

Challenges in oral health research for older adults

Finbarr Allen¹ | Georgios Tsakos²

¹Cork Dental School & Hospital,
University College Cork, Cork, Ireland

²Department of Epidemiology and Public
Health, University College London,
London, UK

Correspondence

Finbarr Allen, Cork Dental School &
Hospital, University College Cork, Core,
Ireland.

Email: f.allen@ucc.ie

Background: The high burden of chronic disease in older adults presents significant organisational and funding challenges to healthcare policymakers. However, it is a matter of debate whether research is informing oral healthcare policy at scale.

Objective: The objective of the study was to identify barriers to translation of research into oral healthcare policy and practice for older adults and suggest strategies to address these barriers.

Results: The effectiveness of current models of oral health care, particularly for vulnerable older adults with special needs, is not well established. Researchers need to engage more proactively with stakeholders such as policymakers and end-users from the study design phase. This is particularly relevant for research in residential care settings. Building a rapport and developing trust with these groups will enable researchers to align their research with the priorities of policymakers. The evidence-based care paradigm, which is underpinned by randomised clinical trials (RCTs), may not be practical in population oral health research involving older adults. Alternative methods should be considered to develop an evidence-informed paradigm for oral health care in older adults. Since the pandemic, there are opportunities to use electronic health record data and digital technology. Further research is needed to evaluate the effectiveness of tele-health in oral health of older adults.

Conclusion: Use of a wider range of co-designed studies rooted in the practicalities of “real world” health service delivery is recommended. This may address issues of concern to policymakers and stakeholders regarding oral health and increase the likelihood of translation of geriatric oral health research into oral healthcare policy and practice.

KEYWORDS

ethics, Gerodontology, health policy, health services research, population oral health

1 | INTRODUCTION

Recent reports have highlighted the major demographic changes related to ageing and extended lifespan is evident in many economically advanced countries.^{1,2} For instance, in Asia, the rate of ageing is extremely rapid and by 2030 more than 60% of the global adult population over 65 years of age will live in an Asian country.³ However,

the prevalence of chronic diseases is high, and many older adults experience multiple co-morbid conditions in old age.⁴ This includes cardiovascular disease, respiratory disorders, metabolic disorders (especially type 2 diabetes mellitus), cancer and mental health issues. Cumulative functional deficits over time increase the risk of frailty in old age, and attendant consequences such as increased risk of falls and depression.⁵⁻⁷ The organisational challenges in reforming

This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial](https://creativecommons.org/licenses/by-nc/4.0/) License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited and is not used for commercial purposes.

© 2023 The Authors. *Gerodontology* published by Gerodontology Association and John Wiley & Sons Ltd.

health systems to address the increasing burden of chronic disease management are substantial. Furthermore, healthcare costs are escalating and providing accessible, affordable and equitable care for all is a major challenge.⁸

Over the past 40 or so years, there have also been significant changes in the prevalence and incidence of tooth loss, most notably, a major reduction in the prevalence of edentulousness.^{9,10} However, untreated dental caries and chronic periodontal disease continue to be highly prevalent.¹¹⁻¹³ For the foreseeable future, as significant numbers of older adults retain teeth into old age, there will be a high burden of maintenance of heavily restored teeth and root caries. Chronic periodontal disease complicated by systemic inflammatory disease will also continue to be challenging in older adults.^{13,14} This rapidly growing burden of chronic disease comes with a financial cost that could be unsustainable for health systems, societies and individuals.^{15,16} A particular concern is the state of oral health, or perhaps more accurately, the dismal state of oral health among dependent older adults resident in care homes.¹⁷⁻¹⁹ It is well-recognised that oral health status can rapidly deteriorate once an older adult is admitted to full-time residential care, and yet there are major barriers to their care which have been identified. In the case of frail older adults, mortality risk associated with high pathogen load in the oral cavity has also been highlighted.^{20,21} There are ongoing efforts to develop clinical care pathways for this underserved group, but the effectiveness of these efforts is at this point unknown.²²

Recently, there have been clarion calls for action to deal with the apparent neglect of dental disease.²³ There is a pressing need to change the current treatment-based focus of oral health care which is costly and often inaccessible to lower income adults including retired and dependent older adults. In order to substantially and equitably improve population oral health, we need to increase efforts to undertake research in collaboration with policymakers and potential service end-users with a view to successful translation of research into policy. This includes health services research as well as basic and clinical research.

In this paper, we discuss the challenges involved in undertaking oral health research involving older adults, including dependent adults. We also offer observations on how to overcome these challenges and contribute to efforts to improve population oral health.

