The perils of periodontitis

Links with Alzheimer’s disease and the impact of diet, p16-23

Plus: Dublin dentist chairs international sports dentistry symposium, p24
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Analysis of dentists signed up to the Dental Treatment Services Scheme (DTSS) by the Irish Independent has revealed acute shortages of professionals available to provide free care to adult medical card holders. An exodus of dentists from the oral treatment scheme has left parts of Ireland’s Midlands region with just one dentist for every 4,700 medical card holders.

While nationally there is one dentist on the scheme for every 1,573 people, in the parliamentary constituency of Laois-Offaly for example this falls to just one dentist for every 4,762 people. The crisis is causing patient waiting times of up to three months in many areas and is forcing others to travel to other counties for essential treatment, with reports of people making the journey from Kerry to Dublin just to get a dental appointment.

Five other regions – south-east Dublin, Meath, Wexford, Sligo/Leitrim and west Dublin – have one dentist for every 3,000-plus adults with a medical card. This contrasts sharply with the Cavan-Monaghan region and Cork which have roughly one dentist for every 1,000 people.

The analysis was carried out using the Health Service Executive’s (HSE) official list of dentists signed up for the medical card, which stands at 812. However, it is thought the number of dentists actively participating in the scheme is significantly lower; in answer to a parliamentary question, it was revealed that just 634 claims were made under the DTSS last year. Duplications, dental technicians being listed as dentists and retired dentists still listed as practising are understood to inflate the figure.

Under the DTSS, medical card holders aged over 16 are entitled to free services such as teeth cleaning and extractions and up to two fillings per year. In total there are just under 1.6 million people with a medical card in Ireland, of which almost 1.3 million fall into the age of eligibility for the scheme.

Outside Leinster, the Sligo-Leitrim region has the worst ratio of signed-up dentists to medical card holders, at one dentist for every 3,230 eligible people. In Munster, Kerry is the most affected by the shortage, with one dentist for every 2,703 medical card holders.

The Irish Dental Association estimates that there are around 2,600 practising dentists in the country, meaning that less than one third are signed up for the state’s medical card dental scheme. In a recent survey of its members who hold a DTSS contract, 80 per cent said they no longer have the capacity to take on or see new medical-card patients. The research found that one patient in six waits more than three months for an elective appointment, while more than half of patients are facing similar waits for specialist care.

The findings come as dentists continue to put pressure on the Department of Health to enter negotiations on a new medical card contract. In response, a statement issued from the Department of Health and the HSE said that additional funding of €15 million has been made available this year to address the issues with the DTSS. It added that the disparity between geographical areas can be seen in dentistry in general, not just medical-card contractors, with centres of population often being better served than rural areas.

It said it cannot control which dental practitioners apply for contracts or where their dental practice is located and that the Government’s National Oral Health Policy, published in 2019, had highlighted the disparity of services. Where access to a dentist is a problem, local services assist patients in finding a suitable DTSS contractor and “in exceptional circumstances” the HSE assists patients to access emergency dental treatment by contacting private contractors or arranging treatment through HSE-employed dentists.

According to government figures, 131,626 more treatments have been provided under the DTSS in the first seven months of 2023 compared with the same period last year, with an extra 24,500 new patients treated. Officials credit the rise to several changes made to the DTSS in May 2022, which included increases in the fees paid to dentists contracted to the scheme and the reintroduction of scale and polish as an eligible treatment.

This is all well and good, but the priority should not be amending the current contract but replacing it with an entirely new scheme that works for dentists and their patients. A mutually recognised consultative forum is the key to getting agreement on this and – fundamentally – a new Dentists’ Act.

“A STATEMENT ISSUED FROM THE DEPARTMENT OF HEALTH AND THE HSE SAID THAT ADDITIONAL FUNDING OF €15M HAS BEEN MADE AVAILABLE THIS YEAR TO ADDRESS THE ISSUES WITH THE DTSS”
Workforce planning is the latest buzzword to hover over the dental profession. I know what you’re thinking — yet more jargon — but what does it actually mean?

According to the National Institutes of Health (USA) - Workforce Planning is “…the process of analysing, forecasting, and planning workforce supply and demand, assessing gaps, and determining target talent management interventions to ensure that an organization has the right people — with the right skills in the right places at the right time — to fulfil its mandate and strategic objectives…”

Again, I can hear the buzzword klaxon from here! But if you actually break down the definition — and apply to the Irish general dental practice context (particularly) it makes perfect sense to examine the areas mentioned within the (albeit) clunky definition.

Recent media attention to the shortage of dentists and dental nursing/auxiliary staff has highlighted a long-held view that there is a significant deficiency in key/critical clinical staff. This is old news to many of us who have been around the block before. In these pages, I have highlighted many areas (over the years) where there are deficiencies — not just in numbers but in specific areas of training — which the clinician of 2023 needs.

A brief review of the current situation in relation to associates and patient demands is probably the best place to start. We live in an ever-growing population. Recent CSO figures tell us that the Republic has approximately 5.2 million inhabitants, according to the 2022 Census. The average age of population is 38 years. The increase in older population (65 years+) continues, set against a (broadly) longer term fall in fertility rates and an increase in life-expectancy. Recent studies continue to show the various health needs (and dependencies) that occur with advancing age. The dental treatment needs are amongst these and, as mentioned on these pages before, the always important area of gerodontontology will take centre-stage in time to come.

We are all acutely aware of the five to five-and-half-year training programme for undergraduate dentistry currently available at University College Cork and Trinity College Dublin. Recent announcements by the Government that an increase in student places will occur at the two dental schools (eight for Dublin and 20 for Cork) is welcome news. These figures appear in the press release from the Department of Further and Higher Education, Research, Innovation and Science (June 2023).

They also said that the Royal College of Surgeons in Ireland (RCSI) will begin training dentists — with an intake of 35. Veterans of the profession will recall that RCSI previously offered dentistry, but stopped in the 1970s.

All told, the proposed changes/increases will create 63 new dental students annually, yielding 315 across all centres at full roll out. This bodes well — but is it the full solution?

A recent review of the dentist to patient population sees Ireland languishing at around sixth lowest in the EU. While the Register of Dentists carefully captures the licensed practitioners, it does little to inform on the hours per week or treatment types provided. This adds to the complexity of accurate workforce planning.

With the continued advancement (and patient demand) for facial aesthetics, the profession is seeing many dentists spend more and more clinical time on non-traditional dental practice. Some have even devoted all clinical time to facial aesthetics. When we combine this trend, along with the demands of modern life, working part-time, child care (for both male and female practitioners), it muddies the water (to say the least) in relation to how much actual ‘traditional’ dentistry is being delivered in surgeries throughout the country each week.

Let’s look at the NIH definition for Workforce Planning again: “…analyzing, forecasting and … assessing gaps…” Surely, aside from more places, the very nature of how, and what, we train our oral healthcare clinicians is part of this too?

Finally, it would be remiss to just discuss the provision of dental surgeons alone, but, as is often mentioned on these pages, the lifeblood of any clinical practice hinges on our colleagues in dental hygiene, dental nursing, dental therapy and practice management. An examination of the current workforce planning for these critical roles must occur in tandem with any dental surgeon intake/development – to secure (as per the NIH definition) the “…organisation (practice) has the right people with the right skills in the right place at the right time…”

We will wait to see if the above measures will lead to an overhaul of the entire oral health workforce population — we can but hope — as none of us is getting younger!

We can but hope

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NI dentists’ income increases

But officials caution that a number of factors are at play

DETAILS of the earnings and expenses of General Dental Services (GDS) dentists in Northern Ireland, for 2021-22, have been published.

The report, by NHS England in conjunction with Northern Ireland’s Department of Health, presents key findings in terms of average gross earnings, total expenses, and taxable income estimates by dental type and contract type. It also contains a detailed breakdown of expenses by dental type, age, gender and activity demographics.

