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Review article

Improving oral health of older adults for healthy ageing

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Abstract The objective of this article is to discuss the importance of oral health in achieving healthy ageing and the role of all stakeholders in improving oral health for older adults. The World Health Organization defined healthy ageing as the process of developing and maintaining the functional ability that enables well-being in older age. It recognized healthy ageing as an important goal and the key to turn population ageing from a challenge to an opportunity. Healthy ageing has positive impacts on individual older adults, their families and societies. It enhances quality of life of older adults, strengthen family bonding of families and reduce resource demand of the societies. Maintaining oral health and function is essential in healthy ageing. Oral health affects systemic health, cognitive health and psychological health. Oral functions such as eating ensure nutritional health in older adults. Most oral diseases are preventable and oral function decline can be recovered by intervention. Unfortunately, oral diseases remain prevalent and oral function decline is being neglected in older adults. Policy makers, national dental associations, academics and healthcare professionals should collaborate to provide a patient-centred, comprehensive and integrated care to older adults. Health policy reforms are needed to reduce the global oral health inequalities in older adults. Population-wide prevention should be accessible, affordable and available to older adults. Universal oral health coverage is crucial for integration of oral health into general health care. © 2023 Association for Dental Sciences of the Republic of China. Publishing services by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

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Introduction

Driven by the declining birth rate and the rising life expectancy, population is aging worldwide. The United Nations estimated that the number of older adults aged 65 or above would reach 1.5 billion with 1 in 6 among our population by 2050.¹ In the *World report on ageing and health 2015*, the World Health Organization acknowledged the worrisome on the profound impact of population ageing on health, health system, workforce and budgets whereas assured the public that, while under the right policy and service, old age did not imply dependence but a rich new opportunity to individual older adults, their families and societies.² The World Health Organization proposed healthy ageing as an important goal to all people and a key to turn population ageing from a challenge to an opportunity.²

Healthy ageing means more than disease free but the maintenance of functional ability in older adults.² The World Health Organization proposed a 10-year action plan in *Decade of Healthy Ageing 2021–2030* to encourage countries to develop and implement policy and supportive programmes in promoting healthy ageing and improving the quality of life in older adults.³ Older adults will be the centre in this plan with all the stakeholders including policy makers, national professional associations, academics and all healthcare professionals working together to improve the lives of older adults, their families and communities in the coming decade.³

Oral and systemic health are interrelated.⁴ Oral diseases and non-communicable diseases share some common risk factors including sugar consumption, tobacco use and social and commercial determinants of health.⁴ Periodontal health have been linked to several chronic systemic conditions such as diabetes and cardiovascular diseases via their shared inflammatory pathway.^{4,5} Oral health enables daily functions like eating, speaking and smiling in older adults.⁶ Tooth loss, hyposalivation and oral cancer hinder oral function and negatively affect nutritional intake, social interaction, and quality of life.⁷ Oral function decline was associated with general function decline and frailty in older adults and might eventually lead to disability and loss of independence.⁸ Therefore, the World Health Organization and the FDI World Dental Federation have recognized the importance of maintaining oral health and function for healthy ageing in older adults.^{2,9}

Unfortunately, oral diseases are preventable but remains prevalent among older adults; Oral function decline can be restored by early intervention but has been neglected. Almost half of the global older adult population had untreated dental caries and approximately half of them had untreated root caries.¹⁰ Almost two third of older adults aged 65 or above suffered from periodontal disease.¹¹ The estimated global prevalence of complete tooth loss in older adults aged 60 or above was 23%, nearly a quarter of the population.¹² Oral function decline is prevalent among older adult population. Almost 60% of community-dwelling older Japanese and over 70% of institutionalized older adults in Ecuador were diagnosed with

oral hypofunction.^{8,13} And one-third of the global older adult population had hyposalivation.¹⁴

The sustained poor oral health in older adults is attributed to the global oral health inequality.⁶ Oral health is operated separately from the mainstream of general health care and receives less priority and financial support in health policy.¹⁵ Older adults who are prone to be cognitively impaired, functionally disabled, medically compromised and financially disadvantaged find oral health care inaccessible, unaffordable and unavailable.¹⁶ Oral diseases in older adults are diagnosed unreasonably at a later stage leading to poor operative outcome and more oral functional decline.⁷ Oral function decline has recently been recognized as an important oral health problem.⁸ The process for oral function decline is gradual and can be recovered by various intervention before irreversible dysfunction occurs.¹⁷ However, assessment of oral function is not a part of the routine screening in primary health care and older adults with mild oral function decline could not receive proper treatment at the earlier stage.⁸

As population ages, the number of older adults suffered from oral diseases and oral function decline are likely to amply in the coming decade. There is an urgent need to reduce the global oral health inequalities through radical changes in health policy and the current health care system. Oral healthcare professionals should collaborate with other healthcare professionals to provide a patient-centred, comprehensive and integrated care to all older adults.² Oral healthcare professionals and all stakeholders should understand the link between oral health and healthy ageing and their roles in improving oral health in older adults. The objective of this article is to discuss the importance of oral health in achieving healthy ageing and the role of all stakeholders in improving oral health for older adults.

