



The Seattle Care Pathway: Defining Dental Care for Older Adults

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ABSTRACT It is well-recognized that the demographic shift in the population will result in a larger proportion of older adults and those adults will live longer than ever before. There is, therefore, a need to ensure dental services recognize this transition and plan for the management of older adults in primary care dental practices. This article describes the evidence for, and the details of, the Seattle Care Pathway to ensure older adults receive optimum dental care.

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In 2013, a group of interested academicians, clinicians and practitioners gathered in Seattle to discuss the issues surrounding the dental care of older adults. Many recognized that while research was available, it was difficult to consume and there was little advice for dental practitioners on how to manage this increasing proportion of their population. In an effort to provide such guidance, the Seattle Care Pathway for Securing Oral Health in Older Patients was produced. Readers can access all 12 papers, including the pathway document¹ itself, free of charge from the *Gerodontology* website — simply search for “Seattle Care Pathway Gerodontology” online. The purpose of this article is to summarize the key findings of the conference in a single source that is accessible and relevant to general dental practitioners.

The Shift

There is no doubt Western countries are all experiencing a demographic shift — a change in the population profile that will see a greater proportion of older adults who will be living longer than ever before.^{2,3} Such a shift has a profound impact on many aspects of society, not least the financial considerations, but perhaps, one of the biggest concerns is maintaining the health and well-being of an aging population in an economically viable manner that does not destabilize health care systems.⁴

Many could argue the shift is a perfect storm — older individuals with greater and more complex health care needs but no workplace medical insurance will strain health care systems while at the same time the proportion of working-age, tax-contributing individuals reduces. The obvious solution to these issues would seem to be that prevention