1.1 | Is the current state of global oral health a public health problem?

As oral diseases are cumulative in nature, good oral health early in the lifespan gives a solid starting point and, judging from the evidence on trajectories of oral diseases, may have a positive impact later in life and, therefore, also on future generations of older adults. However, we must concurrently manage a generation of older adults with a high prevalence of disease and burden of repair including replacement of restorations and prostheses.

It is no doubt a source of frustration to many in the dental and oral healthcare profession that oral health appears to have a low

priority for attention by policymakers. There appears to be convergence between key representative stakeholders such as the FDI and IADR to change this, and the recent UN Decade of Health Ageing initiative and WHO resolution [WHA74.5] are driving a new global action plan to tackle oral diseases. The goal of this WHO plan is to set ambitious and measurable actions to improve global oral health by 2030.

So how do oral healthcare professionals and researchers convince policymakers to act? Sheiham and Watt²⁴ defined a condition or disease state as being “public health problem” when: (i) it is highly prevalent; (ii) it carries severe consequences or costs to the population or individuals, and (iii) there are effective methods available to prevent, alleviate or cure it. Clearly, oral diseases are a “public health problem” according to these criteria. It has been clearly established that oral diseases are highly prevalent at global level, with dental caries being the most prevalent non-communicable infectious disease, and chronic periodontal disease the sixth most prevalent.^{11,12} These diseases share many common risk factors with increasingly prevalent chronic disease states in older adults, including diabetes mellitus and cognitive impairment. There is significant interest in the nature of the associations between dental and systemic disease, and whether tooth loss and oral inflammation contribute significantly to progress of chronic systemic disease.²⁵⁻³¹ Poor oral health has also been associated with physical frailty in population-based cohort studies in the UK, Brazil and Japan.³⁰⁻³³ For instance, Ramsey et al³⁰ reported that the incident frailty risk in older men was higher for those who were edentulous, had three or more symptoms of dry mouth and three or more oral health problems. Importantly, this association persisted after adjustment for age, smoking, social class, history of cardiovascular disease, diabetes and medications associated with dry mouth. It seems biologically plausible, but further longitudinal studies are required to shed more light on whether there is any causal relationship.

Tooth loss and untreated dental disease have been reported as having disabling impacts on health-related quality of life as well as oral function.³⁴⁻³⁶ At society level, substantial loss of productivity and days of work lost as a consequence of dental diseases have been reported.¹⁶ At individual level, there are severe consequences in terms of pain, loss of function [particularly mastication] and psycho-social/health-related quality of life impacts. The oral disease burden in older people residing in nursing care homes is substantial and access to oral health care for dependant adults is limited.³⁷

Dental caries and chronic periodontal disease are preventable. The trajectory of these diseases is behaviourally mediated and can be favourably modified with appropriate intervention. If dental caries can be identified at an early stage [i.e. at an early stage of demineralisation], it is possible to arrest the disease process without significant and costly instrumentation. In most countries, the curative model of oral health care predominates, and this high-cost model of health care is unlikely to be financially sustainable long term. Furthermore, high cost of care is likely to increase socioeconomic inequalities in

oral health. This has led to renewed calls for universal health insurance coverage [UHC] to include prevention focussed oral health care.^{38,39} So, in summary, oral diseases are highly prevalent, have severe consequences on function and well-being, are costly to remedy and are preventable.

1.2 | The importance of health services research

Health services research has been defined as “a multidisciplinary field of inquiry, both basic and applied, that examines access to, and the use, costs, quality, delivery, organisation, financing, and outcomes of health care services to produce new knowledge about the structure, processes, and effects of health services for individuals and populations”.⁴⁰ The scope of health services research is broad and essential to planning services to meet the needs of an ageing population. Policy direction should be influenced by high-quality evidence provided by health service research. Ideally, this should include ongoing systematic population health surveillance [e.g. health surveys], monitoring of the epidemiology of oral health problems and documentation of the impact of population health interventions. This would allow priorities for health policy to be established on evidence, and whether population health interventions were cost effective and had the intended impact. Health services research could also strengthen the advocacy for good oral health, particularly for underserved sections of the community such as dependent older adults. Finally, as policymakers try to drive value-based care

(i.e. care which delivers the best health outcomes at a reasonable cost⁴¹), health services research is required to determine appropriate funding mechanisms.