The average taxable income for all self-employed GDS dentists increased by 6.4 per cent in 2021-22, from £72,500 in 2020-21 to £77,200. For principals it increased by 13.8 per cent, from £122,000 to £138,800 – and for associates by two per cent, from £59,500 to £60,700. Average gross earnings for all self-employed dentists were estimated to be £158,000 and average expenses, £80,800.

General dental practitioners are independent contractors who have agreed to provide dental treatment and appliances on behalf of the Strategic Planning and Performance Group at the Department of Health.

Currently in Northern Ireland, there is only one type of contract under which dentists can operate; that is, General Dental Services (GDS). Under GDS they must provide a full range of mandatory dental services.

A self-employed principal dentist is also the practice owner/partner while an associate dentist is a self-employed dentist that enters into a contractual arrangement with a principal that is neither partnership nor employment.

However, officials said that year-on-year comparisons should be made with caution.

Factors which can affect comparisons include changes in the dental workforce, changes in type and volume of activity per dentist, changes to allowances, and VAT changes.

In addition, the first cases of COVID-19 in the UK were confirmed late January 2020 and the first UK-wide lockdown was announced in March 2020. Most routine dentistry was paused between April and July 2020.

This was followed by a period of recovery and restoration of services throughout the remainder of 2020-21. Restrictions and activity thresholds throughout 2021-22 will have continued to impact on earnings and expenses.

1 https://tinyurl.com/y9kap6d

*Gross earnings minus expenses, before income tax

**Previous reports have shown that on average male dentists tend to work longer weekly hours than female counterparts and this could be a contributory factor to the differences observed.

Patients waiting three months

A survey by the Irish Dental Association (IDA) shows that almost 40 per cent of patients are now having to wait an average of up to three months to get an elective appointment.

The survey also shows that more than half of patients are being forced to wait longer than three months for specialist care, which includes orthodontic and oral surgery. The IDA says this is the direct result of ongoing recruitment issues and a capacity crisis across the sector. More than half of dentists surveyed say they have tried to hire a dentist for their practice in the last 12 months with almost 60 per cent of those unable to find a suitable candidate.

One quarter of dentists are currently not in a position to take on new private adult patients, while four out of five dentists surveyed said they don’t have the capacity to take on any new patients, including children.

As a result, patients are finding it increasingly difficult to access essential care across both the private and public sector, particularly those most vulnerable.

“The stark results of this survey and the resounding response from our members substantiate our concerns surrounding the ongoing issues facing the sector, which are acting as significant barriers to patients who require access to adequate and efficient oral healthcare,” said Eamon Croke, the IDA’s president.

1 https://tinyurl.com/4cz6c4d9
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A new guideline aimed at helping oral health professionals to better prevent and treat peri-implant diseases among their patients has been announced by the European Federation of Periodontology (EFP).

Based on the latest scientific evidence, the guideline offers a set of recommendations to maintain the health of peri-implant tissues and to effectively manage peri-implant diseases.

The S3-level clinical practice guideline, the highest according to scientific standards, is the outcome of Perio Workshop 2022, a meeting of experts and stakeholders organised by the EFP last November.

After months of work, including a rigorous synthesis of evidence in 13 specially commissioned systematic reviews, and a comprehensive consensus process, the paper Prevention and treatment of peri-implant diseases – the EFP S3-level clinical practice guideline1 was published in the EFP-edited Journal of Clinical Periodontology.

Prevention of peri-implant diseases should start as soon as dental implants are initially planned, the guideline states, defining those interventions within ‘primordial’ prevention. Preventive interventions are also recommended when implants are surgically placed, or prosthetically loaded.

Once implants are in function, the patient should follow a supportive peri-implant care programme, including periodic assessments of the peri-implant tissue health and oral hygiene instructions.

The popular assumption that maintaining hygiene at dental implants is somehow less demanding than around teeth is wrong – in fact the opposite is true. The good news is that early detection of peri-implant diseases makes treatment easier, faster and more prone to success.

The guideline follows two similar S3-level clinical practice guidelines the EFP has produced in recent years for a modern, evidence-based management of periodontitis, developed in accordance with the 2018-updated classification of gum diseases.

“Our guideline provides oral healthcare professionals with advice for effective management of peri-implant diseases,” said Professor David Herrera, the paper’s lead author.

Prof Moritz Kebschull, one of the paper’s co-authors, added: “The guideline identifies specific interventions demonstrated to be useful, structures them in needs-based care pathways and examines the current level of scientific support for a variety of widely employed approaches and techniques.”


‘Urgent’ reform of GDC needed

The REFORM of how the General Dental Council (GDC) investigates dental professionals has been called for, as new research reveals significant numbers are experiencing suicidal thoughts or quitting dentistry as a result of their investigation.

In a Dental Protection survey of 125 dental professionals who have been investigated by the dental regulator in the last five years, 82 per cent said the investigation had a detrimental impact on their mental health and 96 per cent said it caused stress and anxiety.

A significant proportion (14 per cent) quit dentistry due to the investigation, and a further 38 per cent considered leaving. Over a quarter (28 per cent) said they experienced suicidal thoughts during the investigation1.

Dental Protection, which supports dental professionals with regulatory investigations, called on both the GDC and the government to take urgent steps to reduce the number of dental professionals needlessly dragged through this process, and resolve cases more quickly.

Dr Raj Rattan, Dental Director at Dental Protection, said: “We see how a GDC investigation takes its toll on the mental health of those involved day in day out, yet these survey results are still shocking and make for difficult reading.

“One dental professional quitting dentistry, or worse, experiencing suicidal thoughts due to a GDC investigation is one too many and this should act as a wake-up call for both the GDC and the government. GDC reform would give the regulator discretion not to take forward investigations where allegations clearly do not require action, to focus on the most serious allegations and process them more quickly, and the government must progress this with more urgency.

“But the GDC can and should make more progress in the meantime – it must deliver on its 2021 commitment to tackle the delays to cases itself, through alternative ways of managing the caseload and increasing the size of its team.”

1 https://tinyurl.com/bdz3xnh

Peri-implant disease guideline published

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- High quality – through our Signature Smile stents, your dentist can faithfully reproduce your new smile design into your mouth
- Inexpensive – compared to porcelain restorations, Signature Smile can give you results similar to porcelain veneers for a fraction of the price
- Repairability – if you incur any damage to your Signature Smile teeth, it is very straightforward to repair your original specification

**Introducing Mary Catherine**

Mary Catherine is an Enniskillen native, who was initially drawn to dentistry because of her interest in art and design. After graduating from undergraduate study at Queens University Belfast, Mary Catherine moved to Edinburgh where spent time honing advanced skills within specialist departments; specifically, special care dentistry, paediatric dentistry, oral and maxillofacial surgery and restorative dentistry.

Following training in Restorative and Surgical specialities, Mary Catherine provides advanced dental treatment such as dental implants, surgical extractions, crown and bridgework. At present her most popular treatment is the Align, Brighten and Contour procedure, which entails Invisalign, Whitening and Composite Bonding, a skill that she honed by learning from Dr Monik Vasant.

Building on a knowledge base of surgical and restorative techniques, Mary Catherine is currently undertaking training in dental implantology, and is on course to complete a postgraduate diploma in 2023. She is also studying for a master’s degree in advanced aesthetic restorative dentistry, accredited by the University of Portsmouth.

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Rural dental practice acquired

A RURAL dental practice with more than 6,000 registered patients has been acquired with new management planning to expand its range of treatment options to cater for both private and NHS patients.

Dental surgeon Carla Overend, who has worked in general practice for more than 10 years, has taken ownership of the long-established Clogher Valley Dental which has provided dentistry services to communities in the Fermanagh and Tyrone areas for almost three decades.

The business previously operated from two sites in Clogher and Fivemiletown but has consolidated under one roof to streamline business operations.

“By bringing everything under one roof in our Fivemiletown practice we can achieve greater managerial and administrative efficiency which will pay dividends as we work reduce waiting lists and increase accessibility to our services,” said Carla. “With scope for a third surgery we’re also well equipped to operate at the same capacity from one site.”

Plans to grow the business include the introduction of a range of new clinical treatment options, including cosmetic dentistry and short-term orthodontics, alongside dental plans and flexible payment options.