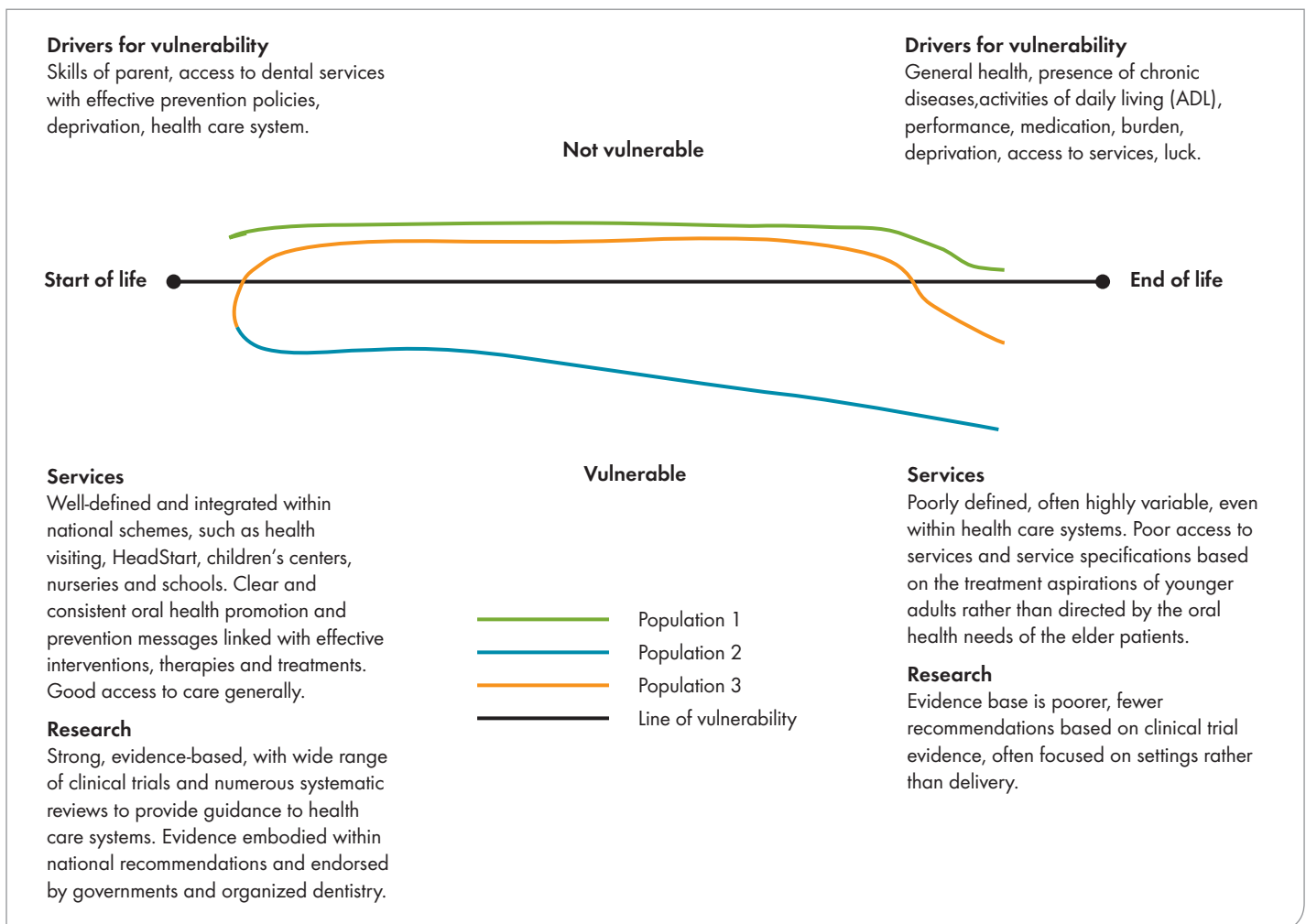


FIGURE. Life course and health.

is key. If individuals can be helped to keep healthy for longer, and if chronic, debilitating diseases can be prevented, then the burden on health and social care systems can be reduced, quality of life increased and the system maintained.

Such an approach requires a different contextual framework for the delivery of health care services and resources. The **FIGURE** demonstrates a life course model of health care.

We can consider this model for any aspect of health care, and dentistry is no exception. The three lines in the model represent three hypothetical individuals or populations:

Population 1. The first population is our ideal, the life course we hope for our families and ourselves. It is an individual born above a line of vulnerability, who leads a long and healthy life and, toward the end of life, suffers some loss of function but remains vital and with a good sense of well-being.

Population 2. The second line is a worst-case scenario and perhaps seen today in those individuals born with life-threatening and altering conditions that cause severe disability and require constant medical attention and assistance. Such patients are likely to be managed by specialists in secondary care facilities.

Population 3. The third line is perhaps the most reflective of the Western population experience. We are born and are vulnerable for a period of time, and then, fortunately, spend the majority of our lives fit and well, but with an end of life that may be affected by chronic conditions, loss of cognitive ability and other factors that impact quality of life and make us increasingly dependent and vulnerable.²

What we know from dental and medical attendance and resource allocation research is the vast majority of resource is spent on the “middle”