1.3 | Moving from research to policy development and implementation

Allied to the need for health services research is the need to improve understanding of what is needed to translate research evidence into public health policy. The Centre for Disease Control [CDC] in the United States have provided guidance on how to engage policymakers with a view to influencing policy development and implementation (Figure 1). As stated earlier, it is important to demonstrate a public health problem that would warrant engagement with public health policymakers. A key element in their guidance is to ensure that the nature of the problem is clearly identified and articulated. In addition to gathering research data, consultation with a wide range of stakeholders is recommended before attempting to engage with policymakers and also throughout the process of policy formulation. Sarkies et al.⁴² have systematically reviewed the evidence regarding successful translation of research evidence into policy implementation. They have proposed a framework (Figure 2) which, if followed, would increase the likelihood of research being translated into action. As with the CDC, they suggest that research data are more likely to influence policy if aligned to the policymakers organisational priorities. The importance of building a relationship between the research and policymaking teams is

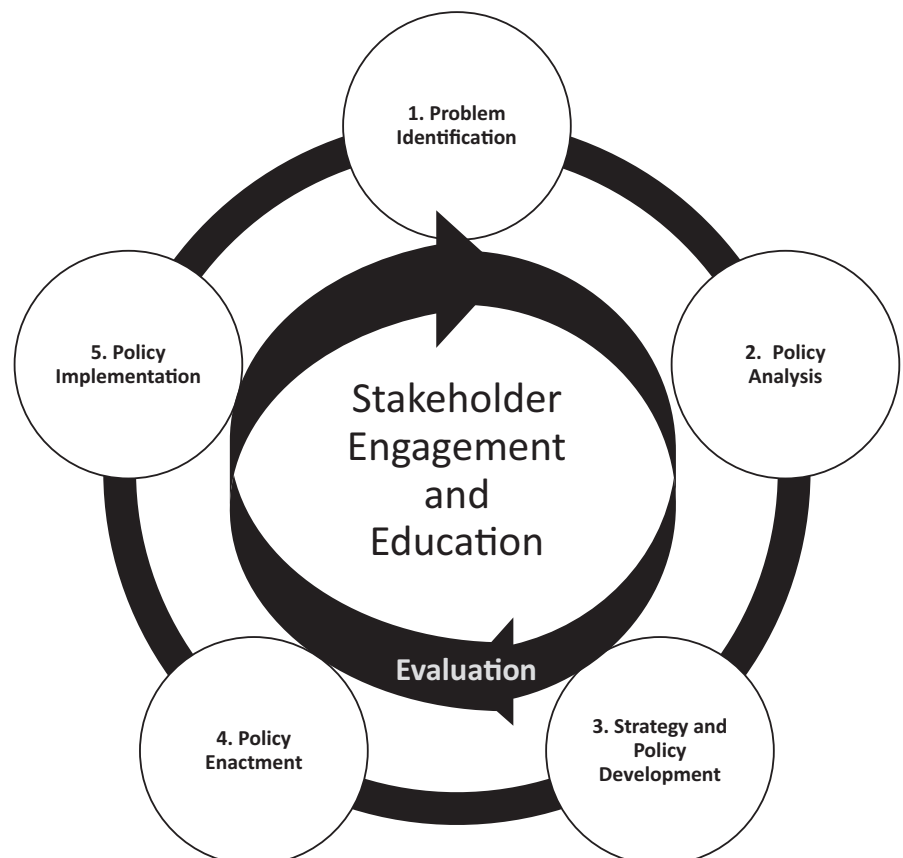


FIGURE 1 Framework for engaging policymakers: From problem identification to policy implementation. Adapted from: <https://www.cdc.gov/policy/polaris/policyprocess/problem-identification/index.html>.

