



Original article

The Seattle Care Pathway for securing oral health in older patients

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doi: 10.1111/ger.12098

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There is a need for a structured, evidence based approach to care for older dental patients. The following article describes the development of the Seattle Care Pathway based upon a workshop held in 2013. An overview is provided on the key issues of older persons dental care including the demography shift, the concept of frailty, the need for effective prevention and treatment to be linked to levels of dependency and the need for a varied and well educated work force. The pathway is presented in tabular form and further illustrated by the examples in the form of clinical scenarios. The pathway is an evidence based, pragmatic approach to care designed to be globally applicable but flexible enough to be adapted for local needs and circumstances. Research will be required to evaluate the pathways application to this important group of patients.

Keywords: dental, elder, older, frail, dependant, caries, pathway, periodontal, workforce, care, root caries, prevention, fluoride.

Accepted 4 November 2013

Introduction

In March 2013, a three-day conference and workshop was held in Seattle, WA, to review, assess and update the evidence for maintaining the oral health of older people. The first day of the conference provided an overview of existing knowledge and is the basis for the published manuscripts available in this supplement to *Gerodontology*. An audience of over 100 clinicians and researchers, from all areas of health care, joined the conference.

On the second day, the workshop continued to define and develop a care pathway to maintaining the oral health of older people, and a smaller group convened on the third day to refine the pathway and produce the document published here.

Frailty

Frailty has been defined as 'a state of increased vulnerability to stressors due to age related decline in physiological reserve across neuromuscular, metabolic and immune systems'¹. Pretty² visits this concept of vulnerability in his paper on a life-course approach to oral and general health (and their interplay) with a model that can be applied at governmental, policy, population and individual levels. Yet it is not clear how best to define or consider frailty. There are several indices of frailty, although they remain uncertain as reliable predictors of health or treatment outcomes^{3,4}. Definitions aside, there is no doubt that frail older people are a present and rising challenge for

healthcare systems worldwide. Thomson⁵ describes the demographic transition globally towards an increasing proportion of older people and the large increase in the number of people who are frail⁶.

Given the concerns over frailty indices, we did not seek to add another to the literature but, instead, define the population in a meaningful way to both professional (dental) and lay groups⁷. These categories become the backbone of the care pathway. In his contribution to our discussions, van der Putten⁸ identifies the challenges that frailty brings to the delivery of oral health care and the important interface between oral and general health⁸. Informed by this work, and that of Rockwood⁴, we developed the following categories of physical and cognitive dependency relative to older people. These definitions have been linked and share some of the descriptors of the Canadian Study of Health and Aging (CSHA) Frailty Scores⁴. This index has evidence to support its predicative capability and also provides a narrative that is relevant to dental professionals.

No dependency (CSHA Level 1 & 2)

Fit, robust people who exercise regularly and are in the most fit group for their age⁴.

Pre-dependency (CSHA Level 3)

People with chronic systemic conditions that could impact on oral health that, at point of presentation, are not currently impacting on oral health. A comorbidity whose symptoms are well controlled⁴.

Low dependency (CSHA Level 4)

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 them⁴.

Medium dependency (CSHA Level 5)

People with an identified chronic system condition that currently impact 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 (CSHA Level 6 & 7)

People have complex medical problems preventing them from moving to receive dental care at a dental clinic. They differ from patients categorised in medium dependency because they cannot be moved and must be seen at home.

The challenges

Three papers address the specific challenges of managing oral health in each category. Walls⁹ summarises the physical and cognitive problems of frailty, while Müller¹⁰ and Ghezzi¹¹ describe the preventive, therapeutic and rehabilitative possibilities for maintaining and restoring oral health. MacEntee & Mathu Muju¹² place these into the contexts of clinical uncertainties that challenge clinicians who attend frail patients and stress the need to adapt the care pathways to the specific needs of each patient. Lo¹³ expands the need for adaptation even further to the clinical contexts of different cultures.

Delivering oral health care

While care pathways may be developed, there is need for a workforce to deliver interventions to the defined population. The elderly population presents particular challenges and opportunities for a wider dental team to support delivery of care. As described by van der Putten^{8,14}, the setting of care can be challenging. It is also clear that the challenges vary geographically with quality and size of the physical estate being examples of variations seen globally. Wolff¹⁵ describes the importance of training and education for future oral healthcare workers and highlights the possibility of a wider skill mix and varied workforce for delivering effective care to people who are dependent. A move towards interprofessional education also provides an opportunity for more holistic care of this group of patients. This educational challenge is governed by the regulatory requirements of each jurisdiction and can have significant financial and clinical influences on implementing a care pathway.