TABLE 1

Dental Challenges of the Older Adult

Tooth loss	While now far less common, incremental loss of teeth leading to the decision to render an individual edentulous is still a major challenge for many older adults. The provision of complete prostheses is becoming more complex as patients typically lose their teeth at an older age and have a reduced ability to cope with the challenges of managing a prosthesis.
Dental caries	Perhaps the most common challenge, in community-dwelling older adults, caries rates are similar to those in young children at about one surface per year. While root caries are often considered the major issue in this age group, this appears to be largely a disease of adults in residential and nursing homes, with coronal caries remaining the site of increment for older adults. Those in nursing homes will typically experience a caries increment rate double that of their community-dwelling peers.
Periodontitis	A highly prevalent condition in this cohort of patients but with most attachment loss being in the form of gingival recession rather than increases in probing depth. The concept of “health survivors” is apropos here – with teeth that remain into old age likely resilient to periodontal disease. The changes in the immune system also contribute to the altered progression of the disease in this group, although this must be set against the reduced ability to undertake some oral hygiene procedures that require fine motor skills.
Dry mouth	Both xerostomia and salivary gland hypofunction are seen in older patients, either together or alone, and can have a devastating impact. Caries risk is increased either due to loss of the protective saliva or due to measures taken to stimulate salivary flow (often sucking candies), and dry mouth is associated with a decrease in quality of life, difficulty eating and wearing a prosthesis. Dry mouth is often associated with polypharmacy.
Oral cancer/ Precancer	Epidemiological data are scarce, but oral cancer and its precursors are generally seen in older populations and rates vary across developed and developing nations. Given its devastating impact, however, clinicians should be vigilant for oral lesions in all patients, especially those with recognized risk factors.
Access	Many older adults find it increasingly difficult to access care. This may be due to transport, cognitive ability or their own general health and mobility. Dental offices may not cater well to wheelchair users or may not be located close to public transport links. In patient surveys, the need to maintain access to dental care is often raised as older adults’ No. 1 concern with respect to their oral health.
Setting	Older adults living in nursing and residential care may be especially difficult to treat, especially if they cannot be easily transported to a regular clinical setting. The need for mobile dental units and staff is clear but the provision of these is often sporadic.
Resources	For many adults, dental insurance ceases or is reduced at retirement and, combined with a lower overall income level, resources become scarce. This is confounded by the fact that many of these patients will have received complex dental treatments that may require additional resource to maintain and protect.

section of this life course with some (increasing) emphasis on young children (those younger than age 3) and very little on end-of-life care.⁵

It should be noted that the life course makes no reference to an individual’s age. While it is clear individuals are aging, placing artificial and arbitrary chronological metrics is not helpful. We all know the 95-year-old man who we see out jogging and we all, sadly, know of the 55-year-old man who has suffered a stroke and is unable to walk. We must consider our patients as individuals and plan their care appropriately.²

Dentistry and Vulnerability

The **FIGURE** also defines the current position of dental services, resources and research. While this is a generalization, it is largely applicable to all Western health care models. For young children, there is a wealth of services, strong clinical trial evidence upon which to base such services and, generally, the political, social and professional will to see oral health care improve. The reasons for poor oral health in young children are well understood, as are the means on individual and population levels to address them. This is not to assert there is no longer an

issue in children’s oral health, but the environment for change is present.²

Looking at the older population, we are not in the presence of such clarity. The reasons for poor oral health are more complex, more interlinked and not as well understood. There is little robust clinical trial evidence that has examined these populations in detail and it is often necessary to extrapolate from studies undertaken on adolescents or children. Services are poorly defined, difficult to access and often restricted, for example, to older adults living in residential care. It is important to remember that while the media will often depict or report

on the elderly living in nursing homes — less than 5 percent of older adults in Western populations are in such housing — the vast majority is community dwelling, living either with caregivers (often partners) or on their own.

Speaking to older people, their partners and caregivers, and third-sector organizations, the medical terms surrounding aging are often found to be pejorative, for example, frailty. Instead, the concept of dependency, or indeed independency, was recognized as a more acceptable means of defining individuals as they age. This is important for dentistry where we have the means of implementing prevention at an early stage to ensure that disease processes can be arrested or even reversed. In the context of the older adult, plans for this approach need to be undertaken early in a time best described as “predependent.”

Dental Challenges of Older Adults

These are well-described in a multitude of publications and were summarized by Thompson in his Seattle conference presentation³ and shown in **TABLE 1**. The major dental issues faced by older people are broadly the same as those of younger individuals. Many dentists are surprised, however, to learn the caries increment in older adults is the same as in younger children, about one surface increment per year, and, often surprising, too, is that this is mainly in coronal surfaces.⁶ Root caries, often thought of as the major challenge of the elderly, is a disease entity largely confined to those in residential and nursing care.⁷

Tooth loss is typically an incremental process that tends to occur throughout life and is more common than edentulism. Predicting it can be complex, and its impact on the remaining dentition, the provision of prosthesis and its effect on quality of life can be substantial.⁸