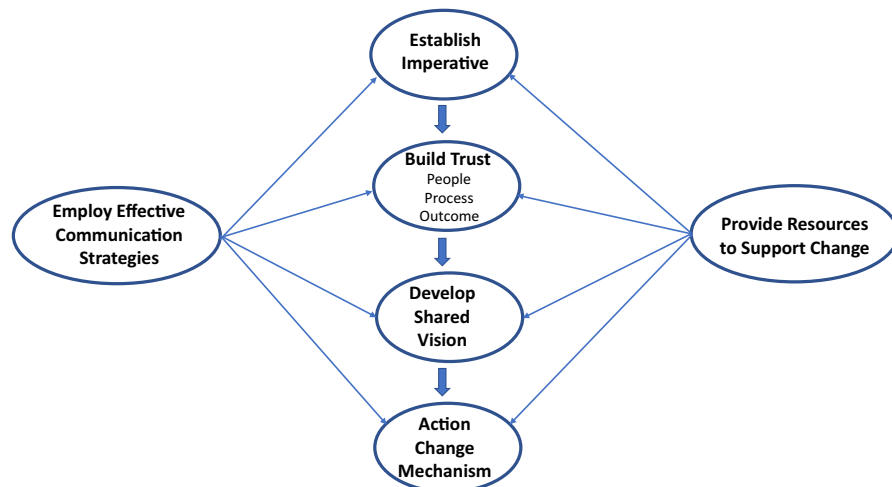


FIGURE 2 Framework to guide translation of research into policy. (Adapted from Sarkies MN, Bowles KA, Skinner EH, Haas R, Lane H, Haines TP. The effectiveness of research implementation strategies for promoting evidence-informed policy and management decisions in health care: a systematic review. *Implement Sci.* 2017;12(1):132).⁴²

emphasised. This time is needed to develop mutual understanding and trust. This forum may also be engaged to decide on the research design before commencing the research. Evidence-based decision making underpinned by randomised clinical trials (RCTs) has been strongly advocated in health research, but some population research questions do not readily let themselves to RCT design. This will be discussed later in more detail, but input from stakeholders helps researchers recognise and understand the complex context and is therefore essential.^{43–45} Qualitative methods (e.g. focus groups and semi-structured individual interviews) which enable researchers to develop a deep understanding of the experiences and perspectives of both service provider and users could be a very helpful methodological tool in this process. This could be in parallel with traditional experimental designs, but the message is not to rely on RCT as the gold standard design for population health research. There is a need to co-develop a governance framework which ensures that a wide range of stakeholders consider the potential implications of research findings before they are published. Within this governance framework, it is important for stakeholders to identify resources (financial and human) needed to appropriately support the project, and to agree how data may be used to effect policy change. The stakeholders will also need to agree a joint communication framework for external interested parties.

1.4 | Barriers and challenges to oral health research in older adults

There are a number of barriers to conducting health services research, with some barriers being unique to older adults living in residential care facilities.

1.4.1 | Research with vulnerable adults

As the number of medically compromised and dependent adults increases in ageing populations, there is a pressing need for research into their health needs and data to plan appropriate care for this vulnerable group. There is a lack of research data on the needs of

vulnerable populations, including frail older adults living in residential care. Accordingly, there are significant gaps in evidence for care pathways and interventions for these groups. Experimental designs such as RCTs are not very practical in this category of special needs adults, and engaging carers in research studies is often neglected or found to be challenging. More recent study designs in care home settings have taken a different approach and intend to address the question of what is practical and implementable using stakeholder engagement in qualitative interviews.⁴⁶ The challenges in conducting research when capacity to provide informed consent is compromised [e.g. cognitive impairment] have been reported.⁴⁷ For instance, it is very challenging to get reliable and valid information about the impact of oral disease on health-related quality of life given the communication difficulties. The process of consent by proxy has been debated, and whether the proxy is able to provide consent in accordance with the wishes of the cognitively impaired adult. A further consideration is whether “implied consent” applies. It has been argued that the research governance rules for vulnerable groups, including cognitively impaired older adults, are so onerous that researchers are likely to exclude them. There is also a time sensitivity in frail and medically compromised older adults, and it is never ideal to have protracted and complex processes to undertake research in this group. Some have commented that urgent action is required to protect vulnerable populations *through* research, not *from* research as is currently perceived.⁴⁸ This may require advocacy for changes in current legal frameworks in many countries to move from a “best interests” approach to a “minimal risk threshold” approach for obtaining consent from vulnerable individuals.⁴⁹

When planning to undertake research involving adults living in care homes, research governance may lie outside of the health system governance. A further challenge is how to manage the concerns of the care home administrators and staff. There may well be barriers to co-operation with researchers, especially if the care home team are required to alter their care procedures to facilitate the research. They may also have concerns about the research findings, especially if they are perceived to be critical of the care patients receive in the homes. In situations where the care facility is under public service ownership, the relevant government agency overseeing

the facility may also have concerns about the research. For example, in Singapore, the relevant authority is known as the “Agency for Integrated Care [AIC].” This body has oversight of all care standards in community-based healthcare facilities. In our experience, the AIC has provided excellent guidance on how to facilitate oral health research projects in residential care homes and helped enable access to those homes. It is essential to build collaborative relationships with this sector to clearly understand concerns about research and to jointly plan a project involving vulnerable adults.