More support needed for eCPD

Regulator plans to engage on the value of creating a personal development plan

RESEARCH commissioned by the General Dental Council (GDC) has shown while many dental professionals take a positive and proactive approach to their own learning and development, more needs to be done to ensure the full benefits of the Enhanced CPD scheme are realised.

The Enhanced Continuing Professional Development (eCPD) scheme established a more flexible and personalised approach to lifelong learning for the dental team. The research was undertaken by Cardiff University to help the GDC understand the experiences of dental professionals and how the scheme has operated since its introduction in 2018.

Their findings indicate that most dental professionals do not find CPD requirements difficult to achieve and that compliance rates are high. Researchers also found that further guidance could improve understanding of some key features introduced by the eCPD scheme, such as Personal Development Plans (PDPs), grace periods at the end of a CPD cycle and the application of recommended topics.

Research found that significant numbers of dental professionals are motivated by their own sense of professionalism and a desire to learn, but the view was not universal. The findings also suggest that some registrants take a more compliance-based approach to CPD, completing the minimum number of verifiable CPD hours, with limited regard for the quality of the activity or relevance to their own learning or development needs.

The GDC will now look at how understanding of the eCPD scheme can be improved, particularly those features that provide flexibility for the dental team and drive personalised approaches to learning and development.

The PDP is the centrepiece of the eCPD scheme and must be completed by all dental professionals. The research indicates the dental team could benefit from more support in creating and maintaining an effective PDP to ensure it is tailored to their needs, regularly updated, and supports the selection of high quality CPD activities.

The regulator now plans to engage with dental professionals on the value of creating a PDP that meets their own learning and development needs, supports career progression and improvements in the quality of care. It will also build on current guidance so more dental professionals can feel the benefits of a customised PDP.

Based on the findings, the GDC will also consider:

• Creating additional guidance on how make to CPD activities verifiable, including peer learning.
• Updating its guide for employers and managers of the dental team, to put more emphasis on supporting staff to find the right CPD and sufficient time to complete it.
• Updating the information provided on recommended topics.

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**2023**

**22 SEPTEMBER – 22 OCTOBER**

**Career Pathways in Dentistry** Online
https://tinyurl.com/y4djzkr7

**02 OCTOBER**

**MGDS RCSi Examination 2023**
Online
wwwfacultyofdentistry.ie/examinations/general-examinations/mgds-examination

**07 OCTOBER**

**BDA NI Centenary Gala Ball**
City Hall, Belfast
tinyurl.com/2yeu98yj

**20 OCTOBER**

**Life Beyond SDR**
Hilton Belfast, Templepatrick
www.bda.org/lifebeyondthesdr

**09 – 11 NOVEMBER**

**BACD 19th Annual Conference**
IET Savoy Place, London
www.bacd.com/annual-conference/bacd-19th-annual-conference-2023-new-horizons

**14 NOVEMBER**

**BDA NI Branch AGM**
The Malone Hotel, Belfast
tinyurl.com/2yeu98yj

**17 – 18 NOVEMBER**

**British Endodontic Society (BES) Regional Meeting**
International Convention Centre, Belfast
www.britishendodonticsociety.org.uk/events/19/regional_meeting_2023

**07 DECEMBER**

**BDIA Midwinter Lunch 2023**
Venue TBC
https://bdia.org.uk/events/BDIA-midwinter-lunch-2023/

**2024**

**31 MAY – 1 JUNE**

**Scottish Dental Show**
Braehead Arena, Glasgow
www.sdshow.co.uk

**Note:** Where possible this list includes rescheduled events, but some dates may still be subject to change.

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**Quo vadis, implant dentistry?**

Award winner Dr Florian Kernen, second from right

The Oral Reconstruction Global Symposium, held in Rome, was attended by more than 1,000 people from 42 countries. Topics discussed included different options for hard and soft tissue augmentation, including guided bone regeneration with blocks, shells, or computer-assisted bone augmentation. The speakers examined questions related to bone and soft tissue healing around implants and reviewed options in the treatment of gingival recession. Another focus was the use of autologous bone or allogeneic, xenogeneic, or synthetic bone graft substitutes, membranes and soft tissue matrices. There were discussions around the question of the right time for implant placement and the advantages of digitisation. The Oral Reconstruction Foundation Research Award was won by Dr Florian Kemen, of the Albert-Ludwigs-University of Freiburg, for his research on ‘In vivo precision of intraoral scanners’.  

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**Preparing to celebrate**

The Association for Dental Education (ADEE) in Europe has begun preparations for the celebration of its 50th anniversary in Dublin in 2025. ADEE brings together a broad-based membership across Europe comprising dental schools, specialist societies and national associations concerned with dental education. The association is committed to the advancement of the highest level of health care for all people of Europe through its mission statements to:

- Promote the advancement and foster convergence towards high standards of dental education.
- Promote the advancement and foster convergence towards high standards of dental education.
- Promote and help to co-ordinate peer review and quality assurance in dental education and training.
- Promote the development of assessment and examination methods.
- Promote exchange of staff, students and programmes.
- Disseminate knowledge and understanding on education.
- Provide a European link with other bodies concerned with education, particularly dental education.

www.addee.org
Ireland’s Dental Council has revised its guidance concerning treating children in dentistry. The revised guide sets out some general principles that should be observed when treating children on seeking consent, mandatory reporting, and on safeguarding.

To complement the guidance, it has also highlighted some useful resources issued by other organisations, such as Tusla, the child and family agency, and the Health Service Executive, that all members of the dental healthcare team should know about.

**Guidelines**

1. **Parent and Guardian accompanying their child:**
   In general, parents have the right to accompany their child into the dental surgery and remain during the course of dental treatment. Should a parent not attend or waive the right to remain in the surgery during the child’s treatment, a third person, who could be a dental nurse, must be in attendance at all times while the child remains in the surgery. Should the third party leave for any reason another person must take their place.

2. **Consent:**
   This must be obtained from a parent or guardian prior to treating children under the age of 16. The child’s interest is of paramount importance and, regardless of their age, they should be involved in the decision making processes. A 16 or 17 year old may give their consent to treatment as if they were an adult.

3. **Mandatory reporting:**
   Dentists are mandated professionals under the Children First Act, 2015 and have a statutory obligation to report instances where a child was or is at risk of being harmed to Tusla. Dentistry is designated as relevant work under the National Vetting Bureau (Children and Vulnerable Adults) Act, 2012 to 2016. If a dental surgery treats children or vulnerable adults, it is regarded as a relevant organisation and the organisation is obliged to ensure that any members of the dental team who are involved in the treatment of children or vulnerable adults are vetted by the Garda National Vetting Bureau.

4. **Child safeguarding statement and risk assessment:**
   Under the Children First Act, 2015 dentists are obliged to carry out a risk assessment in their surgeries and to put a Child Safeguarding Statement in place. The Act sets out the contents of what must be included in this statement and it places an obligation on dentists to specify a range of procedures including dealing with complaints and how the suitability of new staff to work with children is assessed. This statement must be displayed prominently and be available for people to inspect on request. All staff must be given a copy of the statement and be aware of its provisions. The statement must be reviewed every two years.

**Useful resources highlighted as revised**

**Professional reference material**

The Dental Council recognises that circumstances may arise from time to time where a member of the dental team may be unsure of their obligations and the following documents and links are provided as an assistance.

**CONSENT**
- Consent-to-medical-treatment-in-Ireland-Guide-for-clinicians-MPS.pdf

**MANDATORY REPORTING**
- National Vetting Bureau Act 2012

**USEFUL WEB RESOURCES**
- Children First (Tusla) [www.tusla.ie/children-first](http://www.tusla.ie/children-first)
- Garda National Vetting Organisation [https://vetting.garda.ie](https://vetting.garda.ie)
RECENT research has confirmed the impact of periodontitis on risk of neurologic diseases, especially the increased risks for stroke and Alzheimer’s disease\(^1\).

