 2020). Zotti et al. investigated how social media can play a role in improving compliance and increase attendance during follow-up appointments among patients wearing retainers. They found that, by using WhatsApp and

gamification as a way to involve adolescent patients, there was an increase in regularly adhering to retainer wear, attending follow-ups and better long-term results in regards to compliance and a lower relapse rate (Zotti et al., 2019).

The increased dependence on mobile phones, particularly amongst adolescents,

could be utilised to improve compliance levels. It is remarkable that mobile applications have not been extensively utilised and developed as one of the main techniques to monitor and enhance patient compliance. Aspects which can be incorporated in mobile applications include a channel for communication, reminding tools, access to relevant information and logging retainer wear time via a calendar option or microsensor technology (El-Huni et al., 2019) (Al-Moghrabi et al., 2020). A study by Al-Moghrabi et al. developed the multi-faceted 'My Retainers' mobile application (as shown in figure 2) aimed at enhancing retainer wear compliance by providing a channel for communication, aide-memoir, and access to information for the patient. Valued features of the application included the ability to reach out and contact the orthodontist as some patients felt that the move from fixed braces to retainers led to a loss of contact as the frequency of follow-up appointments differed. The aide memoirs with pop-up notifications to combat forgetfulness and using a calendar to track and log hours of wear also proved to be significantly beneficial aspects. There was also the possibility to transfer data collected from the embedded microsensor technology into the application via Bluetooth – the combination of both these methods could lead to increased patient compliance. Despite this option being more costly, it would relieve the patient from having to manually input wear time as it automatically logs real-time wear (Al-Moghrabi et al., 2020). They evaluated the effectiveness of this application on enhancing retainer wear and patient experiences but stated that further research is needed to investigate means of improving compliance (Al-Moghrabi et al., 2019). Mobile applications may also incorporate gamification with the ability to set goals, monitor progress and

reward the user to improve compliance levels.

On the other hand, it can be argued that the use of mobile applications can potentially diminish the patient-clinician rapport which can lead to a loss of trust. There is also the question around legal issues surrounding the risk of patient confidentiality due to communication of patient records over the internet. Further research is needed into the ethical and medico-legal issues around the further integration of the digital field into orthodontics (Iorgulescu et al., 2020) (Favaretto et al., 2020).

Moving forward...

It is evident that further integration of the digital and dental field is inevitable and will become more commonplace in various specialties such as orthodontics. The question is no longer if digital dentistry is possible but instead how far will it take us – could virtual treatment planning and monitoring in orthodontics become the new norm for society, will this transition make orthodontic care more detached, or will it transform the field for the better?