TABLE 2

Definitions of Dependency Used in the Seattle Care Pathway

No dependency	Fit, robust people who exercise regularly and are in the most fit group for their age.
Predependency	People with chronic systemic conditions, which could impact on oral health that, at point of the presentation, are not currently impacting on oral health. A comorbidity whose symptoms are well-controlled.
Low dependency	People with identified chronic conditions that are affecting oral health but who currently receive or do not require help to access dental services or maintain oral health. These patients are not frankly dependent, but their disease symptoms are affecting them.
Medium dependency	People with an identified chronic system condition that currently impacts on oral health and who receive or do not require help to access dental services or maintain oral health. This category would include patients who demand to be seen at home or who do not have transport to a dental clinic.
High dependency	People with complex medical problems preventing them from going to receive dental care at a dental clinic. They differ from patients categorized in medium dependency because they cannot be moved and must be seen at home.

Periodontal disease is complex from an epidemiological position, not least because of the multitude of definitions, indices and reporting mechanisms. Aging was traditionally considered a risk factor for periodontal disease, but the research evidence is not clear.³ Longitudinal studies suggest there is both a progression and remission of the disease process over time and in older adults, attachment loss is often the result of gingival recession rather than increases in periodontal pocket depth.⁹ Nonetheless, plaque control and the presence of florid, plaque-related marginal gingivitis is often seen in older adults, especially those with cognitive or motor impairments.¹⁰ There is a concept of “healthy survivors,” i.e., those teeth present in older adults may be, for a variety of reasons, less susceptible to the disease and hence the overall risk of progression is reduced. Those teeth that were susceptible will have been lost through incremental extraction.

Dry mouth is often cited as a consequence of age that is exacerbated by polypharmacy and other disease processes. Remembering that xerostomia is the subjective feeling of dry mouth, whereas

salivary gland hypofunction results in low salivary flow rate, both can be a threat to oral health and quality of life. Those with low salivary flow rates have reduced salivary buffering and remineralization abilities and those with xerostomia will often seek to reduce symptoms by sucking on sour candies or something similar that provides a source of fermentable carbohydrates and, therefore, increased caries risk.

Oral precancer and cancer is also a disease associated with older adults with catastrophic consequences for those affected. The ability to detect precancerous lesions early, confirm diagnosis and commence treatment (including risk factor reduction) is key to positive outcomes.¹¹

Meeting the Challenges: A Pathway Approach

Pathways were originally developed in industry, particularly Japanese automobile production lines, where there was a focus on clearly defined steps that resulted in a consistent and predictable outcome.¹² The adoption of care pathways in medicine has been rapid over recent years and they aim to collate best evidence and present this to clinicians

in a supportive way so practitioners have a more efficient and predictable means of treating patients. The care pathway represents a journey — one that may be paused, for example, while specialist tests are conducted or a caregiver is consulted, or one that may be deviated from if clinical experience dictates it. It is a journey that can be modified based on local, regional and nationally available guidance and resources.¹³

Pathways should therefore be viewed as enablers — documents or processes that assist in clinical decision making and, if followed correctly, can result in a predictable outcome as well as providing support for a clinician's approach to a particular patient presentation. The full Seattle Care Pathway considered individuals, populations, treatments, prevention and communication issues for varying levels of dependency ranging from no dependency through high dependency. The dependency categories were described as shown in **TABLE 2**¹ and the care pathway in full in **TABLE 3**.

These dependency categories were developed to ensure critical elements within the life course could be captured. They were also felt to be “tipping points” when approaches to care would change. All but the highest level of dependency may represent patients seen in community dental practice. As the definitions were discussed, many in the group could identify these with their own patients or family members.