The Spanish Society of Dentistry and Osseointegration (SEPA) and the Spanish Society of Neurology (SEN) recently released a report with the latest data on this topic\(^2\). The report reviews, updates, and presents the most recent scientific evidence regarding this link. It also provides practical recommendations that, based on the evidence, should be applied in dental clinics and neurology centres.

As Yago Leira, DDS, PhD, periodontist and coordinator of...
the SEPA-SEN working group, told Medscape Spanish Edition: “The main takeaway from this scientific report is that patients with periodontitis are at nearly twice the risk of developing Alzheimer’s disease and at triple the risk of ischemic stroke.”

Data from the report show that individuals with periodontitis are at 2.8 times’ higher risk of ischemic stroke. The available evidence regarding hemorrhagic stroke, however, is conflicting.

How does this dental condition affect the course of cardiovascular disease? Observational studies have shown that those who have had an ischemic stroke and have a confirmed diagnosis of periodontitis are at greater risk of suffering a recurrent vascular event, worse neurologic deficit, and postictal depression than patients without periodontitis.

Immune-mediated inflammation
As far as its link to Alzheimer’s disease, meta-analyses of epidemiologic studies show that periodontitis is associated with a 1.7 times greater risk of this type of dementia and that the risk triples among patients with more serious forms of periodontitis. Likewise, studies suggest that individuals with dementia or neurocognitive impairment are at a greater risk of suffering periodontitis. Other studies indicate that individuals with periodontitis have worse outcomes on various neuropsychological tests of cognitive function.

The current report presents the evidence from three clearly defined perspectives: the epidemiologic association between periodontitis and these neurologic diseases, the biological mechanisms that may explain this link, and interventional studies of dental treatment as a means of preventing stroke and Alzheimer’s disease.

“There is a possible biological explanation for these epidemiologic findings. The report concludes that the low-grade chronic, systemic, immune-mediated inflammatory response induced by the bacteria and their endotoxins and the proinflammatory mediators circulating through the blood contributes to various biological processes that are involved in neurological impairment and cerebral ischemia,” said Leira, who is one of the report’s authors.

Ana Frank, MD, PhD, another author of this study, is head of the neurology department at the La Paz University Hospital in Madrid and a member of the SEPA-SEN group. She explained to Medscape Spanish Edition that the main biological mechanism in stroke and Alzheimer’s disease is chronic exposure of the entire brain (vasculature, neurons, and astrocytes) to the harmful effects of periodontal infection.

“Although low in intensity, this exposure is sufficient to set off a series of events that eventually lead to vascular endothelial injury, changes to neurons and astrocytes, and damage to the neuropil,” she said.

As far as the evidence of an epidemiologic association between periodontitis and both neurologic diseases, Frank cited the exponential increase in risk brought on by periodontitis. She said that further epidemiologic studies are necessary to gain a better understanding of the magnitude of the problem.

A preventative alternative?
Leira cited evidence that periodontal treatment could provide a means of preventing stroke and dementia. He pointed out that numerous population studies have observed various oral health interventions (eg, periodic dental prophylaxis or periodontal treatment) and regular dental visits to reduce the risk of developing dementia and stroke.

“However, we don’t currently have randomized clinical trials that were designed to investigate whether periodontal treatment may be a primary or a secondary preventive measure against these neurological conditions,” he said.

“There are currently several research groups in the United States and Europe, including ours, that are performing clinical trials to assess the impact of periodontal treatment on recurrent vascular events in patients with cerebrovascular disease.”

“Although low in intensity, this exposure is sufficient to set off a series of events that eventually lead to vascular endothelial injury, changes to neurons and astrocytes, and damage to the neuropil”
“On the other hand, there are various interventional studies underway that are evaluating the potential effect of periodontal treatment on cognitive function in patients with dementia. Along these lines, there appear to be encouraging results from the 1-year follow-up in the GAIN study, which was a phase 2/3 clinical trial testing atuzaginstat. Atuzaginstat is an inhibitor of gingipain, the endotoxin produced by Porphyromonas gingivalis, which is one of the bacteria thought to be responsible for periodontitis. The drug reduces neurocognitive impairment in patients with high levels of antibodies against this periodontal pathogen.”

Toward clinical practice
The report has a practical focus. The intention is that this evidence will make its way into recommendations for dentists to implement in clinical practice, especially with elderly patients or patients with risk factors for stroke.

In this regard, Leira said: “On one hand, dentists have to know how to approach patients who have already suffered a stroke (most of whom have vascular risk factors like diabetes and hypertension), many of whom have polypharmacy and are [taking] certain drugs like blood thinners that could negatively impact various dental procedures. In such cases, it is important to maintain direct contact with a neurologist, since these patients ought to be treated with a multidisciplinary approach. “On the other hand, each patient who comes to the dental office and has a diagnosis of periodontitis could be screened to identify potential vascular risk factors, even though the definitive diagnosis would need to be given by a specialist physician. To this end, SEPA is carrying out the Promosalud [health promotion] project, which will soon be applied in a large number of dental clinics in Spain.

“Lastly, specialists in odontology must understand the potential positive benefits surrounding systemic vascular inflammation that periodontal treatment could provide, including, for example, metabolic control and lowering blood pressure.”

For patients with cognitive impairment, the authors of the report recommended adhering to the following steps during dental visits: inform the patient and the patient’s caregiver about the importance of good dental hygiene and monitor for any signs of infection or dental disease; address pain in every patient with cognitive impairment and dental problems, especially those with agitation, even if the patient isn’t specifically complaining of pain (also, try not to give opioids); finally, avoid sedation as much as possible and use the smallest effective dose if it becomes necessary.

Prescribing oral hygiene
Regarding recommendations that neurologists should follow during consultations in light of the link between these diseases and periodontitis, Frank said: “Regardless of how old our patients are, I believe it’s important to emphasise the importance of practicing good oral and dental hygiene. “It’s a good strategy to put this in writing in medical reports, alongside the usual recommendations about healthy lifestyle habits and monitoring for diseases like high blood pressure, diabetes, or dyslipidemia. These, among other factors like smoking, a sedentary lifestyle, alcoholism, and other drug addictions, are vascular risk factors and are therefore risk factors for stroke and dementia.”

According to Frank, the public is largely unaware of the relationship between periodontitis and neurologic diseases. “We still have a long way to go before we can say that the public is aware of this potential link,” he said. “And not just the public, either. I believe we must stress among our colleagues and among healthcare professionals in general the importance of promoting dental health to improve people’s overall health.”

In this regard, Leira emphasised the authors’ intention to make this report available not only to oral health and neurologic healthcare professionals but also to primary care physicians and nurses so that patients with cerebrovascular disease or Alzheimer’s disease and their caregivers can develop a greater awareness and thereby improve prevention.

“This study will also provide the scientific basis to support the SEPA-SEN working group as they implement their future activities and projects,” Leira concluded.

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The impact of diet, vitamins and micronutrients on preventing and treating periodontitis

Current periodontal standard-of-care measures are aimed at preventing and controlling periodontitis and establishing or maintaining balanced interactions between microbial factors and the immune-inflammatory host response that are compatible with periodontal health. Although effective in the majority of patients with periodontitis, these interventions have their limitations. They may cause side effects or result in only partial restoration of health, leaving features of biofilm dysbiosis and inflammation.

In addition, research has revealed that in susceptible individuals, periodontal tissue damage is predominantly mediated by the dysregulated host inflammatory response to the subgingival microbial challenge. This leads to an environment that favours inflammation and contributes to the exacerbation of the microbiota imbalance, inflammation, and overt periodontitis.

With the goal of restraining inflammation to control infection, it has been suggested that host-response modulation strategies could be promising adjunctive treatments to conventional periodontal therapy. In fact, the link between diet and oral health has long been acknowledged. In 2011, the EFP’s European Workshop on Periodontology (Perio Workshop) found emerging evidence that the nutritional modulation of periodontal inflammation was one such promising approach.

