Minimally invasive dentistry part I: making the case for prevention

Learning outcomes

- To appreciate the national and global burden of oral diseases;
- to introduce national and global oral health policies and strategies; and,
- to demonstrate the need for a paradigm shift in the design and delivery of oral healthcare services towards prevention and minimally invasive dentistry.

Introduction

Dentistry is nothing if not adaptable. Over the last two centuries, dentistry has evolved from the domain of barbers, blacksmiths and self-taught practitioners to a respected, university-based profession, and from extractions and hand drills to intra-oral scanners, dental implants and aesthetic medicine. However, modern techniques and materials have not cured periodontal diseases and dental caries. Oral diseases have adapted and found new ways to flourish amidst growing urbanisation, lack of access to fluoride (via community water fluoridation, and oral hygiene products and habits), the availability and affordability of foods high in sugars, and poor access to community oral healthcare services.

Oral diseases are among the most common non-communicable diseases (NCDs) worldwide, affecting 3.5 billion people, and the burden of oral disease is increasing.[1] Untreated oral diseases can have serious and severe negative consequences for quality of life, nutrition, the ability to engage with society, and educational and occupational attainment. Many of the risk factors for poor oral health are common to and can exacerbate other NCDs such as cardiovascular diseases, diabetes, cancer, and chronic respiratory diseases.

Oral health in Ireland

In Ireland, almost one in three people over the age of five years has untreated dental caries in at least one permanent tooth, and one in 20 people over 15 years of age has severe periodontal disease.[2] While this compares favourably with many European countries, there is a lack of current epidemiological data and recent challenges in accessing oral healthcare services may undermine these figures. Additionally, oral diseases disproportionately affect lower socio-economic and marginalised groups, and oral health data regarding these populations is scarce. Use and awareness of State dental services is low. There is limited or sometimes no access to oral healthcare for those living with disabilities, in residential services, or utilising emergency accommodation, with a geographical variation in availability and accessibility of services.

Treatment of oral diseases can be costly and time consuming. The total expenditure on dental healthcare in Ireland in 2019 was estimated to be €515m, and the loss of productivity arising from poor oral healthcare costs €1.44 billion.[3] However, the cost of oral disease and oral healthcare services cannot simply be measured in Euros. Increasingly, the environmental burden of oral diseases and oral healthcare services and their contribution to climate change are being recognised and investigated. The carbon footprint of dental treatment acts as a proxy for understanding the environmental impact of oral diseases. The annual carbon footprint of NHS Dental Services in England has been estimated to be the equivalent of 675,000 people.[4]

Oral health has been neglected in Ireland and suffers from a lack of political priority.[5] Ireland has an unusually complex healthcare system and as a result there are significant gaps in universal health coverage. Dental care in Ireland is provided through a hybrid private and public model. Publicly funded oral healthcare services account for just one-third of total oral healthcare expenditure in Ireland, with the remainder being primarily privately financed. The State funds limited dental treatments provided in private practices and Health Service Executive (HSE) dental clinics for those holding a medical card via the Dental Treatment Services Scheme (DTSS) through the Dental Treatment Benefit Scheme (DTBS) for insured workers, and directly through the Public Dental Service.[6] The DTSS and DTBS are effectively fee-for-service schemes; this system of remuneration can incentivise operative interventions and disincentivise prevention. Publicly funded oral healthcare services were dramatically curtailed after the 2008 financial crisis and have been only partially restored.

This predominantly private model of oral healthcare reinforces the misconception of oral health as a matter of personal responsibility. It also does not take account of our understanding of the biological nature of dental disease, effective preventive strategies, or the ecosystem of the oral cavity. Access to oral healthcare services is often based on ability to pay rather than need.

The case for prevention

In the context of the prevalence and impact of oral diseases, the financial and environmental cost of dental treatment, inadequate funding for public oral healthcare services, the increasing cost of living and widening inequalities,

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combined with a growing and ageing population, a limited workforce, inadequate access to oral healthcare services and international obligations, 'business as usual' is not an option.