Healthy ageing matters

The World Health Organization defined healthy ageing as the process of developing and maintaining the functional ability that enables well-being in older age.² The functional ability comprises of the ability to move around, build and maintain relationships with others, meet their basic needs, learn, grow and make decisions and contribute to the societies.² Maintaining functional ability enables older adults to be and to do what they have reason to value such as having their own identity in the society, building relationships, enjoying life, being independent, feeling security and having the potential for personal growth.² Fig. 1A showed how healthy ageing can give significant impacts on individual older adults, their families and the societies.

Individuals

Healthy ageing enhances older adults' physical, mental and social well-being and allows them to enjoy the life

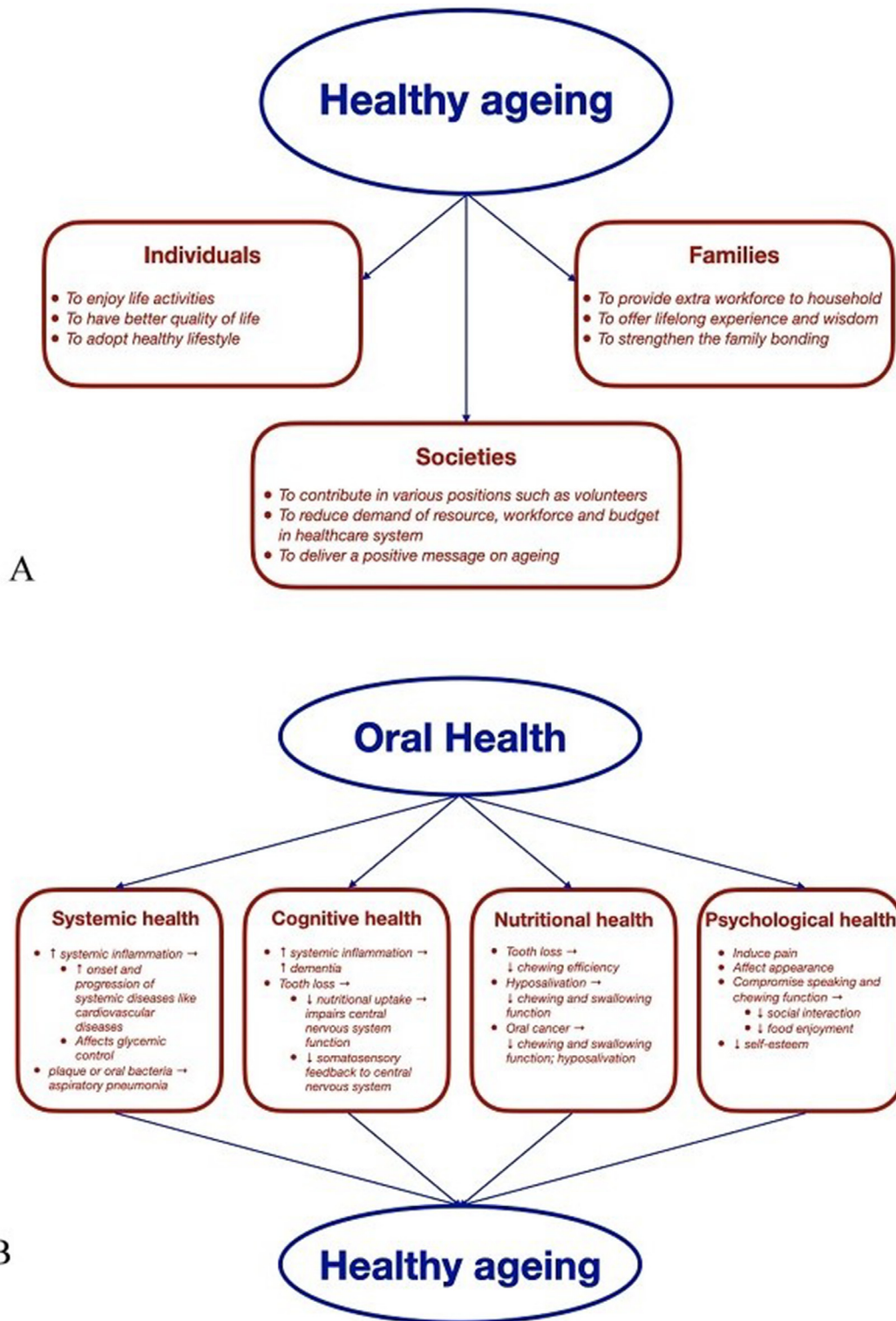


Figure 1 (A) The benefits of healthy ageing to individual older adults, families and societies (B) The impact of oral health on older adults for healthy ageing.