Micronutrients
Micronutrients are vital substances, even though they are needed in smaller quantities (mg/µg) compared to macronutrients (proteins, carbohydrates, and fats). The group includes water- and fat-soluble vitamins, minerals, and trace elements that are needed for a variety of metabolic and physiologic processes, the regulation of inflammation and immunity, and for growth and development (Dommisch et al. 2018). They are essential, given that for the most part they cannot be produced by humans and must be obtained from food.

Very low dietary intake of vitamins and minerals can result in deficiency disease or inadequacies, which are a health problem not confined to low- and middle-income countries. This ‘hidden hunger’ can be caused either by prolonged underconsumption or by poor food choices. Both undernutrition and obesity can coexist with selected micronutrient deficiencies. In people with adequate dietary intake, such deficiencies may occur during periods of increased individual micronutrient requirements, but also in conditions of increased loss of micronutrients, such as alcohol abuse and heavy smoking (Figure 1). Malnutrition and insufficient oral hygiene are two important factors that predispose to necrotising gingivitis. One systematic analysis concluded that micronutrient deficiencies, such as for vitamin C, vitamin D or vitamin B12, may be associated with the onset and progression of periodontal diseases (Chapple et al. 2017).

Vitamins
Vitamin C (ascorbic acid, AA) plays an important role in collagen synthesis, helps maintain the structural integrity of connective tissue, and has a protective
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effect on maintaining tissue homeostasis. It is a water-soluble antioxidant that neutralizes oxidative stress and is depleted in this process. AA deficiency has been considered a systemic risk factor among diet-related diseases that can modify the immuno-inflammatory response and has been included in the current (2018) classification of periodontal diseases agreed by the EFP and the American Academy of Periodontology.

Cross-sectional studies have found lower serum/plasma AA concentrations in patients with gingivitis or periodontitis, and in smokers, than in periodontally healthy individuals and non-smokers. An inverse relationship has been reported between plasma AA levels and the degree of periodontal inflammation as well as severity in different populations and age groups (Van der Velden et al. 2011). Furthermore, total antioxidant capacity has been associated with periodontitis while elevated serum antioxidant levels have reduced relative disease risk. Case-control studies have shown that periodontitis patients had lower AA plasma levels, lower AA intake, more bone loss, and greater periodontal disease progression than the healthy controls (Kuzmanova et al. 2012).

Other studies have shown that, while AA depletion resulted in gingival bleeding regardless of the level of individual oral hygiene, both the consumption of AA-rich fruits and AA supplementation had an inhibitory effect on sulcular bleeding in non-smoking patients with gingivitis and chronic periodontitis. However, this AA consumption or supplementation was less effective following periodontal nonsurgical interventions (Tada et al. 2019).

There are indications that the function of AA is superior when it is obtained from fruits rather than from dietary supplements. Fruits provide several additional micronutrients, phytochemicals, and dietary fibres that may influence the bioavailability of AA and have other beneficial effects.

Vitamin E comprises of a set of lipophilic antioxidant food compounds termed as α, β, γ, and δ tocopherols or tocotrienols. Their primary function, to protect cell membranes from reactive oxygen species and to regulate immune responses, has been widely studied (Shadisvaaran et al. 2021). While some epidemiological studies have observed an association between serum vitamin E concentration and periodontitis, others have not. Prospective studies have shown that higher vitamin E intake was associated with a lower number of teeth affected by periodontitis. Conversely, low serum alpha-tocopherol levels were associated with periodontal progression.

Intervention studies have suggested a positive effect of higher alpha-tocopherol intake on periodontal healing after subgingival instrumentation (scaling and root-planning). The adjunctive intake of vitamin E has been shown to have significant beneficial effects on periodontal parameters as well as antioxidant defence compared to controls. Current literature suggests that vitamin E could improve periodontal status by correcting redox status imbalance, reducing inflammatory responses, and promoting wound healing. However, evidence from clinical trials is still limited. Vitamin D is a fat-soluble micronutrient found only in small amounts in food and is a secosteroid hormone produced mainly by the skin when exposed to sunlight. Vitamin D plays an important role in calcium and bone metabolism. It is also thought to have immunomodulatory and anti-inflammatory effects. In patients with periodontitis, lower vitamin D levels compared with healthy controls have been reported. Higher serum 25-hydroxy vitamin D (25OHD) concentrations have been associated with lower rates of gingivitis and less attachment and tooth loss.

One prospective study reported that every 10µL/L increase in serum 25OHD was associated with a 13 per cent decrease in tooth loss, while another showed that Vitamin D supplementation after nonsurgical periodontal therapy resulted in a slight reduction in probing pocket depth (PPD) and attachment loss compared to placebo controls and improved anti-inflammatory response. Well-designed prospective and intervention studies are needed to define what plasma vitamin D concentration is required prior to the initiation of periodontal treatment to achieve the best therapeutic outcome.

The water-soluble B vitamins are involved in multiple processes, including metabolism, erythrocyte production, and collagen synthesis and they act as coenzymes in several enzymatic processes that support every aspect of cellular physiological functioning. Epidemiological data have demonstrated a higher severity of periodontal disease in individuals with inadequate dietary intake or serum levels of vitamin B9 (folate). Among patients with periodontal disease, smokers had lower serum folic acid concentrations than non-smokers. In a prospective cohort study, an increase in serum vitamin B12 was linked to a decrease in clinical periodontal parameters and tooth loss.

Giving a vitamin B-complex preparation to periodontitis patients after periodontal surgery has improved clinical attachment levels.
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compared with patients receiving placebo. Furthermore, adjunctive systemic folate intake after subgingival instrumentation has resulted in significant additional gain in clinical attachment in patients with stage II-III periodontitis. Nevertheless, further clinical and biochemical data are needed to support these findings.

Vitamin A is a group of different lipid-soluble compounds (retinol, retinal, retinoic acid, provitamin A carotenoids) that play a crucial role in physiological processes such as cellular growth and differentiation, immune-system functioning, bone and foetus development, vision, and the formation of the central nervous system. Provitamin A carotenoids also act as antioxidants. Large-scale epidemiological studies have found either a weak or no association between vitamin A inadequacy and periodontitis and its efficacy in managing periodontitis progression is unclear (Dommisch et al. 2018). In contrast, higher dietary intake of β-carotene has been associated with a significantly lower percentage of sites with PPD >3mm after non-surgical treatment and a greater reduction in PPD in non-smokers than in smokers with periodontitis. Low serum carotenoid levels (α-β-carotene, β-cryptoxanthin) have been associated with a significantly increased risk of periodontitis. In addition, a weak inverse relationship has been reported between the prevalence of mild periodontitis and serum concentrations of α-carotene, β-carotene and β-cryptoxanthin.

Lycopene, a pigment derived from red fruits, has been suggested to be one of the most effective in vitro singlet oxygen quenchers of the carotenoids. Research has shown that individuals with higher serum lycopene concentrations had reduced C-reactive protein (CRP) levels, while those with higher tomato consumption showed reduced leukocyte counts. An association between chronic periodontitis and an increased risk of heart failure has been suggested, with higher monthly tomato consumption reducing this risk in periodontitis patients. Intervention studies with a combined preparation of lycopene and other micronutrients (vitamins A, C, E, selenium, zinc) for oral application adjunctive to mechanical debridement have shown positive effects on periodontal healing.

Minerals and trace elements
Significant inverse relationships have been reported between serum/plasma levels of calcium, magnesium, zinc, and manganese and periodontal severity/progression. Studies have shown that a low serum calcium-magnesium ratio is significantly associated with increased attachment loss and the progression of periodontal disease, and that individuals with periodontitis have a significantly lower dietary intake of calcium, magnesium, copper, selenium, and antioxidant nutrients – and respectively lower serum and saliva levels – compared to controls.

It has been suggested that milk and milk products – a source of calcium, phosphate, and various proteins – may have beneficial effects on periodontal health while, conversely, dietary calcium intakes below recommended reference levels have been associated with increased risk of tooth loss, severity of periodontal disease, and attachment loss.