1.4.2 | The role of teledentistry

The recent COVID-19 pandemic had a significant worldwide impact on the delivery of dental services, education and research worldwide. COVID-19 mortality rates were highest in older and medically compromised adults, and protecting these vulnerable groups was a major public health priority throughout the pandemic. It is possible that enhanced clinical safety protocols introduced through the pandemic will become standard practice.⁵⁰

During the pandemic, clinicians rapidly increased use of remote consultation on digital platforms for vulnerable adults at risk of serious infection. The concept of “telemedicine” has been in vogue for some time, but “teledentistry” is less well developed in dental services. The advances in technology have been very rapid in recent years, and many people now routinely use smartphones and virtual communication platforms such as MS Teams and Zoom. Teledentistry could be particularly useful for older adults who are fully or semi-dependant, and potentially address some of the accessibility issues experienced by these patients. Potentially, digital technology could be harnessed for a variety of purposes, including diagnostics, health promotion, training for staff in care homes and even research. However, at this point in time, there are no agreed standards for teledentistry. Rate limiting steps to successful use of teledentistry in older adults include levels of health literacy and, familiarity with digital technology and health applications. Ideally, research will be undertaken to determine the feasibility of routine use of teleconsultations for dental patients and to evaluate use of electronic health promotion tools. There is a pressing need to develop evidence-based guidelines for the use of teledentistry, and exploration of how best to target and educate older adults in the use of digital technologies. Regulatory bodies will also need to consider their guidance to oral healthcare professionals on best practice when using remote consultations. Where used for health promotion, research should determine the effectiveness in achieving the desired behaviour changes needed to improve health. Recent systematic reviews suggest that there is potential, but further work to evaluate the benefits of teledentistry in the older adult population is needed.^{51,52}

1.4.3 | Methodological challenges

Randomised clinical trials (RCTs) have been widely regarded as the gold standard for developing evidence-based health care.⁵³

However, there are many challenges in undertaking RCTs in older, particularly vulnerable, adults. These include ethical, practical and financial considerations. Assuming that an RCT has been well designed, it is possible to establish the efficacy of an intervention. However, across populations, what is really needed is to test effectiveness of interventions. Furthermore, there are few examples of co-designed measures to test in intervention studies. Along with other authors, we suggest that the evidence-based paradigm, with its reliance on RCT studies, is too linear in scope for evaluation of complex population-level evaluation. Outcomes of an intervention provided in “idealised” conditions are unlikely to be fully replicated when the intervention is provided in less controlled environments such as care homes. Policymakers may have concerns about whether an intervention which is shown to have good efficacy in an RCT can be successfully scaled across a large target population. As such, given the paucity of well-designed RCTs, the evidence base for interventions among older adults is somewhat limited. The challenges in conducting RCTs at population level are even more complex, and we recommend use of a wider range of methods in studies which are co-designed by stakeholder groups to evaluate complex population health interventions.

Currently, there is a high level of reliance on cross-sectional observations with a degree of “over” interpretation of these data. Well-designed cross-sectional studies facilitate exploration of risk-exposure associations. However, to test for causality, longitudinal studies are required. Long-term observation of oral health in older adults are lacking, and there are very few longitudinal studies. Those that have been reported (e.g. the Japan Gerontological Evaluation Study, China Health and Retirement Longitudinal Study, English Longitudinal Study of Aging) continue to improve our understanding of the role of oral health in healthy ageing. Retention of older adults in long-term studies is a challenge, but it is crucial that these studies continue to reinforce our evidence base.

1.4.4 | Operational challenges

Ideally, in an era when electronic medical record systems are becoming widely used, these data could be used to undertake health services research. There would be significant benefits in linking oral health with systemic health data, such as generating sufficiently large datasets to train artificial intelligence networks and collect longitudinal data over a long period of time. However, the legacy of separation between dental and medical services, including clinical records, has hampered multidisciplinary health services research. Oral health researchers are often disadvantaged by not having access to health data or trying to manage poorly integrated data sets. Lack of robust longitudinal data limits our ability to fully understand relationships between oral health and health issues affecting older adults, for example cognitive impairment.