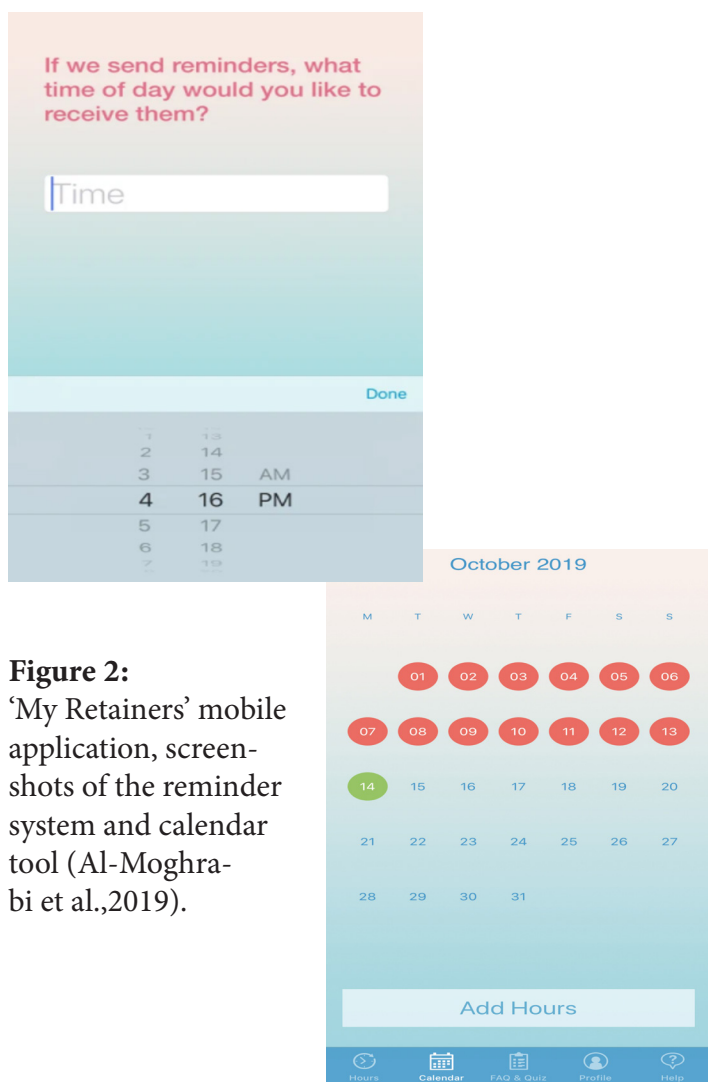


Figure 2: ‘My Retainers’ mobile application, screenshots of the reminder system and calendar tool (Al-Moghrabi et al., 2019).

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Digital Dentistry Conferences

A Glimpse of the Future

Written by Parsa Aghamohammadi

Edited by Halima Ahmed

Do dental conferences and exhibitions remain popular for the transformation of the industry?

With the gradual return of live events after two years of delay, companies around the world are longing to display their most novel products at every opportunity they can grasp. The excitement that surrounds dental congresses, conferences and workshops provides a fantastic setting for these companies to reach out to their potential customers. Dental professionals are also keen participants in such events. Many find these events not only an opportunity to improve their skills, knowledge, and insight in the field of new dental technologies, but as a means to catch up with their friends as well. In recent years, one topic seems to have generated the most excitement in dental conferences, an area with huge potential in linking dentistry to the wider industry, digital dentistry.

Aims of digital dentistry:

The term digital dentistry can encompass a broad range of technologies used in dentistry as it may be defined as any technology used in dentistry involving digital or computer-controlled components in contrast to mechanical or electrical alone (Child Jr, 2011). Considering this definition, we may include simple tasks such as note writing and storage of

notes on a computer as digital dentistry. However, the image most people have in their mind of digital dentistry usually involves the use of advanced intra-oral scanners (IOS), restoration design software and the use of computer aided design/computer aided manufacture (CAD/CAM). From the simplest of these technologies to more complex digital workflow systems, the aims of digital dentistry may be summarised in three interrelated concepts: increasing the speed, improving the quality, and easing the documentation of the various stages of treatment for both patient education and comprehensive record taking for future reference (Stanley et al., 2018).

Role of in-person events:

Dental technology firms are constantly working to attract more clinicians to use their products and hence digital dentistry conferences may be seen as business networking opportunities for both parties. A survey carried out by Messe Frankfurt showed that 97% of their customers remain convinced that in-person events are an essential component of trade fairs (Messe Frankfurt, 2021). But the question that remains is are these live events still effective at encouraging the uptake of new technologies in everyday practice, especially after the world has experienced nearly two years of exclusively online events?

A dentist's perspective:

To help answer that question, I conducted a short online interview with Dr Ali Nankali, a senior clinical lecturer at Barts and the London dental institute and the founder and director of a newly established organisation, UKDentalCourses (UKDC). UKDC aims to provide a unique platform for dental professionals to find sources of information such as courses of their interest, the latest news in dentistry and work published by their colleagues. The organisation ran a digital dentistry conference just before the national lockdown in 2020 was announced in England and are now in the process of planning their second digital dentistry conference set to take place in July 2022. Therefore, Dr Nankali is in a good position to provide a dentist's perspective on such events.

Q: What is the purpose of the digital dentistry conference run by UKDC and how is it different from other similar events?

A: I have been involved in digitalization since 1981, when we were using a massive IBM computer and personal computers were not accessible to the public. It was not an easy task as we had to use DOS system with C programming Language. During the past four decades, this science has reached an entirely different level, and now every single one of us can feel how society is getting attached to these high-tech systems. Having said that, the demand for computers is on the rise and increasing faster than anticipated. The reason behind this is the increasing volume of data being stored electronically, referred to as digitalisation which can potentially allow us to create exciting software for improving many aspects of life in the society including our careers as dental professionals.

Many people may consider digital dentistry to be all about intra-oral scanners or 3Dmilling machines (CAD/CAM). Whilst it is true that such tools do fall under this category, this description does not grasp the full extent of this field. Existing electronic records are a good example of digital dentistry which have already been in use in surgeries and dental institutes for more than ten years. However, some dental professionals still feel uncomfortable with incorporating this technology into their practice.



