Since 2016, the FDI World Dental Federation and oral health product manufacturer Philips have been partnering to promote World Oral Health Day on 20 March. In this interview, Dental Tribune International (DTI) speaks to FDI President Dr Kathryn Kell and Philips CEO of Business Group Health and Wellness Sinéad Kwant about the significance of this day, challenges in improving oral health globally and how the collaboration between the two organisations can help.

**DTI:** In your opinion, is oral health improving worldwide?

**Kell:** The global burden of oral disease remains significant and widespread, most people will be affected in their lifetime. The message that good oral health is an essential part of overall health and quality of life is still not fully embraced everywhere, and individuals across the globe continue to suffer from poor oral health. Oral health promotion, as well as prevention and control of oral disease, is key to ensure that people around the world are prioritising their oral health. As the authoritative voice of dentistry, it is our responsibility to step up to the challenges and drive the fight against oral disease to ensure that we are fulfilling our vision of leading the world to optimal oral health.

**Sínead Kwant:** While there is a growing trend for people to integrate technology into their lifestyles to improve their health and well-being, such as using apps to track diet and fitness or oral health goals, there remain larger global issues that impact oral health. While people in the developed world live longer, increasingly sedentary lifestyle styles have led to a surge in chronic diseases, including obesity and diabetes. These in turn have significant implications for oral health. With almost four billion people worldwide affected by oral disease, it is our job to raise awareness of and educate people on the link between oral health and overall health and encourage them to develop healthy habits that last a lifetime.

In your opinion, what are the main risks or barriers to people not focusing on their oral health?

**Kell:** Oral health is affected by a wide range of social determinants that can impact access to care. Lack of access to education, however, remains a barrier to people maintaining good oral health. Therefore, we work hard to raise awareness of the importance of oral health and educate people on the intrinsic link between oral health and general health. We advocate preventative care, early detection and treatment to encourage people to adopt good oral hygiene habits and follow the advice of oral health professionals so that they understand the impact of oral disease on their overall health and well-being.

**Kwant:** One of the main barriers to people focusing on their oral health is education and awareness about the importance of good oral health habits and the impact on overall health. Another reason is that many people do not visit their dentist or hygienist regularly and discuss their oral health. They go when there is something wrong rather than practising preventative care. Working with the FDI, we hope to raise awareness of the importance of building good oral health care routines and encourage people to visit their dental professional and, importantly, to follow his or her advice and maintain good routines between visits.

**What do you hope your World Oral Health Day campaign will achieve?**

**Kell:** This World Oral Health Day, we hope that people will embrace the campaign theme of “Say ahh: Think mouth, think health.” We want people to make the connection between their oral health and their general health and recognising the close association between the two and the impact that one has on the other. We encourage people everywhere to commit to prevention and control their risk factors, oral health professionals to commit to educating their patients on the positive impact of protecting their oral health on general health, and policymakers to understand the countries’ oral health challenges and launch policies that address oral disease at a local, national and regional level.

**Kwant:** Our World Oral Health Day, we want to highlight how a healthy mouth is critical in preventing oral disease, as well as raising awareness of the link between oral and overall health. If we can get people to make small behavioural changes, these can go a long way towards positively impacting oral health, for example, their diet and brushing their teeth twice a day for two minutes.

Tell us about the FDI and Philips partnership and why it’s important?

**Kell:** Philips is a key ally in helping us ensure the success of World Oral Health Day. As leaders in the corporate world, companies like Philips have access to an international community of diverse stakeholders and—by working together—we can disseminate oral health messages to many more people globally. We have seen through their World Oral Health Day activation efforts that Philips is fully committed to improving oral health habits through meaningful innovation. We find this type of support instrumental in helping us improve people’s oral health across borders.

**Kwant:** We know that good oral health can have important associated benefits when it comes to overall health and wellness. Working with the FDI, we have the opportunity to team up and raise awareness of the state of people’s oral health. It is our job to understand the barriers dental professionals face when it comes to making sound recommendations and to provide solutions that help them to engage their patients on good oral health.

What is next for the future of oral health care?

**Kell:** Prevention is key. We must shift our attention from a traditional restorative approach to one that emphasises disease prevention and oral health promotion. Oral health professionals need to play a key role in educating patients on the implications of protecting their oral health. A more integrated approach to healthcare can help achieve better outcomes for patients with oral disease.

**Kwant:** We believe that we will see a move to more preventative care owing to the rise of digitally connected technology. This also has the possibility of transforming the relationship between the patient and dental professional by introducing the ability to share brushing results or work towards goals. This will change the way dental professionals communicate with the best patients and hopefully improve patient compliance between visits.