Fortunately, oral diseases are largely avoidable through evidence-informed, cost-effective and sustainable population-level measures that address the social and commercial determinants of health, individual preventive regimes, and minimally invasive clinical interventions. Banerjee defines minimum intervention care as "the oral physician's holistic team-care approach to help maintain long-term oral health with preventive patient-centred care plans combined with the dutiful management of patients' expectations".[7]

Dental professionals no longer need to view dental caries as a metastatic lesion that needs to be excised with wide margins. Modern understanding of the histological carious process, and contemporary materials and clinical approaches, allow a minimally invasive approach to prevent new caries lesions, remineralise existing carious tissues, preserve sound tooth structure and, where appropriate, repair teeth. This approach can also be broadened across other disciplines such as endodontics, orthodontics, prosthodontics, periodontics, and paediatric dentistry.

Prevention in action

There are many examples of successful, equitable, sustainable and cost-effective programmes at population and individual levels for the prevention of oral diseases both at home and abroad.

In 1964, Ireland commenced community water fluoridation (CWF), leading to a sustained decrease in the incidence in dental caries among children and adults, increased retention of natural teeth and improved dental health.[8] CWF is one of the most effective and successful public health interventions of the last century, listed by the US Centers for Disease Control and Prevention (CDC) as one of the top ten public health interventions of the 20th century, and with the lowest carbon footprint of population-level caries prevention programmes.

The Childsmile Programme, funded by the Scottish Government, is a national oral health programme for children designed to improve the oral health of children and reduce inequalities of oral health and access to dental services. It comprises programmes of supervised tooth brushing, fluoride varnish applications, community interventions, stakeholder engagement, and a comprehensive research and evaluation programme to understand outcomes and demonstrate successes. In 2020, 74% of five-year-old Scottish children had no dentinal caries compared with approximately 40% before the introduction of the Childsmile Programme.[9]

Smile agus Sláinte

Smile agus Sláinte was published in 2019 with progressive and ambitious ideas to redesign and reimagine oral healthcare services in Ireland underpinned by sound public health concepts of the common risk factor approach, a life-course approach and mainstreaming. The policy advocates for the provision of oral healthcare packages with a focus on prevention for all eligible patients, and with a particular focus on vulnerable groups. It proposes a move away from the traditional fee-per-item model of remuneration towards a mixed payment system to encourage prevention.

While the proposed shift in emphasis towards prevention and additional support for vulnerable groups was widely lauded, the initial response to the policy highlighted the perceived lack of positive engagement with the profession and absence of ring-fenced funding and training to support the transformational structural changes envisaged.[10] Subsequent political disinterest, a global pandemic and difficult economic tides have frustrated implementation of the policy, although recent comments from the Minister for Health have reiterated the Government's commitment to implementation of the National Oral Health Policy.

The international context

In Ireland, oral health and the apparent silent epidemic of dental caries may be struggling to attract widespread attention, but globally it is receiving overdue and widespread limelight. The Lancet Commission on Oral Health published a landmark series on oral health in 2019, outlining the stark reality of the scale and cost of oral disease and calling for radical reform to combat the challenge.[11] Subsequently, the WHO acknowledged that good oral health is integral to physical and mental health and well-being, and a core tenet of universal health coverage, through the WHO Resolution on Oral Health.[12] This resolution reinforces the need for a shift away from the traditional curative approach to oral diseases towards a preventive approach.

In 2021, the WHO established a new section for dental preparations in the List of Essential Medicines.[13] This was one of the first concrete steps to advancing the WHO Resolution on Oral Health and has been followed by the WHO Global Oral Health Action Plan and Oral Health Status Report.[14,15] The action plan sets out two global targets to be achieved by 2030:

1. 80% of the global population will be covered by universal health coverage including oral health.
2. The global prevalence of oral diseases will show a relative reduction of 10%.