activities like eating, speaking, social interaction they value.² Perceived health improves their overall life satisfaction, happiness and quality of life.¹⁸ Healthy ageing also helps maintain older adults' functional ability to adopt

healthy lifestyle, such as attending regular oral and general health care, maintaining oral hygiene practice and having adequate nutritional intake and physical exercises, to reduce the risk of age-related diseases and disabilities.²

Families

Healthy independent older adults have less demand for long-term care or support from their family members or caregivers.¹⁹ In contrary, they can provide extra workforce to the family when most family members are at work by providing care to their grandchildren or assisting and managing the household.¹⁹ Living longer means older adults may spend a longer amount of time with their families including their grandchildren.²⁰ Their lifelong experience and wisdom are valuable to their children and grandchildren. Grandparent–grandchild relationships had positive influences on the lives of both generations and the overall family bonding.²⁰

Societies

Older adults in good health can continue to participate in and contribute to society in various positions such as mentors, volunteers, caregivers, consumers, entrepreneurs and even members of workforce.¹⁹ Moreover, older adults with independency require less manpower, resources and budgets from the societies on social care and long-term health care.² Healthy ageing help deliver a positive message that ageing is valuable and the society is better off for having older adult population.¹⁹ This shift of attitude foster the development of age-friendly environment with a solid recognition of the rights of older adults.¹⁹

Oral health matters

The FDI World Dental Federation defined that oral health is multifaceted and includes the ability to speak, smile, smell, taste, touch, chew, swallow, and convey a range of emotions through facial expressions with confidence and without pain, discomfort, and disease.²¹ This new definition acknowledged the importance of oral health in individuals' oral function, health, physical and mental well-being, and quality of life. Oral health affects healthy ageing in older adults through its associations with their systemic health, cognitive health, nutritional health and psychological health. Fig. 1B summarizes the impact of oral health on older adults for healthy ageing.

Systemic health

Bacteria in dental plaque are the essential component in the development and progression of dental caries and periodontal diseases. If left untreated, bacteria in carious lesion or periodontium may induce local inflammation in the oral cavity in the form of periapical lesion or periodontal disease. The bacteria and the released inflammatory mediators in the oral cavity may enter the bloodstream and contribute to systemic inflammation in other parts of the body. Oral diseases are associated with the onset or progression of several systemic diseases via this shared inflammatory pathway.¹⁰ Diabetes and periodontal disease have been well proven interrelated.²² Periodontal disease adversely affected the glycaemic control in diabetic patients and periodontal therapy was associated with the reduction in glycated haemoglobin level.²³ There is

evidence for a positive association between periodontal diseases and several cardiovascular diseases such as coronary heart disease, atherosclerosis and heart failure.²⁴ The levels of inflammatory mediators, C-reactive protein and serum interleukin-6, were higher in patients with periodontal disease but were reduced after periodontal therap.²⁴ Bacteria in the oral cavity can directly be aspirated into the respiratory system causing pneumonia, especially in frail older adults with swallowing impairments.²⁵ Studies showed that oral hygiene measures can reduce the incidence of and mortality from aspiratory pneumonia in frail older adults.²⁵ Therefore, good oral health can prevent or stabilize certain chronic medical conditions in older adults.

Cognitive health

Cognitive function is a set of abilities such as processing speed, memory, language, visuospatial function and executive function.²⁶ Good cognitive function allows older adults perceive, learn, comprehend and memorize and hence maintain their day-to-day functioning.²⁶ Older adults with cognitive impairment become dependence and require long-term care.²⁶ Emerging evidence indicated that sub-optimal oral health such as gingivitis, dental caries and tooth loss was associated with an increased risk of developing cognitive impairment.²⁷ The link between tooth loss and dementia has recently received research attention under two proposed mechanisms.²⁸ The first one was that tooth loss affected nutritional intake and hence central nervous system function; the second one was that tooth loss deteriorated chewing function and somatosensory feedback to the central nervous system, leading to impaired cognition.²⁸ Hence, good oral health and function help ensure cognitive health.