Therefore, the main aim of this conference is to boost the use of digital dentistry by illustrating the reality of it.

Q: How is the conference planned for 2022 different from the previous one in 2020?

A: In this conference, we want to provide an opportunity for the attendee to see the effects of digital dentistry in our health care services. So, we are trying to be more clinical this year, by introducing devices and their impacts on our treatments. In addition, to make it easier for the attendees, and as there is a high demand, we are going to offer the option to physically attend or to tune in online to the conference for those who are not able to travel due to COVID-19 restrictions. People who are attending the conference would have a chance to meet well-known speakers and visit our exhibition where delegates from organisations such as Planmeca will be demonstrating the latest devices they have been working on. The attendees can even book sessions in advance to have unique experiences in using the high-tech devices.

Tickets will need to be purchased for this conference; however, the ticket prices are very nominal with a range of ticket options to make it more affordable.

Q: Do you think there has been a change in attitude among dental professionals after nearly two years of experiencing only online events?

A: The answer is an absolute yes. UKDC-World runs hundreds of professional courses per year now, and people are attending from all over the world, including dental students. I believe this is another advantage of digitalisation. Previously, we used to talk about the positive impacts of being online yet not everyone was willing to accept this method of communication. The situation created in the pandemic accelerated the uptake of this technology.

I need to highlight that being online has many advantages, but it is not the solution to everything. We still need hands on courses and face-to-face meetings due to their unique benefits. These two aspects work together amazingly, and we should keep a right balance between them.

Q: What is your personal experience in using new digital technologies in practice and how effective have dentistry exhibitions and conferences been in changing your own perceptions about digital dentistry?

A: Today, I cannot work without it. Nearly all records are digitalised and 4D images have brought the quality of treatments to a whole new level. For instance, we improved treatments by providing predicted outcomes more precisely and now patients can see the proposed treatment plan with more clarity helping them to make their decisions more wisely and not based on assumptions. Over the years, I have come to understand and experience that digital dentistry can be easy, safe, and in the long term, time and cost effective.

Q: How do you see the future of digital dentistry in the next ten years?

A: Addictive! Nowadays, when walking down the street, it is very difficult to find a person without a mobile phone, and this is what we would see with dentistry in the near future. We would see an exponential growth in the uptake of new technologies as we become mesmerised

by their amazing outcomes. This is the reason that I am constantly encouraging professionals, specifically our younger generations, to start making themselves engaged in this field and use learning experiences such as conferences and exhibitions to familiarise themselves with the newest technology on the market.

Conclusion:

With rapid advancements in digital technologies over the past decade, it is axiomatic that all professions will experience a shift from analogue to digital at some point. In dentistry, which has always been at the forefront of incorporating the newest medical technology into practice, this shift began years ago. Dental conferences and exhibitions play a vital role in making the connection between the manufacturer and clinician; online and in-person hybrid events, a legacy of the recent pandemic era, may be the way forward in this area.

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Are Digital Impressions the way to go?

Written by **Tamara Hamad**
Edited by **Halima Ahmed**

Are intraoral scanners, otherwise known as digital impressions, a piece of kit that should be found in all dental clinics? Does the data suggest we should move from manual to digital impressions?

The ever-advancing age of technology has reached nearly all aspects of our lives. Not least of which is the way our dentition and soft tissues are being recorded to produce single and multi-unit fixed dental prosthesis such as crowns, implants and orthodontic appliances. Many of you may have experienced the unpleasant impression taking of your teeth, involving a tray filled with a conventional impression material such as hydrocolloids or elastomers, being pushed against your arch whilst you studiously breathe through your nose. And whilst these continue to be widely used and available in clinical settings, digital intraoral scanners (IOS) have continued to grow in today's market. Their introduction has meant providing 3D scanned images of your dentition; whilst allegedly eliminating and improving the problematic properties of the conventional impressions (CVI) technique which Christensen notes as:

- Reduced mess when taking the impression and less armamentarium requirement, hence more time can be focused on patient care and interactions.
- Increased patient satisfaction as there is less associated discomfort. This is especially important for those patients with a strong gag reflex.

- Removes the need to ship impressions to the laboratory to have prosthesis produced. Instead, it can be digitally sent, thus, creating easier communication with the lab technicians.
- Reduces overall treatment time as no disinfection, pouring, casting or trimming of the model is required.
- The accurate scans produced from digital scanners means articulating the cast is no longer required in many cases (Christensen, 2008).