These international developments could help to advance oral health up the local political agenda but genuine co-operation between all stakeholders across the profession will be required to develop a detailed and achievable implementation strategy for oral health system reform before another opportunity is missed.

Conclusion

Smile agus Sláinte has proved prescient, foreshadowing an international wave of attention on oral health and oral health policy. It is also the first published oral health policy in the history of the State, representing a potentially unique and much-needed opportunity to reform oral healthcare services and the profession for the better, in alignment with global oral health policy. However, the window of opportunity may close without implementation.

The obstacles are abundant but the path is clear. Preventive and minimally invasive dentistry have been key parts of our past and present. Now more than ever, in light of widening inequalities in health and wealth, they are the future. Parts II and III of this series will introduce caries risk assessment and new concepts in the management of dental caries in the context of preventive and minimally invasive dentistry, respecting the biological nature of oral diseases and the oral cavity.

References

1. Watt R, Listl S, Peres M, Heilman A. Social inequalities in oral health: from evidence to action. London: International Centre for Oral Health Inequalities Research and Policy, 2015. https://media.news.health.ufl.edu/misc/cod-oralhealth/docs/posts_front-page/SocialInequalities.pdf.

2. World Health Organisation. Oral Health Ireland 2022 Country Profile. Geneva: World Health Organisation, 2022. https://www.who.int/publications/m/item/oral-health-irl-2022-country-profile.
3. Jevdjevic M, Listl S. Economic impacts of oral diseases in 2019 – data for 194 countries. Universitat Heidelberg. https://doi.org/10.11588/data/JGJKK0. Accessed April 5, 2024.
4. Duane B, Lee M, White S, Stancliffe R, Steinbach I. An estimated carbon footprint of NHS primary dental care within England. How can dentistry be more environmentally sustainable? *Br Dent J.* 2017;223(8):589-593.
5. McAuliffe Ú, Whelton H, Harding M, Burke S. 'Toothless' – the absence of political priority for oral health: a case study of Ireland 1994-2021. *BMC Oral Health*. 2022;22(1):95.
6. Further information regarding eligibility and availability of State-funded dental services can be found at https://www.hse.ie/eng/services/list/2/dental/.
7. Banerjee A. 'MI'opia or 20/20 vision? *Br Dent J.* 2013;214:101-105.
8. James P, Harding M, Beecher T, *et al.* Impact of reducing water fluoride on dental caries and fluorosis. *J Dent Res.* 2021;100(5):507-514.
9. Ross AJ, Sherriff A, Kidd J, *et al.* Evaluating Childsmile, Scotland's National Oral Health Improvement Programme for children. *Community Dent Oral Epidemiol.* 2023;51(1):133-138.
10. Irish Dental Association. Towards Sustainable National Oral Health Services: An IDA Position Paper. Dublin: Irish Dental Association, 2024.
11. Peres MA, Macpherson LM, Weyant RJ, *et al.* Oral diseases: a global public health challenge. *Lancet.* 2019;394(10194):249-260.
12. World Health Organization. Seventy-Fourth World Health Assembly. WHA 74.5 Oral Health. Geneva: World Health Organization, 2021. https://apps.who.int/gb/ebwha/pdf_files/WHA74/A74_R5-en.pdf.
13. World Health Organization. World Health Organisation Model List of Essential Medicines – 22nd List, 2021. Geneva: World Health Organization, 2021. https://www.who.int/publications/i/item/WHO-MHP-HPS-EML-2021.02.
14. World Health Organization. Draft Global Oral Health Action Plan (2023-2030). Geneva: World Health Organization, 2022. https://www.who.int/publications/m/item/draft-global-oral-health-action-plan-%282023-2030%29.
15. World Health Organization. Oral Health Status Report: Towards universal health coverage for oral health by 2030. Geneva: World Health Organization; 2022. https://www.who.int/publications/i/item/9789240061484.