Nutritional health

Nutritional health is pivotal in healthy ageing.²⁹ Chewing and swallowing are the vital oral functions to maintain adequate nutritional intake in older adults.⁷ Tooth loss, hyposalivation and oral cancer are the common dental problems in older adults impacting oral functions.⁷ Tooth loss, mainly resulted from advanced dental caries and severe periodontal disease, makes mastication challenging. Older adults without a functional dentition had an increased risk of chewing disability at an odds ratio of 4.7. Reduced chewing ability limits older adults' food choice, nutritional intake and enjoyment of food.⁷ Saliva plays an important role in facilitating speech, taste perception, mastication, swallowing and digestion.¹⁰ Physiological age changes in salivary glands, medications and oral cancer-related treatment can affect salivary function.¹⁰ Older adults with hyposalivation have an increased risk of swallowing difficulty at an odds ratio of 8.¹⁰ Oral cancer and its related treatment severely impair mastication, swallowing, speech and salivary gland function.⁷ The extent of impairment depends on treatment modalities, cancer site and progression stage.⁷ Oral function decline contributes to malnutrition, general functional decline and frailty in older

adults.¹⁷ Therefore, good oral health and function can also ensure nutritional health in older adults.

Psychological health

Dental caries, ill-fitting dentures and periodontal disease induce pain and discomfort; Tooth loss impairs appearance, speech and chewing function.¹⁰ Oral diseases negatively affect the appearance, food enjoyment, social activity and hence reduce the quality of life of older adults.³⁰ Older adults with edentulism showed an increased risk of having depression.³¹ A recent study showed oral function in terms of occlusal force was associated with prevalence of psychological frailty in older Japanese.³² Therefore, oral health plays a significant role in the psychological health of older adults.

Reducing oral health inequalities

Global oral health inequalities persist within and between countries and affect the low socioeconomic groups such as older adults most.³³ Oral diseases are the cause and consequence of poverty and social inequalities. It is imperative to implement oral health policies at multiple levels in multiple sectors to eliminate the inequalities.³ The World Health Organization and the FDI World Dental Federation have proposed to include oral health into universal health coverage, integrate oral health into general health care and promote oral health through population-wide health programmes in health policy.^{2,33} These policies can alleviate the global oral health inequalities and build an age-friendly world in the future.^{2,33}

Universal oral health coverage

The FDI World Dental Federation affirms that oral health is a basic human right and should be part of the universal health coverage to deliver to all people with no person left behind.³³ Universal health coverage defined by the World Health Organization as “ensuring all people receive the promotive, preventive, curative, rehabilitative and palliative health services they need at a sufficient quality without any financial hardship”.³⁴ Universal oral health coverage can ensure oral healthcare accessible, affordable and available to all older adults.³³ It helps detect oral diseases in older adults at an earlier stage and contribute to less expenditure on related treatment.³³ Brazil, Thailand and Japan have been implementing universal oral health coverage over a decade. The implementation has improved the accessibility and the use of subsidized public oral health services especially in low socioeconomic groups and shown positive effects on oral health.^{35,36} In Japan, the percentage of older adults aged 80 with 20 natural teeth or more has increased from 7% in 1989 to 51% in 2016.³³

Integrated oral and general health care

The World Health Organization and the FDI World Dental Federation urges the integration of oral health into general health care to forge a patient-centred, comprehensive, multidisciplinary care for older adults.^{2,33} Oral and

systemic health are interrelated and shared common risk factors.⁴ The integrated care system can facilitate the prevention of oral diseases and non-communicable diseases by controlling their shared risk factors, aids in the early detection of systemic diseases, assist in data sharing and health surveillance and allows better allocation of resources and workforce.¹⁵

Population-wide preventive approach

The traditional curative approach in managing oral diseases is costly and unaffordable to older adults and hence is ineffective in improving the oral health of older adults.³⁶ The practice of dentistry should be shifted from a treatment-dominated to a prevention-oriented approach.³⁶ Besides, the evidence showed that downstream intervention, such as individual preventive measures or health education delivered in clinical dental practice, was effective for short term only and might even exaggerate rather than lessen the socioeconomic inequalities in oral health.³⁶ Prevention should be provided in an upstream, integrated and population-wide approach addressing all determinants of health including behavioural, social and commercial factors.³⁵

Improving oral health in older adults

Healthy ageing is an important goal to all people. Healthy ageing cannot be achieved without maintaining oral health and function.⁶ All stakeholders should understand the importance of oral health and function in healthy ageing and their roles in improving oral health of older adults.