How does your partnership with dental professionals help to improve oral health globally?

**Kell:** Dental professionals are the principal providers of oral disease prevention and treatment and play an indispensable role in working to improve oral health around the world. They must take every opportunity to serve as global ambassadors for a health and encouraging patients to live healthy lifestyles in their daily practice. Education leads to action and action fuels change. It is up to our profession to step up to the challenges and take action against the burden of oral disease.

**Kwant:** Dental professionals are key to improving oral health. By partnering with the FDI, we have the opportunity to team up and raise awareness of the state of people’s oral health. It is our job to understand the barriers dental professionals face when it comes to making sound recommendations and to provide solutions that help them to engage their patients on good oral health.

What is the impact of oral health on overall health?

**Kell:** Oral health and general health have a close two-way relationship. The mouth is a mirror of the body and offers clues about the status of overall health. Many general health conditions increase the risk of oral disease and vice versa. Oral disease can impact every aspect of life, including personal relationships and self-confidence, school and job performance, and even enjoying food. Maintaining a healthy mouth contributes to a lifetime of well-being and helps people live a better quality of life into old age.

**Kwant:** We are continuing to explore the link between oral health and systemic health, but we know that it has an important effect on overall health and wellness. A well-documented example of this is the link between diabetes and oral health. Diabetes affects hundreds of millions of people worldwide, and the difference good oral health care can make to the overall health of those with the condition can be significant. Taking care of one’s mouth can have an important longer-term influence on overall health and wellness.

If you could give one tip or piece of advice about oral health, what would it be?

**Kell:** It is never too early or too late to start looking after your mouth; your body will thank you! Adopting good oral hygiene habits, having a healthy diet that is low in sugar, quitting tobacco use, keeping away from excessive alcohol consumption, and having regular dental check-ups help protect the mouth and body at all ages.

**Kwant:** I would recommend visiting the dental professional, especially from a young age. I would like to encourage people to visit their dental professional or hygienist regularly and to follow his or her advice. The two most common types of oral disease, tooth decay and periodontal disease, are completely preventable with an effective oral care routine, brushing for two minutes twice a day. It is important to remember that good oral health is for life, not just for World Oral Health Day, and developing these habits from an early age can positively impact on longer term health and wellness.

Thank you both for the interview.

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**“Good oral health is for life, not just for World Oral Health Day”**

An interview with FDI President Dr Kathryn Kell and Philips CEO of Business Group Health and Wellness Sinéad Kwant
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The need for an endodontic skill set within the profession is higher than it has ever been. Culturally and socially, there have been significant changes in patient perception to the news that a tooth is in trouble, where the solution is either root canal treatment or removal. I am old enough to have treated patients who needed the replacement of complete dentures that were a “wedding gift” in their youth. As a gesture of goodwill to the bride in waiting, wholesale extractions and the provision of complete dentures were gifted to ensure the absence of dental problems or expense throughout their new found love.

How things have changed. Patients can now attend seemingly the absence of dental problems or expense throughout their new found love. We are aware that cracked teeth are difficult to diagnose owing to the clinical picture being variable and inconsistent between patients and their presentations. Of course, parafunction has been shown to increase the risk of crack and subsequent fracture. Outside of contin-

ual habitual forceful actions in patients who brux, solitary incidents of biting down on something unexpectedly hard, such as an olive stone, are also common. Such catastrophic incidences may be more common in undermined, weakened heavily restored teeth. The prevalence increases in patients who are middle-aged and is greater in females than males, with the overwhelming majority affecting posterior teeth. The fate of such teeth varies from simple repair of a bunted cusp to the need for endodontics and extraction. One interesting feature in the literature seems to point to teeth with steeper cuspal inclines being more susceptible to fracture. This morphological feature is likely to result in the wedge effect of deep cusp–fossa relationships between teeth. Frequently first molars have been implicated as common teeth to fracture owing to their closeness to the masseter muscle and the temporomandibular joint hinge. When loss of vitality is considered and root canal treatment is delivered, protecting what remains to prevent crack formation seems to be the consensus through cuspal coverage. This apparent susceptibility may be caused by a weakened tooth, but may also be due to the loss of pro-

the hope of seeing something of note, nothing. The patient protests “I got the pain every now and then, but when it happens, it’s really something else…can’t you see anything?” You sit the patient back down again and look at the amalgam filling with the suspicious eye. It looks the same as every other asymptomatic amalgam you have ever placed during your career, your thumbprint is uncanny. As your senses have been sparked, the eye of faith is overborne: there is a bit of faceting on the cusp, there are some craze lines, the patient does tend to wear her restorations. “It’s cracked… the tooth is cracked.” Your patient creeks their neck up to look at you more intensely. “Can you fix it?” You see our patients, as much as we do, are perplexed by cracked teeth. “The tooth looks “normal”, feels “normal” outside of the occasional painful episode, why can’t you notice?” “Stuck together again” like some old china vase?