Once the categories of patients were determined, the evidence base around their prevention and treatment options could be collated. The pathway document was presented in tabular form with the main supporting evidence provided.¹

Throughout the development of the guidance, the authors worked on the basis of dependency rather than a particular chronological age. However, it was clear

the implicit rationale behind the work was older patients, and it became clear there had to be a “trigger age,” an age at which patients should be considered against the pathway to ensure a change in dependency was not missed. An age of 55 years was agreed upon, with the assumption that at this chronological time point almost every patient would be in the “nondependent” category. Despite this stated trigger point, dentists should remain vigilant to the onset of dependency at any age.¹

Implementing the Pathway

The care pathway describes the assessment, preventive regime, treatment and communication recommendations for each level of dependency (**TABLE 3**). While the table is designed to be easy to implement and understand, the authors of the pathway determined that clinical vignettes or examples might help the application. A series of examples were included in the article and some further case scenarios, looking at no, pre- and medium dependency, are described here. The purpose is to place the pathway into real-life context for dental practitioners, considering those patients who are most likely to present.

No Dependency

These are older individuals who are fit and exercise regularly. An example of this type of patient might be the following:

“Arnold is a 75-year-old who lives at home with his wife and three dogs. He exercises regularly and is actively involved in dog training for new dog owners in his community. He attends six-month recalls at your practice and three-month cleanings with your hygienist. When you review his chart, the last treatment you provided was a replacement restoration two years ago. He is on a statin for cholesterol but otherwise is on no medication.”

One of the comments raised in the conference was that this group was commonly seen in general practice, but often “fell off the radar,” meaning they began to fail to attend and before long were lost to the practice. This was recognized as an important place to start considering the impact of aging. For this group, the importance is to start the conversation about what may happen in the future. How can we keep in touch in case things change? It was agreed that complex treatment plans in this group were not contraindicated but a conversation about implications on the maintenance of such treatments should things change was important. These groups need, as all patients do, a good home-care/self-care plan with an emphasis on prevention. The concept of “protecting the investment” was raised. These patients have spent considerable financial and time resources on their oral health. As risk factors may increase with age, we should provide them with information and guidance to help them maintain this. Frequently reviewing medical history and medicine will be important.

Predependency

These patients present with a chronic systemic condition with potential impact on oral health, which at point of presentation, is well controlled. An example of this type of patient might be the following:

“Sarah is 66 years old and is a widow living alone. She is active in her community and attends church regularly where she has an extensive social network. She sometimes uses a walking stick when she feels a little dizzy, and is taking medications for diabetes and high blood pressure but both are well controlled. She recently had an

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TABLE 3

The Seattle Care Pathway

Dependency Level	Assessment	Prevention
No Dependency	Routine processes in locality – U.K. National Dental Assessment. Recall interval based on risk assessment (U.K. National Institute for Health and Care Excellence (NICE) guidance). Use of dependency checklist. Assessment of long-term viability of oral health.*	Locally derived guidance – U.K. Delivering Better Oral Health.
Predependency	Condition identified and risk assessment undertaken to inform any potential increased frequency of contact. ¹⁸ Consideration of additional diagnostics (for example salivary flow rate). ¹⁹ Oral health care plan – Strategy – Treatment plan. ²⁰ Recognition that risk may be greater as result of increasing dependency. Assessment of long-term viability of oral health. Consideration of use of skill mix. ²¹	Based on assessment consider the following: Caries: High-fluoride toothpaste, varnishes, gels and mouth rinses. ²² Perio: Antibacterial toothpaste, professional cleaning, chlorhexidine (not long-term use), oral hygiene instruction. Oral cancer: Risk modification and education. ¹¹ Tooth service loss: Risk modification, sensitivity products as indicating. ²³ Production of daily oral care plan (home care).
Low Dependency	Manifestation identified and risk assessment undertaken and increased frequency of contact unless compelling reasons to maintain current frequency. ¹⁸ Recognition that risk may be greater as result of increasing dependency. Assessment of long-term viability of oral health. Oral health care plan – Strategy – Treatment plan. ^{20**} Consideration of use of skill mix. ²¹	Assessment of the reason behind the impact – prevention based on mitigation of factors. ²² Definitive move to evidence-based prevention products. ²⁴ Consideration of how these can be delivered – for example high-fluoride ²⁵ toothpaste now combined with electric toothbrush or modified brush. ^{25,26} Consider medication issues ²⁷ both in terms of systemic impact and sugar free. ²⁸ Consider recommending gum chewing and/or salivary substitutes if indicated. ²⁹ Production of daily oral care plan.
Medium Dependency	Usage of support identified and risk assessment undertaken and increased frequency of contact unless compelling reasons to maintain current frequency. ¹⁸ Recognition that risk may be greater as result of increasing dependency. Assessment of long-term viability of oral health. Oral health care plan – Strategy – Treatment plan. ²⁰ Consideration of use of skill mix. ²¹	Ensure that the prevention routine is both adequate – i.e., move from high- to very-high fluoride toothpaste; that routine can be delivered by others if required. ²⁵ Education of caregivers in delivery of prevention. Consider increased use of professional applied products – utilization of increased patient contacts, i.e., nurse-applied varnishes. ³⁰ Consider recommending gum chewing and/or salivary substitutes if indicated. ²⁹ Production of daily oral care plan.
High Dependency	Inability to receive care elsewhere identified and risk assessment undertaken and increased frequency of contact [†] unless compelling reasons to maintain current frequency. ¹⁸ Recognition that risk may be greater as result of increasing dependency. Assessment of long-term viability of oral health. Oral health care plan – Strategy – Treatment plan. ²⁰ Consideration of use of skill mix. ²¹	Focusing prevention on easily deliverable products and therapies, emphasis on pain and infection management. ¹⁴ Further move to professional products, including varnishes and gels. Consideration of prevention of disease complications – i.e., chlorhexidine use to prevent respiratory infections. ³⁰ Production of daily oral care plan.