So, should we all move from
conventional impression
techniques...



Figure 1: CEREC Omnicam IOS by Dentsply Sirona. Image taken from the Dental Royal London Hospital. Currently being used by postgraduate students.

Ultimately, a plethora of factors are involved in this question. Equally, the answer to this question will vary from one clinician or clinic to another. There are a myriad of intraoral scanners and studies out there to read and compare between. Whilst studies may show positives or negatives of the digital scanners in terms of their required function, the logistics such as cost, space, maintenance and training may not always be factored in. In this article, I will discuss the data for 3 different scanners: CEREC Omnicam by Dentsply, iTero by Align Technology and Trios by 3Shape; against CVI's, delving into patient satisfaction/acceptance and time taken for the scans.

Patient satisfaction/ acceptance:

Patient satisfaction can be very subjective and involve factors such as ease of treatment, comfort, time, taste/smell and expectations. At the end of the day, whilst we want to utilise the best and newest programs and materials, if the patient's response or feedback is suboptimal, this alters what treatment we can provide and how

we provide it. Yuzbasioglu et al. conducted a 9-item questionnaire to understand patients' perception and preference of the CEREC Omnicam IOS over CVI's. Some of the questions in this questionnaire included 'Which impression technique is more comfortable from point of comparison of two impression procedure?', 'Which impression technique do you suggest in case of a friend's need for impression taking?' and 'Which impression technique do you prefer from point of feeling taste/smell or voice/heat during impression procedure?'. A 100% preference to the digital scanner was found amongst the patients over CVI methods (Yuzbasioglu, et al., 2017). Whilst the participants of this study were medical students, it would be interesting to understand how anticipation to being in a dental clinic, with all the smells notorious of a clinical setting and patient anxiety and stress, would alter their perception or preference for either impression techniques. Preference for IOS's over CVI's was also noticed in a 7 statement post-impression survey given to the TRIOS IOS participants of the study conducted by Burzynski, et al.. Statements included 'Having impressions made is comfortable', 'The impression was painless' and 'The impression made my mouth dry'; the results of which indicated greater agreement for digital impression over conventional methods. However, there was no significant difference in the results ($P > 0.05$). In addition, no comparisons can be drawn from this study as participants only experienced one impression technique, hence, would be unable to compare IOS's and CVI's to pick a favourite. Regarding participants that had impressions taken with the iTero IOS in Burzynski's study, comfort levels and lower pain experience was found to be significantly greater for iTero participants compared to the TRIOS and CVI groups (Burzynski, et al., 2018). This difference has been attributed to the iTero scanner slimmer scanner wand and smaller intraoral camera, both of which result in greater comfort in the patient's mouth and lead the patients to believe the time being taken for the impression was shorter than the reality.

Time taken:

Taking up Christensen's point that IOS's reduce total treatment time due to the lack of need to pour, cast and trim models; the 'fast and precise' CEREC Omnicam IOS was tested for its efficiency against a conventional impression material by comparing mean times in points along the treatment and assessed its clinical