Ellwood¹⁶ articulates the potential contribution from the oral care industry to providing effective care pathways and explains how the emerging market of older patients will stimulate innovative

Table 1 The Seattle Care Pathway: actions required to maintain oral health at different levels of dependency.

Actions	Level of dependency				
	None	Pre	Low	Medium	High
Assessment	Adopt appropriate local, regional or national periodic recall intervals	Identify conditions threatening oral health and determine appropriate periodic recalls ²⁵ Consider additional diagnostics tests (for example, salivary flow-rate) ²⁶ Develop strategic oral healthcare plan to include professional and self-care ²⁷ Recognise that risk is elevated by increasing dependency Assess long-term viability of oral health Consider use of the wider interprofessional healthcare team for delivery of care plans ²⁸ Assess possibility of elder abuse	Identify cause of increasing dependency (e.g. polypharmacy; dementia, stroke) Assess risk of oral disorders (e.g. caries, periodontitis, mucositis) Increase frequency of periodic recalls as needed to assess elevated risks ²⁵ Develop strategic oral healthcare plan to include professional care and self-care ²⁷ Prepare for the growing risk of oral disorders as dependency increases Assess long-term viability of oral health and management strategies	Participate with social and other medical services (e.g. social work; occupational therapy; physiotherapy; dietetics) to assess health risks generally and review frequency of periodic recalls to manage elevate risk of oral disorder and disease ^{23,25,29} Reassess long-term viability of oral health-related preventive strategies	Examine patient's physical, cognitive and social context for barriers to emergency palliative and elective oral care Monitor the burden of oral care on the patient and others, including family and friends, providing care Monitor the oral healthcare plan with attention to the increasing complexity of delivering each element of the plan Increase vigilance for signs of elder abuse
Prevention	Develop homecare plan to prevent or control oral infection, pain and dysfunction	Consider prescribing for: caries – toothpastes, varnishes, gels, and/or mouthrinses, with a high fluoride content ^{30,31} Periodontitis: antibacterial toothpaste, professional cleaning, chlorhexidine products (not long-term use in this group due to side effects), OHI ³²	Assess the cause for the impact on oral health Base preventive strategies on mitigating the aggravating factors ³⁰ Adjust methods of delivering pre-dependency prescriptions as needed (e.g. modified toothbrush handle or electric toothbrush) ^{36–38} Assess risk of adverse effects from polypharmacy (e.g. dry	Maintain contact with other members of the interprofessional healthcare team to monitor and help their contributions to the oral health regimens ^{31,37,43} Re-assess the need to increase concentration of fluoride in toothpastes and mouthrinses ³⁷ Prescribe application of	Focus on the increasing challenges of preventing and managing oral infections and disorders, and of controlling pain and comorbidity, such as respiratory infections; and dry mouth ^{45–48} Emphasise management of pain and infection ⁴⁵ Maintain use of highly concentrated fluoride

(Continued)

Table 1 (Continued).

		Level of dependency			
Actions	None	Pre	Low	Medium	High
		Oral Cancer: risk modification and education ³³ Tooth surface loss: risk modification, sensitivity products as indicated, tooth/mouthguard ³⁴ Develop daily oral care plan Mucositis: advise denture-wearers to leave dentures out of the mouth in a dry environment when sleeping ³⁵	mouth; sugars in medications) ^{39,40} Offer relief from dry mouth as required with water spray in an atomiser bottle, chewing gum, salivary substitutes, or pilocarpine ^{41,42} Monitor effectiveness of the daily oral care plan	preventive and therapeutic products (e.g. fluoride varnishes; chlorhexidine rinses) by nurses and other care staff ^{43,44} Reassess risk of adverse effects from polypharmacy (e.g. dry mouth; sugars in medications) ^{39,40} Reassess need for relief from dry mouth and effectiveness of daily oral care plan	toothpastes, mouthrinses, varnishes and gels Expand preventive strategies to manage severe mucositis ⁴⁹ and the growing risk of respiratory infections ^{43,50}
Treatment	Routine	Consider long-term viability of restorations and prostheses Plan treatment outcomes for easy maintenance	Identify, repair or replace strategically important teeth guided by the principle of the 'shortened dental arch', with or without implants, to maintain oral function ^{21,51,52} Plan for ongoing maintenance, including restorative and surgical treatments, to maintain function and prevent or control infection and pain ^{45,46}	Repair and maintain strategically important teeth with conservative treatments (e.g. atrumatic restorative technique (ART) with fluoridated glass-ionomer materials ^{53,54} , and design oral prostheses to simplify oral hygiene and prevent infection ⁵¹ Use prosthodontic attachments between overdentures and abutment teeth or implants to simplify hygiene and maintenance ^{55,56}	Offer palliative treatment on demand from the patient to control pain and infection and maintain social contacts and activities ^{45,57}

(Continued)

Table 1 (Continued).