The diagnostic conundrum is over. Balance, you know what the problem is, as does the patient now, despite being fairly unconvinced with your antics. The next nudge is how to treat, if at all. Although you cannot be 100 per cent sure that there is a crack, it might not propagate, it may stay the “same” and the patient may not need any treatment as long as he avoids the tooth. What about their Snickers though?

Some patients may accept this. Generally, patients are in two camps with whatever diagnosis we provide them with. Some are proactive “Right there’s a crack, you can’t mend it. Let’s whip it out—I’ve still got another six teeth in my top jaw can chew on, no worries”, while others are reactive “You know, let’s just sit on it and if it gives me a problem, then I’ll come back”, to which you may reply it could catastrophically snap or fracture. The alternative, and the evidence for this is fairly light on the ground at the current time, is to instigate strategies to reduce the likelihood that the tooth will become more symptomatic—in other words, you want to brace the crack. Similar to my uncle’s wrinkly belt and his ever expanding waistline, you can hear the leather strain as he tucks into his pie. What did we get taught? Use a copper band or an orthodontic band, both of which may be difficult to source in primary care. Or a copper band or an orthodontic band, both of which may be difficult to source in primary care. Or what did we get taught? Use a copper band or an orthodontic band, both of which may be difficult to source in primary care.
The tooth was taken out of occlusion. Of course, it was at the back of everyone’s mind that this tooth was unrestored and she had a pristine mouth. She saw a second endodontist in the practice owing to the escalation of her symptoms. By this time, she wanted the tooth extracted, but the romantic amongst us all felt the tooth could be saved, so it was extirpated! The pulp positively nuked and the tooth dead. That should have sorted it right? Unfortunately, her symptoms continued. Could it have been something atypical?

She had been stressed and grinding. More deliberation, still no further was the diagnosis. The tooth was dressed once again, with a change in the medicament. Still no joy. A restorative dentist then proceeded to drill the crack out and restore with composite. Still no joy.

The tooth was taken out of occlusion when one dentist noticed the development of periodontal ligation widening on one of the long-corne periapical radiographs. The root canal treatment was completed jointly by two excellent endodontists and the second mesiobuccal canal was located. Under any other circumstances, it was a fantastic clinical outcome. Unfortunately, the pain was unabating (Fig. 4). Let us see as much as we can. A CBCT scan was taken that was also inconclusive (Fig. 3). Was it something to do with the sinus? The radiographic report was suggestive, but again nothing conclusive. Towards the end of the two weeks, the patient marched herself into the office of the exodontist to have the tooth extracted. Misery. We had failed.

With the tooth in hand and a wry smile, the nurse dipped the tooth in disclosing solution, which identified one large crack in the furcation area of the palatal root with several accessory ones (Fig. 4). The relief was palpable on her face. Despite losing a tooth, the culprit had finally been identified. It seems as though the mechanical failure of teeth, unlike our old adversary, bacteria, has the ability to trump us, from diagnosis through to treatment, despite our best intentions, knowledge and experience.

The question that crosses my mind as I see the slow but steady increase in “crackitis” is how are we going to manage this contemporary problem? Will we see the emergence of crackologists? The first step is raising awareness among patients and the profession. Patients need to stop themselves from grinding their teeth needlessly during the day and have to instigate strategies to reduce the likelihood of parafunction in the night. One emerging issue is psychological health. Patients are increasingly stressed and depressed, which is a recognised risk factor. One fairly paradoxical issue is that medication may actually increase the likelihood of bruxism, so the pharmaceutical industry may be perpetuating the problem in those stressed people who already grind and grind even more.

Cracking the code of fractured teeth is going to be difficult and will be a contemporary challenge for us all. One of my trainers from yesterday, who had more wisdom than Yoda, once said, “From these words never depart, lips together and teeth apart.”

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Mastering the implant digital workflow

Dr Ross Cutts, UK

Whether we like it or not we are embracing the digital era in our brave new world. Many dental practices are now becoming paper free—a digital innovation—and even using tablet computers to record patient details and medical histories. We are continually surprised by the rising age of the technologically savvy patient, particularly those of a certain generation that perhaps we assume to be less ‘digital’ than the perceived smartphone generation. This change in “digital” than the perceived smartphone generation. This change in patient demographic and attitude towards technology is filtering through to us in the dental profession.