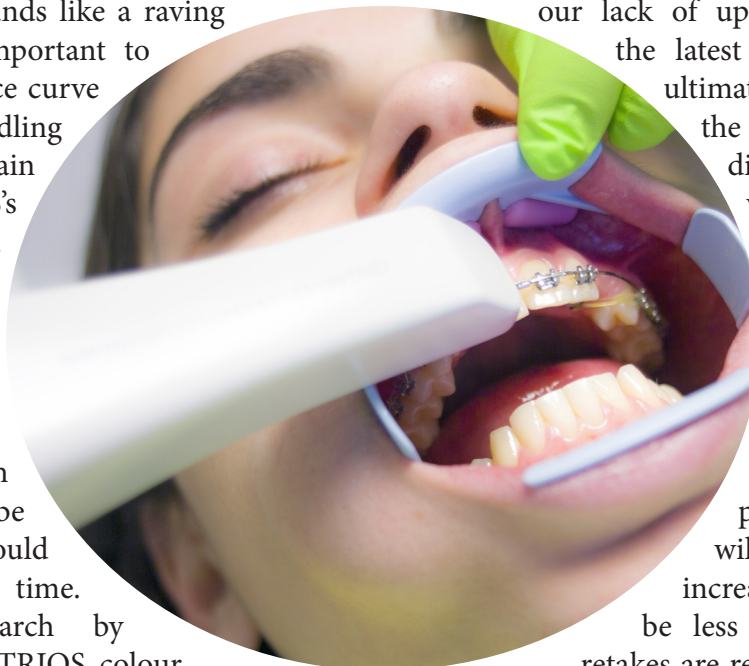
significance (Christensen, 2008). Not only are there fewer steps involved in the CVI method, but mean times for both upper and lower scans, bite registration and total treatment time was reduced with CEREC and found to be clinically significant (Yuzbasioglu, et al., 2017). Whilst this all sounds like a raving review of IOS's, it is important to note there is an experience curve to climb with the handling of IOS's, and time to train clinicians on the use of IOS's also needs to be factored into the overall scheme of things. Information this study lacked was the operator's experience, and ultimately, were the scans any good? In which case, a re-scan would be indicated and hence, would increase total treatment time. Interestingly, the research by Burzynski, et al. on the TRIOS colour scanner, which was the most advanced scanner at the time of this study, found that when looking at impression taking alone, the IOS had a significantly greater median time (minutes) compared to the alginate CVI material (Burzynski, et al., 2018). The iTero IOS which was also assessed in this study however was found to have a quicker median time compared to CVI's, but this was not clinically significant. However, before dismissing these scanners, whilst the impressions took longer on the IOS and were not significantly slower for the TRIOS and iTero scanners respectively, time for disinfection of trays, pouring and casting of impressions for the CVI technique was not factored into the study. Furthermore, the scanner of yesterday may not be like the scanner of today, as IOS's are constantly being updated and improved by manufacturers in this fast-changing field of dental technology.

What is the take home message?

We can see from the studies covered that certainly patient acceptance for the digital scanners is high and in fact higher than CVI techniques. There is however still room for improvement for the IOS's in term of the time they take. We also still do not understand the time taken to become accustomed to these digital scanners; ultimately being taught conventional impression

techniques in dental school gives graduates a head start over digital systems. Arguably, if professionals are introduced to new technologies earlier in their career, they may be more accepting of this technological change and gain more experience earlier on. Furthermore, our lack of up-to-date studies regarding the latest IOS releases means that ultimately we cannot comment on the time efficiency of current digital scanners. Inevitably, with time we would expect this to improve, achieving faster full arch scans. Another arguably more important factor to consider regarding digital scanners is their accuracy, in vivo. With poor accuracy, not only will time taken for the scan increase, but the patient would be less than pleased if multiple retakes are required. However, going off

the studies by Yuzbasioglu et al. and Burzynski et al., preference for digital scanners was greater, and in the case of the CEREC scanners, 100% preference was recorded against conventional techniques. This certainly suggests that people are ready for change, and with consistent improvement of the IOS's time efficiency, there will certainly be a place for the intraoral scanners in all dental settings in the near future.



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Same day crowns using CAD/CAM technology

CAD/CAM technology has revolutionised crowns with the potential for same day prep and fitting of the definitive restoration using aesthetic materials.

Written by **Emily Castle**

Edited by **Parsa Aghamohammadi**

Computer aided design and manufacturing (CAD/CAM) is the use of a computerized system to fabricate fixed and removable, permanent and provisional prostheses and is being widely adopted both in dental practices and in laboratories (Davidowitz and Kotick, 2011). This can revolutionise fixed prosthodontics,

restorations that fit perfectly, providing greater efficiency in the production of the restoration in terms of time and expenditure.

The clinical workflow for fabricating chairside restorations using the CAD/CAM process is as follows: Firstly, the tooth in question is prepared for the crown by reducing all surfaces adequately to

a luting agent (Davidowitz and Kotick, 2011). A summary of the workflow is displayed in figure 1.

Advantages and disadvantages of CAD/CAM

There are several major advantages of CAD/CAM techniques. Patients generally are very satisfied with the speed of the procedure and the