In recent years, revised data protection and privacy legislation in many countries has influenced access to and use of health data for research. This is particularly so when the data set includes personal

information that are not de-identified. There is considerable variation across countries regarding data privacy legislation and how it should be interpreted.⁵⁴ The onus is placed on the researchers to demonstrate full compliance and accountability in relation to use of health data. In many countries, researchers are required to convince institutional review boards how they will comply with data protection and privacy legislation.^{55,56} This includes strong justification and procedures for storing, use, sharing and disposal of potentially identifiable data, and for prospective studies, requests to contact participants and/or access health records beyond baseline data collection can be challenged. When designing a research study which requires the use of personal health data, consulting with the institutional data protection office is highly recommended. They will offer guidance during the study planning stage and help researchers articulate clear governance structures for handling patient data. Ultimately, once the approval authorities are convinced that these sensitive data will be handled ethically, responsibly and securely, they are likely to be released for research.

1.5 | Suggestions for future work

In summary, given the paucity of research which has been implemented in policy for older adults oral health care, there is a case for re-framing the discussion about research involving older adults, including vulnerable and frail adults. The limitations of poorly designed clinical trials in dentistry are clear and possibly contribute to explaining the limited translation of the research into health policy. There needs to be a concerted effort to engage policymakers and stakeholders in research design and dissemination of research findings. In so doing, there is a greater likelihood of conducting research whose findings are context relevant and can be implemented in guidelines and/or policy. This is likely to use of a wider range of co-designed studies rooted in the practicalities of "real world" health service delivery and addresses issues of concern to policymakers and stakeholders. Harnessing big data sets to help model future care needs should be accelerated and the role of electronic technology and artificial intelligence in oral health care needs to be properly evaluated and formalised.

AUTHOR CONTRIBUTIONS

Finbarr Allen conceived the idea for the paper and led the drafting of the manuscript. Georgios Tsakos contributed to the content of the manuscript, proofread and approved the final draft.

ACKNOWLEDGEMENT

Open access funding provided by IReL.

CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no data sets were generated or analysed during the current study.

REFERENCES

1. World Health Organization factsheets (2021) <https://www.who.int/news-room/fact-sheets/detail/ageing-and-health>
2. World population ageing 2017 [highlights]. New York City (NY): United Nations, Department of Economic and Social Affairs. 2017 (ST/ESA/SER.A/397) (https://www.un.org/en/development/desa/population/publications/pdf/ageing/WPA2017_Highlights.pdf, accessed October 2022).
3. United Nations Department of Economic and Social Affairs, Population Division. World Population. Prospects 2022: Summary of Results. UN DESA/POP/2022/TR/NO. 3. 2022.
4. Murray CJL, Abbafati C, Abbas KM, et al. Five insights from the global burden of disease study 2019. *Lancet*. 2020;386:1135-1159.
5. Clegg A, Young J, Iliffe S, Rickert MO, Rockwood KI. Frailty in elderly people. *Lancet*. 2013;381:752-762.
6. Fried LP, Ferrucci L, Darer J, Williamson JD, Anderson G. Untangling the concepts of disability, frailty, and comorbidity: implications for improved targeting and care. *J Gerontol A Biol Sci Med Sci*. 2004;59(3):255-263.
7. Bock J-O, König H-H, Brenner H, et al. Associations of frailty with health care costs--results of the ESTHER cohort study. *BMC Health Serv Res*. 2016;14(16):128.
8. World Health Organization. *Global Spending on Health 2020: Weathering the Storm*. World Health Organization; 2020 Licence: CC BY-NC-SA 3.0 IGO.
9. Petersen PE. The world Oral health report 2003: continuous improvement of oral health in the 21st century – the approach of the WHO global Oral health Programme. *Community Dent Oral Epidemiol*. 2003;31:3-24.
10. Kassebaum NJ, Bernabé E, Dahiya M, Bhandari B, Murray CJ, Marcenes W. Global burden of severe tooth loss: A systematic review and meta-analysis. *J Dent Res*. 2014;93(7 Suppl):20S-28S.
11. Kassebaum NJ, Bernabé E, Dahiya M, Bhandari B, Murray CJ, Marcenes W. Global burden of untreated caries: a systematic review and meta-regression. *J Dent Res*. 2015;94:650-658.
12. Kassebaum NJ, Bernabé E, Dahiya M, Bhandari B, Murray CJ, Marcenes W. Global burden of severe periodontitis in 1990-2010: a systematic review and meta-regression. *J Dent Res*. 2014;93(11):1045-1053.
13. Bernabé E, Marcenes W, Hernandez CR, et al. Global, regional, and National Levels and trends in burden of Oral conditions from 1990 to 2017: A systematic analysis for the global burden of disease 2017 study. *J Dent Res*. 2020;99:362-373.
14. Jin LJ, Lamster IB, Greenspan JS, Pitts NB, Scully C, Warnakulasuriya S. Global burden of oral diseases: emerging concepts, management and interplay with systemic health. *Oral Dis*. 2016;22(7):609-619.
15. Righolt AJ, Jevdjevic M, Marcenes W, Listl S. Global-, regional-, and country-level economic impacts of dental diseases in 2015. *J Dent Res*. 2018;97:501-507.
16. Peres MA, Macpherson LMD, Weyant RJ, et al. Oral diseases: a global public health challenge. *Lancet*. 2019;394:249-260.
17. Janssens B, Vanobbergen J, Petrovic M, Jacquet W, Schols JMGA, De Visschere L. The oral health condition and treatment needs assessment of nursing home residents in Flanders (Belgium). *Community Dent Health*. 2017;34:143-151.
18. Yoon MN, Ickert C, Slaughter SE, Lengyel C, Carrier N, Keller H. Oral health status of long-term care residents in Canada: results of a national cross-sectional study. *Gerodontology*. 2018;35:359-364.
19. Porter J, Ntouva A, Read A, Murdoch M, Ola D, Tsakos G. The impact of oral health on the quality of life of nursing home residents. *Health Qual Life Outcomes*. 2015;13:102.
20. Van der Maarel-Wierink CD, Vanobbergen JN, Bronkhorst EM, Schols JM, De Baat C. Oral health care and aspiration pneumonia in frail older people: a systematic literature review. *Gerodontology*. 2013;30:3-9.