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* Consideration of the long-term success, impact and maintenance of current restorative condition, oral health and prevention.

** Development or modification of this plan.

[†] Contact is defined as an activity involving contact between patient and the wider dental team.

Treatment	Communication
Based on an assessment of patient need to secure oral health.	Speak to patient about long-term oral health issues especially when considering complex treatment modalities that require replacement and/or maintenance.
Based on patient needs but with greater consideration of long-term viability of treatments given assessment of likely dependency in the future and impact on oral care.	Identification of the condition and its likely future impact on oral care – education of patient. Communication with general care physician re: conditions.
Consideration of the strategic importance of retaining teeth. ³¹ Shortened dental arch, and longevity and maintenance of more complex procedures. ³² Provision of implant support dentures where indicated. ³¹ Based on maintaining function and freedom from infection and pain – plan for failure.	Discussion around care plans, caregivers, social circumstances as appropriate. Need for strategic approach to retaining functional occlusal contacts. Link in with wider health care team – around medication management (sugar in medicines).
Further consideration of strategic importance, repair rather than replace, glass ionomer cement for fluoride release in dry mouth, adhesive bridgework. Minimal intervention to preserve health but consideration of long-term viability which may lead to more complex treatments being recommended, for example implants to support lower denture. ³¹ Use of simple restorative techniques such as atraumatic restorative technique. ³³ Change attachment types on implant or tooth supported overdentures. ³⁴	Establish link with source of support to ensure that daily oral health plan can be delivered and that prevention modalities are appropriately implemented.
Palliative treatment based on patient demand ensuring freedom from pain or infection, and esthetics where required. ¹⁴	Ensure that the patient is at the center of discussions to ensure that what is being delivered is what is needed.

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anterior tooth extracted following a persistent periapical infection and this was added to her partial denture. She finds the additional tooth uncomfortable and wants to know what can be done.”

Sarah is considered predependent as her diabetes and high blood pressure could, if they became unstable, adversely affect her oral health. She is struggling with her adapted denture, which may be affecting her ability to socialize or eat. The care pathway for predependent individuals advocates a candid approach to communicating with the patient. It is important to articulate the risks of poor disease management with the patient, in this case the polypharmacy, and this should impact on the recall interval for Sarah. Prevention should be the centerpiece of a detailed home-care plan and consideration should be given to the inclusion of high-fluoride dentifrices, gels or mouth rinses. In terms of the treatment offered to Sarah, this must be considered in the context of her potentially increasing dependency and therefore should be easy to maintain but may need adaptation over time. Efforts should be made to ensure that, within her care record, the contact details for her family, or perhaps someone in her church group, are recorded so they may be contacted if Sarah fails to attend her recall appointments.