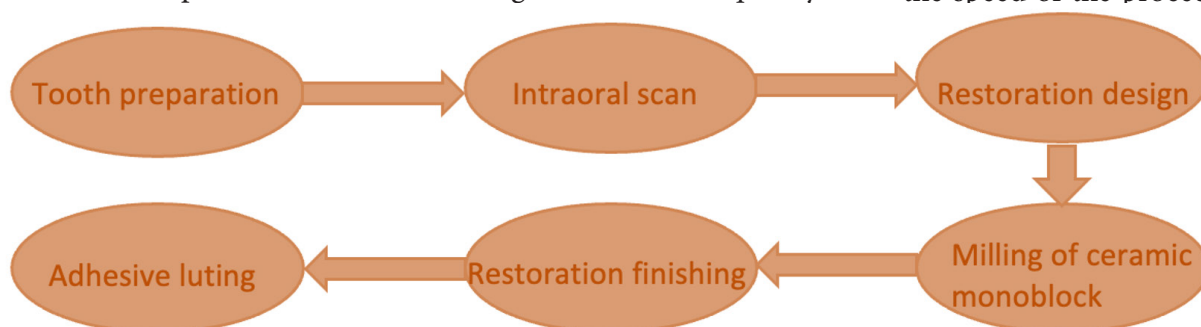


Figure 1 – Summary of CAD/CAM workflow

as material selection for crowns often means a compromise on the part of the patient, whether this be aesthetics as with full metal crowns; or strength and longevity as with porcelain crowns and porcelain fused to metal crowns. The development of CAD/CAM techniques allow stronger and more aesthetic materials to be utilised, meaning there are more options to patients than ever before (Miyazaki and Hotta, 2011). There are also benefits for the clinician, as CAD/CAM technology offers the potential of same day, chairside

accommodate the material chosen. Once the tooth is prepared, an intraoral camera is used to produce a digital impression by scanning the geometry of the patient's mouth. Software is then used to convert the digital impression into a design model for the proposed restoration. This is then transferred onto a ceramic monoblock via a milling chamber. The crown can then be finished by colouring, glazing and polishing (Li et al., 2014), before being placed on the prepared tooth for assessment and finally cemented in place using

materials available can produce excellent aesthetic results when compared to traditional full metal crowns (Karpukhina, 2021). CAD/CAM techniques also allow minimal reduction of natural tooth and can produce excellent marginal fit as the crown margins are scanned and reproduced with high precision and predictability. This reduces the incidence of secondary caries, a major cause of failure for crowns (Vianna et al., 2018). In CAD/CAM techniques, traditional impressions are replaced by intraoral scanning, which can

make impression taking much more palatable for patients that find impressions challenging, such as patients with an overactive gag reflex (Davidowitz and Kotick, 2011).

One of the main disadvantages of CAD/CAM dentistry is expense; both for the practice and for the patient. The purchase and maintenance of specialist equipment means that the cost incurred by the practice to begin the manufacture of these restorations can be prohibitive (Fasbinder, 2018). The cost for the patient is also high due to the specialist nature of this process. One way around the start-up cost to the practice is to use a lab which can mill the crowns, although this can reduce the potential for same-day restorations (Davidowitz and Kotick, 2011). Another major disadvantage of CAD/CAM is the challenge posed in selecting a material, the specifics of this process are outlined below, because not all CAD/CAM compatible materials can be used in all areas of the mouth, so inappropriate material selection can result in significant wear to the opposing dentition, or fracture of the restoration, leading to costly replacement (Miyazaki and Hotta, 2011).

Materials for same day restorations

Zirconia is polymorphic, existing in three temperature dependant structures and exhibits transformation toughening, where build-up of compressive forces around defects prevents crack propagation (Karpukhina, 2021). Adding yttrium to zirconia stabilises the structure, improving its properties, particularly fracture resistance and flexural strength. It is more conservative than a porcelain

fused to metal crown and has similar translucency to a natural tooth (Miyazaki and Hotta, 2011). Some disadvantages of zirconia are inferior aesthetics to porcelain, and contraindication in bruxist patients (Meirelles, 2017) as its hardness can damage the opposing dentition. It is also expensive with a long sintering procedure, which can make same day manufacture less feasible (Fasbinder, 2018).

Resin nanoceramic is made from silica and zirconia nanoparticles treated with a silane coupling agent, forming a highly cross-linked resin matrix (Meirelles, 2017). They have higher flexural strength and fracture toughness than ceramic and are repairable with composite. Resin nanoceramic is easy to mill, making it ideal for same day restorations but has inferior aesthetics to ceramic (Lambert et al., 2017).

Leucite reinforced ceramics contain leucite tetragonal crystals (up to 50% volume) which increase its flexural and compressive strength. The leucite crystals act as crack deflectors as they contract more than the matrix, allowing stresses to build up around them (Lambert et al, 2017). Leucite reinforced ceramics have relatively low strength, so are at risk of fracture if they are used in posterior regions (Meirelles, 2017).