Policy makers

The World Health Organization's 2021 *Oral Health Resolution* and the 2022 *Global Strategy for Oral Health* declared the urgent need for improvements in oral health systems to achieve universal health coverage for oral health.¹² The FDI World Dental Federation published a document to call for the integration of oral health promotion and oral healthcare into noncommunicable disease strategies and universal health coverage benefit packages.³⁷ The document pointed out five key messages to help policymakers integrate oral health into health system responses.³⁷ First, oral health is a main indicator of general health, well-being, and quality of life. Hence, responses to noncommunicable disease and universal health coverage should prioritize oral diseases. This can be supported by strong oral health information systems. Second, oral diseases and other non-communicable diseases have common risk factors. Thus, joint prevention of these diseases is feasible through multisectoral response and existing cost-effective solutions. Third, poor oral health is a risk factor for noncommunicable diseases. Therefore, integrating oral health promotion and oral healthcare services for all can optimize and strengthen health systems. Fourth, oral health affects treatment outcome of noncommunicable diseases so multidisciplinary research and interprofessional collaboration across care teams are warranted. Fifth, engaging people living with oral diseases, communities, and health professionals is vital

to integrate effectively oral health into the non-communicable disease and universal health coverage responses.³⁷

National dental associations

National dental associations can advocate and support policymakers to implement oral health policies such as universal oral health coverage and integrated oral and general health care.⁹ They can formulate guidelines on the prevention and management of oral diseases in older adults. The American Dental Association presented caries management clinical practice guidelines to oral health care professionals.³⁸ Additionally, national dental associations can promote the oral function assessment for older adults. The assessment identifies older adults with oral function decline for intervention at the earlier stage. Japan utilized the Kihon checklist as a screening tool in public health programmes to identify at-risk older adults who showed early signs of oral function decline.³⁹ This tool not only assesses the oral function but also the physical function, nutrition, cognition, social activity and mental well-being of older adults.³⁹ The Kihon checklist can position oral healthcare professionals at a more centered role in the multidisciplinary healthcare team and facilitate the integration of oral health into general health. National dental associations can also organize community oral health promotion programmes to educate the public about the importance of oral health and oral function on healthy ageing. They can organize interprofessional training to enhance clinicians' competency which is a key factor for willingness of clinicians to integrate in a multidisciplinary setting.¹⁵

Individual oral healthcare professionals

Individual oral healthcare professionals can provide patient-centred comprehensive assessment on oral conditions, oral function, nutritional habits and systemic conditions of each older adult. They can consult and collaborate with medical colleague to provide multidisciplinary care for older adults. Hyposalivation is commonly caused by polypharmacy in older adults.¹⁰ Oral healthcare professionals can discuss with medical colleagues on the possibility on reduction of the number of medications for older adults to prevent medication-induced hyposalivation.⁷ They can deliver tailored preventive measures including daily oral hygiene practice, dietary advice and orofacial muscle exercises to older adults and their care-giver to prevent oral diseases and oral function decline. Oral healthcare professionals can maintain and restore functional dentition to older adults with extensive tooth loss to prevent oral function decline and malnutrition.⁷ They can participate in community oral health programmes to deliver education to the public.

Academics

Geriatric medicine and dentistry can be included in undergraduate curricula not only in dental and medical schools but also other health-related schools such as

nursing and social sciences.¹⁵ The curricula can involve basic knowledge such as common medical and oral problems in older adults and their interrelationship and special precautions when deliver healthcare to older adults with different medical or cognitive conditions.¹⁵ Education providers can organize hands-on workshops on how to assist older adults' daily activities in performing good oral hygiene practice and how to teach and assist orofacial muscle exercises.¹⁵ Moreover, students can learn how to collaborate and communicate with other health care professionals through integrated learning.¹⁵ These undergraduate curricula can increase students' competency in delivering geriatric care in the future. Additionally, academics play an important role in providing evidence for supporting policy making. They can collect common oral health indicators regularly to evaluate the effectiveness of integrated oral and general care system and population-wide prevention programmes to provide feedback for improvement in oral health policy. They can also conduct clinical trials to evaluate the effectiveness of the various preventive measures of oral diseases and oral function decline and provide an evidence-based recommendation on the cost-effective method for clinical dental practice and community health programmes.⁴⁰

Conclusions

Healthy ageing is an important goal to all people. Oral health and function affect healthy ageing. Health policy can reduce the global oral health inequalities and make oral health care more accessible, affordable and available to older adults. Oral health and function are important in healthy ageing. Policy makers, national dental associations, academics and all healthcare professionals should understand their roles in improving oral health of older adults.

Declaration of competing interest

The authors have no conflicts of interest relevant to this article.

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