21. Yoneyama T, Yoshida M, Ohru T, et al. Oral care reduces pneumonia in older patients in nursing homes. *J Am Geriatr Soc.* 2002;50(3):430-433.
22. Stark P, McKenna G, Wilson CB, et al. Interventions supporting community nurses in the provision of Oral healthcare to people living at home: a scoping review. *BMC Nurs.* 2022;21(1):269.
23. Watt RG, Daly B, Allison P, Macpherson LMD, et al. Ending the neglect of global oral health: time for radical action. *Lancet.* 2019;20(394):261-272.
24. Sheiham A, Watt R. Oral health prevention and policy. In: Murray JJ, Nunn JH, Steel JG, eds. *Prevention of Oral Diseases.* 4th ed. Oxford University Press; 2003:241-258.
25. Liljestrand JM, Havulinna AS, Paju S, Männistö S, Salomaa V, Pussinen PJ. Missing teeth predict incident cardiovascular events, diabetes, and death. *J Dent Res.* 2015;94:1055-1062.
26. Polak D, Shapira L. An update on the evidence for pathogenic mechanisms that may link periodontitis and diabetes. *J Clin Periodontol.* 2018;45:150-166.
27. Rydén L, Buhlin K, Ekstrand E, et al. Periodontitis increases the risk of a first myocardial infarction A report from the PAROKRANK study. *Circulation.* 2016;133:576-583.
28. Sanz M, Marco Del Castillo A, Jepsen S, et al. Periodontitis and cardiovascular diseases: consensus report. *J Clin Periodontol.* 2020;47(3):268-288.
29. Tonetti MS, Van Dyke TE. Periodontitis and atherosclerotic cardiovascular disease: consensus report of the joint efp/aap workshop on periodontitis and systemic diseases. *J Clin Periodontol.* 2013;40(Suppl. 14):S24-S29.
30. Ramsay SE, Papachristou E, Watt RG, et al. Influence of poor Oral health on physical frailty: a population-based cohort study of older British men. *J Am Geriatr Soc.* 2018;66:473-479.
31. Albani V, Nishio K, Ito T, et al. Associations of poor oral health with frailty and physical functioning in the oldest old: results from two studies in England and Japan. *BMC Geriatr.* 2021;21(1):187.
32. De Andrade FB, Lebrão ML, Santos JL, Duarte YA. Relationship between oral health and frailty in community-dwelling elderly individuals in Brazil. *J Am Geriatr Soc.* 2013;61:809-814.
33. Tanaka T, Takahashi K, Hirano H, et al. Oral frailty as a risk factor for physical frailty and mortality in community-dwelling elderly. *J Gerontol A Biol Sci Med Sci.* 2018;73:1661-1667.
34. Gerritsen AE, Allen PF, Witter DJ, Bronkhorst EM, Creugers NH. Tooth loss and oral health-related quality of life: a systematic review and meta-analysis. *Health Qual Life Outcomes.* 2010;8:126-131.
35. Zhao L, Lin HC, Lo EC, Wong MC. Clinical and socio-demographic factors influencing the oral health-related quality of life of Chinese elders. *Community Dent Health.* 2011;28(3):206-210.
36. Echeverria MS, Wunsch IS, Langlois CO, Cascaes AM, Ribeiro Silva AE. Oral health-related quality of life in older adults-longitudinal study. *Gerodontology.* 2019;36:118-124.
37. Czwikla J, Schmidt A, Schulz M, et al. Contacts with general practitioners, dentists, and medical specialists among nursing home residents: a cross-sectional study in 44 German nursing homes. *BMC Health Serv Res.* 2022;22(1):35.
38. Listl S, Quiñonez C, Vujicic M. Including oral diseases and conditions in universal health coverage. *Bull World Health Organ.* 2021;99(6):407.
39. Aida J, Fukai K, Watt RG. Global neglect of dental coverage in universal health coverage systems and Japans broad coverage. *Int Dent J.* 2021;71(6):454-457.