Case-control studies have revealed significantly lower magnesium, selenium, and zinc levels in diabetic and non-diabetic patients with periodontitis compared to healthy controls. Other studies have shown non-surgical periodontal therapy leading to increased serum zinc levels in Type-2 diabetes mellitus patients with periodontitis, while subjects with magnesium supplementation have lower attachment loss and higher tooth retention compared to non-supplemented control subjects.

The current evidence on nutraceutical and food-based interventions as an adjunct to non-surgical periodontal therapy has been recently reviewed in a systematic review by Johan Peter Woelber and colleagues at the universities of Freiburg and Heidelberg in Germany (Woelber et al. 2023).

Diet and prevention
The prevention of non-communicable diseases (NCD) focuses on dietary changes to reduce the systemic inflammatory burden. A Western diet – rich in refined grains, red meat, high-fat dairy products, simple carbohydrates, and consumption of processed food – has been described as pro-inflammatory.

Cross-sectional data have indicated that a high-quality diet is identified as a health-promoting factor along with control of normal weight and adequate exercise. Participants who adhered to these three factors have shown a 40 per cent lower risk of developing periodontitis. Nonetheless, the role of physical activity, weight loss, and dietary counselling is the focus of further research.

A pro-inflammatory diet and poor micronutrient intake have been linked to an increased risk of periodontal disease. In contrast, adherence to an anti-inflammatory dietary pattern “high micronutrient and fibre” has been linked to a lower risk of periodontitis and tooth loss.

Dietary anti-inflammatory interventions such as Mediterranean diet, the Okinawan-based Nordic Diet (OBND), and so-called Palaeolithic diets have resulted in reduced gingival inflammation despite constant – or even increasing – plaque accumulation. In patients with periodontitis and either metabolic syndrome or Type-2 diabetes mellitus, dietary change to a wholesome nutrition or OBND led to improvements in both the periodontal and systemic inflammatory parameters without providing professional oral hygiene. Fasting has also been shown to facilitate the reduction of periodontal inflammation.

Further research
In conclusion, there is increasing evidence of the overall importance of micronutrients on general and periodontal health. Furthermore, the dietary source of micronutrients needs to be considered in the context of favourable dietary patterns based on a wide variety of micronutrient-rich foods as well as putative interactions between various micronutrients. Future research is required to further elucidate the role of micronutrients in the prevention and treatment of periodontal disease. Prospective and clinical intervention studies may help to define causal relationships, potential intervention strategies, and future recommendations.

While this article reflects some of the important aspects regarding the role of micronutrients in the prevention of periodontal disease and in periodontal therapy, it does not claim to offer a complete picture, since putative relevant aspects – such as genetics, microbiology, micronutrient deficiencies, and adverse effects – could not be covered extensively.
EUROPEAN EXPERTS MEET

Dublin dentist to chair EA4SD International Symposium

WORDS
WILL PEAKIN
When at school John Haughey was contemplating which career to pursue, he thought about becoming a doctor. He had the grades. But John was also a keen athlete and the hours demanded in qualifying and working shifts in general practice would have left little time for sport. Keen to still work in healthcare, his PE teacher suggested dentistry; while also demanding, he could work at and enjoy both.

After graduating from Queen’s University Belfast, John did his vocational training in Carlisle and worked in the north-east of England before he and some friends decided that some time in the sunnier climes of Australia appealed.

While a keen Gaelic footballer, John was also interested in its American counterpart and a big story at the time was the use by 2010 Super Bowl winners, the New Orleans Saints, of the Pure Power Mouthguard. It is a product which was said to not only protect players’ teeth but also, through its design and effect on the body’s behaviour, enhance their performance.

The mouthguard has its basis in the science of neuromuscular dentistry, which focuses on the relationship between the jaw muscles, nerves and occlusion of the teeth. The dentist John was working for in Australia had an interest in the field. “It was the combination of the publicity around the mouthguard and exposure to neuromuscular dentistry that sparked my interest in sports dentistry,” he said.

On returning to practise in Ireland, John undertook a course in sports dentistry at the UCL Eastman Dental Clinic run by Peter Fine, who has since developed it into an MSc (of which John is now a Clinical Teaching Fellow). This was in the run-up to the 2012 London Olympics and it led to John being recruited as an emergency field of play dentist at test events and during the Games.

Two years later, he was in Glasgow for the Commonwealth Games where he was a member of the athlete medical team, responsible for the oral health of athletes competing in boxing, judo, wrestling, powerlifting, netball and gymnastics. Since then, he has worked at the 2015 European Games in Baku, the 2016 Summer Olympics in Rio, the 2017 Islamic Solidarity Games in Baku and the 2022 Commonwealth Games in Birmingham.

As well as his work with major sporting competitions, John has also researched the effect of the lower jaw position on athletic performance, while completing his MSc in neuromuscular therapy, and contributed a chapter, Delivering Dental Facilities at Sporting Events, to the sports dentistry book Sports Dentistry: Principles and Practice.

“The part that oral health plays in sporting performance has been highlighted by the work of Dr Ian Needleman and Dr Julie Gallagher, of the UCL’s Centre for Oral Health and Performance.

It includes one of the largest evaluations of oral health at a multi-sport competition6, the first state of the science summary of what was known about oral health in elite and professional sport5, the most comprehensive study of oral health in professional football8, the largest epidemiological study of the oral health of elite athletes undertaken6, an investigation into athlete-reported oral health behaviours, risks to oral health and potential for behaviour change9 and a feasibility study of implementing behavioural change to enhance oral health behaviours in elite athletes11.

Many high-profile sports people have been adversely affected by poor oral health, ignoring dental conditions which have subsequently caused them to miss training or withdraw from competition. Increasingly, there is also an understanding of the effect that poor oral health can have on sports people’s systemic health. In addition, from the work of Sophie Cantamessa with France’s national football team, there is evidence that poor oral health slows players’ recovery from injuries sustained on the field.

Later this year, John is chairing the third International Symposium of the European Association of Sports Dentistry (EAS4D) which is being held in Edinburgh on 24-25 November. It aims to bring together sports dentistry and medicine – and analyse how they work together for athletes’ health. Sports dentists and physicians will highlight the important elements in preventing injuries and monitoring health.

The EAS4D was founded in Paris in 2016. The following year, the EA4SD became an official partner of the European College of Sports and Exercise Physicians (ECOSEP), the first international sports physicians’ association to create a sports dentistry committee. In 2018, the World Dental

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Federation (FDI) created the first official guidelines and toolkit for sports dentistry, available to more than one million dentists and 200 national dental associations in more than 130 countries.

In 2019, the EA4SD became an official partner of the Academy for Sports Dentistry in America, thus creating a global network of sports dentistry and starting strategic cooperation in terms of development and the network. In 2020, the first Consensus Statement on sports dentistry integration in sports medicine, was published in the Journal of Dental Traumatology, by the EA4SD, ECOSEP and ASD.

Thanos Stamos, co-founder of the EAS4D, said: "When I started to treat professional football players and other athletes in my dental clinic, I soon realised that the existing examination and treatment protocols were not enough to provide the best possible dental care to athletes who were travelling at least twice a month, exercising hard every day, and competing at their maximum twice a week.

"The athlete had no time, or the motivation, for dental treatments. The coach wanted the athlete available for training. The team physician wanted the minimum 'return-to-play' time (the decision-making process of returning an injured or ill athlete to practice or competition). Overall, there was a complete lack of awareness in sports about the importance of oral health in the overall health and physical activity.

"It was a challenging time to be a dentist treating sports people. What would a football player in possession of the ball do while being challenged by an opponent? He would look for teammates. Luckily, there were a lot of dentists in a similar situation, so there were 'teammates' on the field.

"It did not take long to agree with colleagues from different countries about the European Association for Sports Dentistry (EA4SD), based in Paris. We were motivated by our common vision to adapt our science to athletes’ needs, conduct research, create a network, and present scientific evidence on how the oral health has an impact on sports.

"Oral health and dental treatments have an immediate and visible impact on the body, including the cardiovascular, respiratory, and musculoskeletal system, plantar arch, muscle strength, posture, and gait. Caries and periodontal disease are found in highly elevated incidence in athletes.