Dental implantologists tend to lend themselves more readily to the digital revolution of dentistry in the UK and globally. Many practitioners opposed to or reluctant to embrace it, are actually being influenced by it from shifting workflows in dental laboratories even where more traditional clinical practices are followed chairside. Quite often wet impressions are poured, and stone models are scanned to produce digital stereolithography (SL) files for laboratories to process during crown and bridge unit manufacturing.

As an implant clinician you do not have to invest in a computer tomography (CT) scanner or chairside intraoral scanner—there are ways that other centres and laboratories can provide these services—however having these tools at your disposal greatly increases your efficiency and you are not relying on external services for your patients.

So how do we begin the implant digital workflow?

Treatment planning

Successful implant treatment begins with thorough case assessment and planning of the proposed restoration. This is important for all cases not just what we deem the complex ones, even the most experienced implant placer can miss a potential treatment planning hazard especially during a busy day.

Accurate study model casts are an essential part of this, however we can now use intraoral scans preoperatively to begin the digital workflow. We take a scan rather than impressions to form digital models. Our laboratory can then use these to create digital wax-ups of proposed treatment outcomes (Figs. 5 & 6).

We are routinely used to 2-D radiograph imaging techniques within dentistry but with the availability and access to cone beam computed tomography (CBCT) scanning devices now we are able to assess bone quantity and quality of proposed implant surgical sites (Figs. 3 & 4). With ever reducing doses of 3-D imaging and improving accuracy we have the option to use CT scans combined with clever software packages such as coDiagnostiX™ (Dental Wings) to plan safe and accurate implant placement and restoration. We are able to preoperatively plan precise implant placement with safe surgical margins away from important anatomical structures such as the inferior alveolar nerve or maxillary sinus. From this we are then able to design and either mill or print a surgical guide to use for precise implant placement (Figs. 5–7).

Surgical treatment phase

Even with assisted or guided surgery there are sometimes certain restrictions that prevent us from achieving the most ideal implant placement, such as in the case presented here, where posterior access in the second molar region is reduced, making it extremely difficult to achieve the perfect parallel (Figs. 8 & 9).

There are fully guided systems available which allow for absolutely precise implant placement, but these are fraught with complexities and should be reserved for experienced placers. The accuracy of surgical guides should not be used to make up for a lack of surgical competency.

There are many factors to be considered when using surgical guides, depending on whether the guide is tooth-, soft-tissue- or bone-supported. Tooth-supported allows the greatest degree of accuracy.

If tooth-supported:
- Are there windows in the guide which demonstrate full seating of the guide?
- Are the teeth which support exact positioning of the guide mobile? Any mobility adds a degree of inaccuracy.
- Is the guide made from a direct intraoral scan or a scan of a study model? If scanning a study model, would this be an accurate stone model representation? Otherwise one could risk poor seating and inaccuracy of the guide.

If soft-tissue-supported:
- Mobility completely negates any accuracy of the guide, so it should only be used for a pilot drill and then a more conventional surgical protocol should be adopted.

If bone-supported:
- Raising a very large surgical flap is likely.
- It is very difficult to get accurate full seating of a bone-supported guide in the precise planned position, thus one has to rely upon external fixation.
Prosthetic reconstruction

Once the implants are placed in situ and fully integrated we then have the option to choose between conventional wet-impression techniques and digital intraoral scanning devices. For the majority of cases intraoral scanning is extremely predictable and reliable—more so than conventional techniques—with milled (and lately printed) models having excellent properties and fewer accumulation of processing errors. However deeply placed implants, relative to adjacent teeth with deep contact points, are very difficult to scan and pick up. Straumann tissue-level implants offer a very straightforward restorative platform to scan from (Figs. 10–13).

With greater numbers of implants and fewer teeth to act as reference points intraoral scanning becomes less reliable, particularly across the arch. Therefore, we need to act with caution and be aware of its limitations. We have used composite flow stuck to the soft tissues to increase reference points for our scanners increasing their ability to stitch images more accurately together. With this in mind we cannot assume the scan to be accurate and any framework fabricated would be non-passive, we therefore are obliged to use other methods to verify the scans accurately. We have found locking temporary abutments within a composite framework introrally the easiest and most reproducible way to do so. It then allows us to design and mill a truly passive framework by Createch and a temporary acrylic bridge (Figs. 14–17).

Conclusion

There are many opportunities to opt in and out of using technology regarding the digital implant workflow. For anyone considering capital investment, the most important question to ask is, how will or can this improve the outcomes I provide to my patients and then determine whether that warrants the expenditure. Too often we are subjected to sales pitches of the next biggest thing by company sales representatives and gadgets and gizmos end up by the wayside.

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