Medium Dependency

These are patients with an identified chronic systemic condition that is currently impacting oral health and who receive or require support in managing access to dental services or maintaining oral health. This category would include patients who demand to be seen at home or who cannot get transportation to a dental clinic. An example of this type of patient might be the following:

“John is living in residential care in the same town as your dental practice.

With assistance, he can attend the practice, but these appointments need to be scheduled carefully and his caregiver must accompany him. John has mild dementia and can consent to his treatment but has poor short-term memory and often repeats his questions. He is on a range of medications that have caused salivary hypofunction and he complains of a dry mouth. John consumes a large number of candies in an attempt to stimulate saliva and he has an extensively restored dentition in which there is

Prevention should be the centerpiece of a detailed home-care plan and consideration should be given to the inclusion of high-fluoride dentifrices, gels or mouth rinses.

evidence of new carious lesions and failing extracoronary restorations. He doesn't report any pain at present.”

John is a patient who is on the “tipping point.” His medications are having a direct impact on his oral health and he requires an immediate and aggressive preventive approach. Given his cognitive difficulties, these need to be coordinated with his caregiver and should include high-fluoride products, for example, 5000 ppm toothpaste. Plaque control measures should be discussed with him and his caregiver, and his physician should be contacted to see if it is possible to alter his medication regime to reduce the dry mouth symptoms. Professional prevention, for example, the application of fluoride varnish,

should be commenced with frequent recalls that should be facilitated between the dental office and the residential home. Restorative treatment should be designed with easy maintenance in mind and it may be inappropriate to consider complex work that may become increasingly difficult to clean in the future. Consideration could be given to treatments that might be adapted in the future, for example, fixed implant work that might be changed to removable.^{14,15}

Patients in the medium dependency group, when questioned in focus groups, placed access to care as their top priority, followed by a pain-free, functional dentition. They fear their loss of independence will prevent them from going to the dentist to receive the care they need, therefore, assuring them of continued access and facilitating this are key. The importance of oral hygiene measures should be made clear to care personnel and a written plan is essential.

The full care pathway document provides further examples of the management of patients with increasing dependency and should be consulted by those practitioners who serve such populations.¹

Cultural/Generalizability

Care pathways, such as the Seattle Pathway, are designed to be generalizable to a range of populations, health service organizations and cultures. They should be consistent with, or enable the incorporation of, local, regional and national guidance and regulations. They should be operable in insurance and state-funded systems. It is therefore a requirement of practitioners to assess the guidance and consider its implementation within their practice population.

The impact of culture should not be ignored when considering the needs of patients in this group. Lo described

the differences between¹⁶ cultural attitudes toward tooth loss, aging and dental treatment. For example, in a given culture, the ability to eat and socialize may be more important than preservation of individual teeth, whereas for others the loss of teeth, and any commensurate perceived esthetic impact, would be considered unwanted.¹⁶

The conference also considered the skill of the current dental workforce in managing the increasing needs of older dental patients.¹⁷ The pathway advocates that much can be done for dependent patients without the need to refer to specialist services. However, research suggests many dentists are concerned with providing treatment to patients with complex medical histories or those with cognitive impairments. There is, therefore, a need to ensure graduate dental education and continuing professional education courses address these concerns.¹⁷

Summary

The purpose of this article has been to present and describe the rationale behind the Seattle Care Pathway. The authors recognize the pathway may be a first step to providing an evidence-based approach to the management of this increasingly complex group of patients who are destined to become an ever-greater proportion of our practice populations. The overarching advice is that prevention, both self care and professional, is key for these patients and the practitioners should be vigilant about changes in the health and social circumstances of their older adult patients.

While products and therapies exist for this cohort of patients, there is a need for robust clinical trials in this population, as well as further consideration of how dental service funding, either public or private, can be leveraged to support the implementation of effective prevention. ■

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