“Today, thousands of dentists in Europe and around the world are interested in and benefit from this new field in dentistry. The research and scientific evidence about oral health in sports is increasing rapidly, sports dentistry has become continuing education, specialisation, post-graduate diploma in dental faculties, present in major sports medicine and dentistry international conferences.

“Sports dentistry began as an innovation, continued as a sustainable integration in sports medicine and now it is an emerging global trend in the dental and medical field.”

www.ea4sd.com

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WHAT WOULD A FOOTBALL PLAYER IN POSSESSION OF THE BALL DO WHILE BEING CHALLENGED BY AN OPPONENT? HE WOULD LOOK FOR TEAMMATES. LUCKILY, THERE WERE A LOT OF DENTISTS IN A SIMILAR SITUATION, SO THERE WERE ‘TEAMMATES’ ON THE FIELD"
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Introduction
For the single tooth replacement in the posterior sextant, there are different fixed options available with a variety of dental materials. Implant-supported single crowns can be used, saving the natural tooth structure of the adjacent teeth. However, implant therapy may not be possible for cases where other variables are not conducive. These variables can be medical factors, scarce bone or anatomical constrains, the economic situation, a negative attitude of the patient toward surgical treatment.1 In these cases, an inlay-retained fixed dental prosthesis (IRFDP) is an appealing minimally invasive treatment modality, especially if there is a presence of restorative fillings adjacent to the missing tooth. IRFDP should be opted for instead of a full coverage dental prosthetic restoration. Notwithstanding the fact that a full coverage fixed dental prosthesis (FDP) restoration is the gold standard for such tooth replacement, they have several disadvantages, to name some, risk of secondary caries, soft-tissue pigmentation, and an opaque-to-darkish appearance in the cervical area of the abutment teeth with metal coverage.2 Additionally, FDPs are known for their invasive nature, since they require anywhere from 67.5 per cent to 75.6 per cent of coronal tooth surface removal depending on the choice of material (ceramic, gold or metal).3 Dental restorations are placed under immense pressures in the clinical functions of biting and chewing. These mastication forces in the moral region can reach over 900N. As per the DIN standards, FDPs should be able to endure occlusal force greater than 1000 N in a static fracture resistance test.4 Tooth coloured high pressed ceramics have the probabilities for debonding.5,6 They have low fracture resistance.6,8 There is a risk of fibre exposure, hair line microcracks in the fibre-reinforced composite bridges.9,10,11 However, the new high strength ceramics, with their stiffness and high mechanical properties (i.e., resistance to fracture and/or fatigue), could be considered a right choice in an IRFDP rehabilitation.12

A number of studies have shown that monolithic zirconia inlay-retained FPDs exhibit a higher resistance to fracture when compared with lithium disilicate inlay-retained FPDs.13,14 It requires a conservative dental preparation, fewer dental sessions and less laboratory time. With its monolithic properties the risk of chipping is low, and it has satisfactory aesthetics. In addition, it helps achieve minimal wear on the antagonists.15,16,17 Monolithic zirconia IRFDP are good option even for the patients with unfavourable occlusion with parafunctional habits or fracture history.18,19,20

The only disadvantage monolithic zirconia IRFDP had was their inability to achieve satisfactory transparency, which has been overcome to provide superior aesthetics.18,20

“Zirconia ceramic RBFDPs yielded a 10-year survival rate of 98.2% and a success rate of 92.0%.”21

Inlay-retained bridge design
IRFDPs require minimum coronal tooth height of 5mm, parallel abutments and a maximum mesiodistal edentulous gap of 12mm.21 The patient needs to have a good oral hygiene and low susceptibility to caries. The contraindications include severe parafunctions, the absence of enamel on the preparation margins, extensive crown defects and abutment-tooth mobility.

There are four different designs for monolithic zirconia IRFDPs:

1 Box design: The proximal box featured as same dimensions as the proximal box of the inlay-shaped preparation. Figure 1 (a,b)

2 Inlay-box design: The inlay-shaped design involves occlusal and proximal box preparation with round line angles, corners, and a rectangular floor. The occlusal preparation allows a 2.5mm depth and 4mm width of zirconia, with approximately 6 degree’s divergence of the walls. The proximal box was prepared with 1mm width and 2mm extension apical to the floor of the isthmus with approximately 6 degree’s divergence. This will contribute to a 4.5 × 4mm connector dimension as shown in Figure 1 (c,d) and Figure 3.

3 Tub shape design: This design involves occlusal surface preparation as the inlay design but without the preparation of the proximal box, with 2.5mm occlusal cavity preparation depth as shown in Figure 2 (a,b)
4 Butterfly wing design:
The wings are done to resemble that of the resin-bonded bridges on the lingual walls of the molar and the premolar. Wings were extended lingually to half the molar and premolar, covering most of the mesial cusp lingually on the molar and half the lingual cusp on the premolar. Occluso-gingivally, they stopped at the lingu-occlusal line angles, leaving the occlusal surface intact and extended 0.6mm depth.26

The cavity is prepared for inlay-retained monolithic zirconia IRFDPs according to the following guidelines:27 Figure 1 (e,f)27

- occlusal depth: 2.5mm (floor of isthmus to central groove)
- vestibular palatal/lingual width of the inter cuspal isthmus: 3mm.
- depth of proximal box: 2mm (shoulder with rounded internal angle)
- buccal vestibular width: maximum of 4.5mm (3mm of zirconia framework and 0.5– 0.6mm of ceramic veneer on each side)
- minimum dimensions of connectors:3 3mm
- cusps are included in preparation when an abutment tooth has a wide bucco-oral defect (>50 per cent) or has been devitalised.
- divergence angle of the cavity: approximately 6 degrees.

There are two types of surface treatment of zirconia after contamination with saliva remnants.28

Mechanical surface treatment
After try-in, rinse the restorations with water spray and dry with air. Cover all bonded surfaces of the restoration with a layer of ZirClean®-Bisco-USA, Ivoclean-Ivoclar or 0.5M NaOH and leave for 20 seconds, then rinse the restorations thoroughly with water spray and dry with air.

Chemical surface treatment
Sandblast the fitting surfaces of the inlay bridges with Al2O3 particles with 50µm diameter, 2.8 bar and 1cm distance water sprayed for 60 seconds and cleaned using the ultrasonic cleaner in 95 per cent ethyl alcohol for 10 minutes. After surface treatment of zirconia, apply 10-methacryloyloxydecyl dihydrogen phosphate (MDP) containing primer (Z Prime Plus, Bisco, USA) on the fitting surfaces of zirconia bridges. However, there is no need for special surface treatment for the abutment as the cement is self-adhesive.

Final cementation of the restoration
We will need to apply the dual-cure self-adhesive resin cement to the intaglio surfaces of the bridges and to the preparation surfaces. Place the restorations in the site and apply finger pressure. Remove excess cement carefully using a brush. Apply a layer of glycerine gel to inhibit air. Light cure at the four axial line angles and in the occlusal direction for one minute. Finish and polish the margins using finishing diamond burs, rubber polishing points, and diamond polishing bur.

Cementation
Zirconia still presents a challenge when used with adhesive techniques due to their single-phase tetragonal crystalline structure that is not etchable by commonly used agents such as hydrofluoric acid. Debonding of the adhesive interface and delamination and microcracks of the ceramic veneering material were the most long-term failures observed and reported.26,27,28

The recommended connector dimensions in all-ceramic posterior inlay-retained fixed partial dentures varied between 9mm2 to 16 mm2, with no significant differences when zirconia was used as the frame material14 while lithium-disilicate ceramic required 16mm2 at least.29

The inlay retainers were constructed from computer-aided-design/computer-aided-manufacturer (CAD/CAM) zirconia to improve the fracture resistance and veneering of the zirconia inlays was omitted.29

REFERENCES:
https://tinyurl.com/5tmznzur
Case study
A 45-year-old woman requested replacement of her UL4, UL5 crowns and replacement of missing UR6 on the same quadrant (Figure 4a, b and c). She did not like colour of her upper left crowns (Figure 4a).