Conclusion

CAD/CAM dentistry has significant potential in fixed and removable prosthodontics, as dentists can produce perfectly fitting crowns on the same day as the prep, eliminating previous concerns with impression taking and storage, temporary crowns and repeat appointments. With careful selection of the material to be used,

the fixed restoration produced can also be highly aesthetic, and have excellent longevity, improving patient satisfaction when compared with traditional crown fitting (Miyazaki and Hotta, 2011).

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Midway...

Written by **Zaynah Fariduddin**

Edited by **Duniya Majumder**



While it may have been delayed due to COVID, BDS4 students were not about to miss an opportunity to commemorate the halfway milestone on our journey through dental school with the highly anticipated Midway Ball. This prestigious event took place at Kibele Restaurant on Great Portland Street, right in the heart of London, where we enjoyed a delicious three course meal and spent quality time with friends and tutors.

Attendees arrived to a drinks reception, handwritten name cards and favour bags to take home; these contained beautiful customised candles by Merait, pens, bottle openers and hand sanitiser (one way to promote COVID safety!). We had a 'Magic Mirror' photobooth, milk and white chocolate fountains and a photo wall filled with memories submitted by the year group, complete with a 'Midway Ball 2021' banner. These little details and decorations made the night an extra special way to highlight students' achievement of making it this far at Barts.

Following speeches by our Dean Professor Paul Coulthard and BDS3 Year Lead Dr Younas, we presented the Midway Awards. These ranged from 'The most likely person to become an Instagram dentist' (won by Jade Kwaku) to 'Best trim' (won by Joseph Gbenro). Zulqarnain 'Zed' Rashid even won two awards, Class Clown and Best Dressed! We also presented a couple of staff awards, including 'Greatest Year Lead of All Time' for Dr Younas and 'The Students' Rock' to Dr Dominic Hurst. The unwavering support from these



tutors was critical for our year group during the various challenges we went through last year so it was wonderful to have an opportunity to honour their efforts.

One highlight of the evening would have to be the rap performance by our very own student-formed BDS4 rap group Dental Drillers (comprised of Milton Justinsuthakaran, Aniraj Sapra, Pardeep Sondhi and Riyan Shah). Their flawless performance of original songs 'Patient X' and 'Dental Drillings', were enjoyed by students and staff alike. We then opened up the dance floor for our DJ to play music as attendees danced the night away.

This event would not have been possible without the help of my amazing committee – Mariam Khan, Syeda Anjum and Carmen Dhesi. The four of us worked tirelessly to nail down a venue, obtain sponsors, organise decor, pack favours bags and all the other little details. Unfortunately we were too busy making sure the event was running smoothly to get a committee photo on the night! Thank you to our sponsors Dental Defence Union, Roderrick Dental and Dentify, as well as the Dental Society (particularly treasurer Aadam Ul-Haq for his hard work behind the scenes). Organising the Midway Ball was no easy feat but it was an immensely successful event and I am so grateful to everyone who helped make it a reality.

Here are some photos from the night – thank you to Stylianos Hadjiforados for his wonderful photography.



...or should we say 'Three-Quarter- Way' Ball?

THE METaverse

Written by **Safwaan Hoque**
Edited by **Nimi Osunkoya**



Facebook is the largest social media platform in the world with 1.91 billion active monthly users and recently changed their name to 'Meta,' pre-empting a change in how social media will be used. The name 'meta' indicates how social media is evolving into the 'metaverse.' The 'metaverse' can be defined as a virtual world where people will be able to socialise and work, which will change the way people live their lives (Ball, 2021).

...However, how will this affect dentistry?...

Currently dentists use social media as a means of marketing space. Dentists can upload videos and photos on social media platforms like Instagram showing the 'before and after' effects of their procedures. This helps dentists advertise their skills with the hope in attracting new patients. Mainly cosmetic dental procedures are shown with teeth whitening and teeth straightening being the most popular, as it gets the most likes and interactions from social media users. Social media however, puts an unrealistic expectation on people having the perfect white smile due to edited photos, which does result in people having invasive treatments such as getting veneers on healthy teeth. This causes people to focus more on the appearance of their teeth rather than their general oral health. Additionally, the social media platform Tiktok has had increasing popularity leading to dentists using the platform to make content. Many dentists use Tiktok to engage with a younger demographic making educational videos about oral care and comical videos about dentistry. These videos are beneficial as they help people overcome the fear of going to the dentist, a phobia which causes people to neglect going to their dentist resulting in poor oral health. Dental students also use social media to document their journey from applying to dental school and then their daily lives as a dental student. Aspiring dentists find these videos to be motivational and gives guidance during the application period. Social media allows school students to communicate with current dental students gaining an important insight into the course and career of dentistry.