40. Thaul S, Lohr KN, Tranquada RE. Institute of Medicine (US) Committee on Health Services Research: Training and Work Force Issues. : National Academies Press (US); 1994.
41. Porter ME, Lee TH. The strategy that will fix health care. *Harv Bus Rev.* 2013;91(10):50-70.
42. Sarkies MN, Bowles KA, Skinner EH, Haas R, Lane H, Haines TP. The effectiveness of research implementation strategies for promoting evidence-informed policy and management decisions in healthcare: a systematic review. *Implement Sci.* 2017;12(1):132.
43. Moore GF, Audrey S, Barker M, et al. Process evaluation of complex interventions: Medical Research Council guidance. *BMJ.* 2015;350:h1258.
44. Brocklehurst PR, Baker SR, Listl S, Peres MA, Tsakos G, Rycroft-Malone J. How should we evaluate and use evidence to improve population Oral health? *Dent Clin N Am.* 2019;63(1):145-156.
45. Brocklehurst PR, Baker SR, Langley J. Context and the evidence-based paradigm: The potential for participatory research and systems thinking in oral health. *Community Dent Oral Epidemiol.* 2021;49(1):1-9.
46. Watson S, McMullan J, Brocklehurst P, et al. Development of a core outcome set for oral health services research involving dependent older adults (DECADE): a study protocol. *Trials.* 2020;21(1):599.
47. Shepherd V. Advances and challenges in conducting ethical trials involving populations lacking capacity to consent: A decade in review. *Contemp Clin Trials.* 2020;95:106054.
48. Griffiths S, Gude A, Greene L, et al. Do I have the capacity to make capacity judgements? Researcher reflections from a person-centred dementia support study. *Dementia (London).* 2022;21(3):972-994.
49. Douglass A, Ballantyne A. From protectionism to inclusion: A New Zealand perspective on health-related research involving adults incapable of giving informed consent. *Bioethics.* 2019;33(3):374-382.
50. McKenna G, Janssens B, Srinivasan M, Brocklehurst P, Tsakos G. Who is caring for the oral health of dependent institutionalised elderly during the COVID-19 pandemic? *Gerodontology.* 2020;37(4):315-316.
51. Aquilanti L, Santarelli A, Mascitti M, Procaccini M, Rappelli G. Dental care access and the elderly: what is the role of teledentistry? A systematic review. *Int J Environ Res Public Health.* 2020;17(23):9053.
52. Fernández CE, Maturana CA, Coloma SI, Carrasco-Labra A, Giacaman RA. Teledentistry and mHealth for promotion and prevention of oral health: A systematic review and meta-analysis. *J Dent Res.* 2021;100(9):914-927.
53. Jones DS, Podolsky SH. The history and fate of the gold standard. *Lancet.* 2016;385:1502-1503.
54. Oderkirk J, Ronchi E, Klazinga N. International comparisons of health system performance among OECD countries: opportunities and data privacy protection challenges. *Health Policy.* 2013;112(1-2):9-18.
55. Oh SR, Seo YD, Lee E, Kim YG. A comprehensive survey on security and privacy for electronic health data. *Int J Environ Res Public Health.* 2021;18:9668.
56. Lee RR, McDonagh JE, Farre A, Peters S, Cordingley L, Rapley T. Data protection, information governance and the potential erosion of ethnographic methods in health care? *Sociol Health Illn.* 2022;44:211-217.

How to cite this article: Allen F, Tsakos G. Challenges in oral health research for older adults. *Gerodontology.* 2023;00:1-7. doi:[10.1111/ger.12681](https://doi.org/10.1111/ger.12681)