Detailed options discussed for replacement of UL6 with a fixed bridge, or a cantilever bridge, or an IRFDP, or an implant. Patient was not comfortable with any of the invasive options and consented for an IRFDP bridge to replace UR6 after whitening.

Treatment planning
Patient was assessed for IRFDP in upper left side. There was space a minimum coronal tooth height of 5mm, parallel abutments and a maximum mesiodistal edentulous gap of 12mm with good oral hygiene.

The bone level of the vital abutment teeth was radiologically investigated. There were no signs of active bone resorption or any contraindicating periodontal and periapical pathology. UL6’s maximum mobility of grade 1 was considered acceptable. As shown in Figure 4c there were no marginal leakage, discolouration, or secondary caries in the amalgam restoration.

Preparation and scan
As there was no proximal box present after removal of old amalgam, tub shape design was chosen. In tub shape design the occlusal surface was prepared as the inlay design but without the preparation of the proximal box, with 3mm occlusal cavity preparation depth. The cusps were not included as UL7 has <50% bucco-oral defect. iTero was used for scanning the tooth preparation. Face bow was used to avoid cant (tilt).

Prepared dentin was sealed with an adhesive system (Scotchbond, 3M ESPE and flowable composite Venus’s diamond flow, Kulzer) to prevent contamination by bacteria and components coming from provisional cementation materials. Pro temp 3M ESPE was used for temporisation.

The minimum dimensions of the connector were 3×3mm, to enhance optimum mechanical stress distribution.

Placement
The temporary restoration was removed with spoon excavator. Rubber dam was applied to isolate tooth preparation from the oral environment. The abutment was cleaned with prophy brush. The IRFDP was tried in mouth and saliva remnants were removed after soaking in 5M NaOH for 20 seconds. The restoration was sandblasted with 50ums of alumina for 60 seconds and cleaned with water spray. The restorations and abutments were dried with air. There is no need to sandblast if it has been done in lab.

The coat of zirconia primer (Scotchbond Universal Adhesive, 3M ESPE) containing 10- methacryloyloxydecyl dihydrogen phosphate (MDP) is used to increase the bond strength.

Maxcem Elite Kerr Corp self-adhesive cement was used for bonding IRFDP. Self-adhesive cement was cured for 10 seconds to increase bond and flexure strength. Static and dynamic occlusion was checked with 40ums articulating paper. The IRFDP occlusion was adjusted with fine diamond bur and then polished with compo glaze.

Conclusion
IRFDP restorations are good and least invasive alternatives for the replacement of a missing tooth.

A good design, tooth preparation and choice of material and adhesives increases the fracture resistance of a prosthesis.

The digital oral scans provide the laboratory with precise margins, helping them prepare an immaculate IRFDP margin. With scans, there are either no or significantly reduced risk of distortions in preparation of margins (unlike impression materials which have the susceptibility for shrinkage or anomalies because of ill-fitting trays, or accumulation of saliva).

Even though there has been some research on IRFDP, we still need further clinical studies with greater sample sizes and a longer period to evidence the effectiveness and survival rates of IRFDP.
**BALANCING PATIENT CARE AND BUSINESS SUCCESS: METRICS YOU SHOULD BE USING**

As healthcare professionals, we often use metrics and grading systems to record the current status of a patient’s health, dental or otherwise, and record positive or negative changes in those metrics over time to decide what care or treatment that patient needs.

What we are less familiar with is using metrics and grading systems to assess the current and future health of our healthcare business/surgery.

The good news is that learning how to measure the health and performance of your dental business is easy and you probably already have everything you need in place to get started. So, let me introduce you to the metrics of business...

**WHAT IS A KPI?**

A KPI (Key Performance Indicator) is a quantifiable metric that reflects how well your business is achieving its goals and objectives.

**SO, WHAT KIND OF GOALS AND OBJECTIVES DOES YOUR BUSINESS HAVE?**

Often, when I put this question to clients, I am met with a blank stare, as dentists are often so busy just keeping everything going, that they do not have the time to really ‘dive deep’ into thinking about what they would actually like to achieve.

And this is completely understandable. I recall my time owning an optometry practice when my primary goal was simply to get through the week without making any mistakes in the care of my patients. Ideally, there’d be sufficient funds in the account by week’s end to cover bills, staff salaries, and with a bit left over for myself.

Does that sound familiar? Let’s keep it really simple then...

**WHAT DO YOU WORRY ABOUT?**

For a lot of us it’s things like...

- The clinic diary is too quiet and we’re worried that the clinic is too full and we’re worried patients are waiting too long and they will go elsewhere.
- Another typical worry is the bank account balance. When it’s very low, we think maybe we shouldn’t have bought that equipment, maybe we shouldn’t have hired that extra hygienist and maybe that associate I have working with me is not pulling their weight!
- With regard to whether your clinic is busy enough or too busy? Using a metric like the Monthly Break-Even Point of your business tells you the minimum amount of money you need to generate in revenue every month. This allows you to quickly assess if you’ve met that target.

This simple metric gives you amazing insight into how well the business is managing its costs over time. So if you use no other metric, use this one. (You can read my blog about How to Calculate Your Break-Even Point.)

For most small businesses, it’s recommended to keep no more than 10 -12 KPI’s but for dental businesses, about six is ideal and all of these are usually readily available on your clinic software package.

The typical metrics that every dentist should be using are:

- Earnings/performance per individual
- Cashflow forecasting (predict what your bank balance will be at the end of every week, month and year)
- Break-Even Point
- Patient numbers (including new patient numbers)
- Monthly revenue
- Monthly costs, including wage costs
- Monthly margins on services (i.e. how much money are you actually making from your services and is your pricing right or does it need to change?)

In conclusion, using metrics allows you to efficiently manage the business side of your surgery with confidence, knowledge and ease, so you can focus on looking after your patients.

Elaine Smith is an optometrist with more than 25 years’ experience in the healthcare industry. She now works with other healthcare professionals through her business www.business-fitt.com helping them use metrics and KPIs to manage, organise and improve business performance so they can focus on looking after their patients.
SOUTHERN IMPLANTS is a privately owned osseo-integration company, founded in South Africa in 1987, and within the group are companies specialising in spinal, cardiac and tissue regeneration.

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Our clinical support and product specialist in Ireland is Stephen Wilson. Having come from an engineering background, he initially entered the dental field through the supply and repair of dental equipment. His focus is on customer care and specialist support for those customers using Southern’s advanced implant solutions.

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Established in 1935, Christie & Co is the largest, and only specialist firm of agents and RICS Registered Surveyors handling both the valuation and the sale of dental practices in the UK. Dealing across the whole market and all price ranges and practice types, our specialists have in-depth market knowledge.

In the first half of 2023 alone, across the UK, we brought more than 140 new practices to the marketplace, achieved 545 viewings, and received more than 485 offers, which illustrates the appetite out there for quality practices across the country. We remain optimistic about the market for the remainder of the year, sure that sellers will continue to achieve the best prices for their practices.

As the specialist covering Northern Ireland, I work with dentists across the country to ensure they receive the best price for their businesses. We’re seeing a lot of buyers keen to acquire in Northern Ireland, which is causing a competitive marketplace, as illustrated in a recent corporate divestment that I worked on – a five-surgery, mixed practice that received a huge amount of interest just hours after hitting the market.

Within two days, we received our first offer, with a subsequent three offers by the closing date. In the end, a deal was agreed with a pair of independent buyers who were entering into practice ownership for the first time.

**USING AN AGENT VS SELLING DIRECT**
When considering selling your dental practice, it may be tempting to cut costs by selling directly rather than using an agent, but this is likely to result in losing you money in the long term and limit the number of offers received on your business.

Instead, do your research and be sure to enlist the help of a good business property adviser, solicitor, and accountant, all of whom can help you maximise the profitability of your practice.

To discuss the dental market in Northern Ireland, or for a confidential chat about your options, contact Joel Mannix: joel.mannix@christie.com / +44 7764 241 691

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