With social media transitioning into a more interactive space with the development of the 'metaverse,' the actual impacts of the 'metaverse' on dentistry is unknown however, predictions can be made. Bill Gates, the founder of Microsoft, has stated that 'most virtual meetings will move from 2D camera image grids- to the metaverse, a 3D space with digital avatars' (Jones, 2021). This could lead to initial dental consultations becoming virtual with patients not having to physically be at the practice. Members of the dental practice team such as the receptionist will not necessarily need to be at the practice with the virtual avatars taking their place. The 'metaverse' will also lead to advancements in 3D imaging, which may allow for scans of the oral cavity to be made outside the dental practice (Virtual

reality society, 2017). Dental students may learn in a different manner with lectures taking place on the 'metaverse' but more interactive than zoom lectures with 3D digital avatars. Henceforth, students may also conduct practical work away from labs and clinics on the 'metaverse' to simulate how working in a dental practice will be. The use of the 'metaverse' can be limited by its accessibility to everyone. Costs of using the metaverse is unknown and the willingness of people to use the 'metaverse' is also in question.

Social media currently is used as an advertisement platform in dentistry but with the changes in social media, dentistry will adopt a more practical use of social media with the 'metaverse' changing the patient's interaction with their dentist.

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Growing a business *over social media*

Written by **Demi Bains**
Edited by **Duniya Majumder**

AN INTERVIEW



With more of us choosing to shop online than ever before, social media marketing and brand awareness online have become a major key to success in business. Both new and well-established businesses are now utilizing social platforms to boost their sales and access a wider audience. To help understand this concept, I interviewed Yas and Saud of BDS4, the creators of “ForAllThingsDentistry”, who were kind enough to give an insight into this ever-growing topic.

Q: So, could you give us a quick overview of what “ForAllThingsDentistry” is all about?

A: “ForAllThingsDentistry is a business focused on helping students all over the world better their planning and organisation with our dental student specific products, including the very first UK based dental student planners - the only one of its kind! We design and hand-make dental planners, notebooks, notepads, bookmarks and more, with many personalization options available across our entire product line.”

‘There will never be a perfect time to start, so just go for it, you’ll figure it out on the job!’

Q: Given that so many people make notes digitally now, what made you want to go back to paper?

A: “While it is true that digital note-taking has become increasingly popular in recent years, a large market for paper-based notebooks and planners still remains. The positive effect of hand-writing on understanding and retaining information over digital note-taking is a widely accepted concept. Many students would agree that there is degree of satisfaction from the sensory experience of a tangible product that you don’t get with digital products. Our A5 notebooks, planners and clinical skills books can be used on clinics and during lab sessions with their hardback wipeable covers.”



Q: What have you found most challenging about selling online?

A: “Planning and creating new and engaging content every day and balancing this with our social and academic lives has been the most challenging. This includes filming and editing short videos, regularly updating website product photos, sharing interactive instagram stories, posts and more to keep our social media pages active and engaging!”

Q: How have you been able to reach such a wide array of dental students?

A: “The main social media platform that we use to reach our intended consumers is Instagram. Here we are able to reach the very niche market of dental students by using carefully thought-out dental related hashtags on all of our Instagram posts. Our customers often share their positive experience with our business by posting their new product(s) across their social media and tagging our account. We also further increase our reach via word-of-mouth and through students using our products at university. Whilst customers are redirected to our website via Instagram, we also have a shop on the popular global marketplace Etsy where we can further market our products, particularly on an international scale.”



Q: What advice do you have for those wishing to start a business online?

A: “It all starts with a unique idea, something that you’re extremely passionate about getting out there. That passion is what gives you the resilience you need to get through the inevitable ups and downs and the hard work it takes to run a business. Have trust and faith in your own personal creativity and success will come to you when your ideas come from you. Social media is a great tool for online businesses, spend time on growing your page and make the most out of all the platforms available to you. Perfect your product photos and descriptions to show off your product to a potential customer behind a screen. Running an online business is extremely rewarding, especially when you receive kind messages and reviews from customers sharing their satisfaction.



As difficult as it is to start a business from the ground up, we are fortunate in this digital age to have the means to forge connections with people all over the world through the click of a button. Hearing the thoughts of two young business owners has been valuable and shows the exciting things that are achievable when you have a passion for a product idea!

DA