Actions	Level of dependency				
	None	Pre	Low	Medium	High
Communication	Explain implications of increasing dependency on oral healthcare and specific treatment outcomes, especially involving complicated oral prostheses	Explain to patient and other attending healthcare providers, including physicians, the significance of conditions likely to complicate the management of oral health as dependency increases	Expand communications to all members of the interprofessional healthcare team Emphasise preventive strategies to manage the risk of caries and periodontal disease, and maintain oral function without infection	Maintain communications with members of the interprofessional healthcare team Increase vigilance of the daily oral care plan	Monitor communications all caregivers, including the patient, family, friends and members of the interprofessional healthcare team to allow for continuous adjustments by everyone to the palliative care ^{5,8}

development of new home care and professionally applied products.

Developing a pathway

Rooney¹⁷ describes the rationale behind dental care pathways as developed in the UK. He explains the role of a standardised and evidence-based approach to developing effective pathways with clear goals, good communications, necessary documentation, monitoring, evaluation and appropriate resources. The use of pathways ensures that patients receive a standardised level of care reducing variations that may not be evidence informed, and in doing so, provide consistent outcomes. Of importance in any care pathway is the ability to monitor patient progress through their journey by utilising meaningful clinical milestones.

The pathway

The pathway is based on the levels of dependency described previously and shown in Table 1. This approach ensures that oral health is maintained throughout life, irrespective of the level of dependency (Table 1). The pathway will have unique characteristics specific to the jurisdiction in which it is implemented. For example, in the UK, there is a national oral health strategy implementation plan (*Delivering Better Oral Health*)¹⁸ as well as national requirements for patient recall based on risk assessment¹⁹. Consequently, implementation of the pathway in the UK must allow for these national directives in relation to recalling patients, and for the particular payment system, regulatory framework and workforce available in the UK.

Settings for care will also vary depending on where the pathway is implemented. For example, in the UK compared with most other European countries, many care homes are smaller institutions in which it is difficult to establish dental clinics that meet the requirements for national infection control standards²⁰.

The pathway relates to the specific treatment needs of each assessed patient. However, the pathway can also be utilised to assess population-based interventions, such as community-based prescriptions for high-fluoride toothpastes and for robust assessments of health needs upon which services can be developed.

Trigger times

We have moved away from chronological age as a defining characteristic of the pathway; how-



Figure 1 No dependency/Full independence. Fit, robust individuals who exercise regularly.

ever, our concerns are mostly with older people. There is, therefore, need to consider the point at which a person's dependency should be categorised. It has been suggested that this should occur from 55 years when most people are living independently although some people will be categorised as 'pre-dependent' because they are being treated for a disease that seems well controlled, even if they are younger than 55. Some authors have reservations about putting a specific chronological age on entry to the pre-dependency category because pre-dependency can occur at any age. However, everyone agrees that dentists should be vigilant to the onset of frailty at any age.

Clinical scenarios

The following clinical scenarios demonstrate how the care pathway (Table 1) can be used for a range of patient presentations (Figs 1–5).

No dependency

John and Mabel are both 72 years old and have been married for 50 years. They are healthy but have extensively restored dentitions that are functioning well. On their latest visit to the dentist,



Figure 2 Pre-dependency/Less independence. Chronic systemic condition with potential impact on oral health that, at point of presentation, is not currently impacting on oral health. A comorbidity whose symptoms are well controlled.

neither of them reported problems. They can travel by car to the dental clinic (Fig. 1).

The pathway recommends. John and Mabel are over 55 and are therefore assessed against the criteria in the pathway. They fall into the 'no dependency' category. With good oral function and the ability to receive treatment easily, the full range of treatment options are open to them. However, it is important to begin discussions about the possibility of a change in dependency and its potential impact on oral care. Complex treatment that requires high levels of maintenance are not contraindicated, but they should be advised in writing about the implications to the maintenance of health and comfort if their category of dependency changes.

Pre-dependency

Ravi, 68 years old, lives alone. His two children live nearby and visit him regularly. He can walk with the aid of a stick and is currently on medications that successfully control his high blood pressure and diabetes. He noticed recently, after losing two upper molars, that his lower removable partial denture is uncomfortable when chewing

hard foods. He lives close to a dentist and has sought advice on how to improve the comfort of the denture (Fig. 2).

The pathway recommends. Ravi is pre-dependent. His diabetes and high blood pressure if they become unstable could disturb his oral health. His request for help to enhance the comfort of the denture relates not only to his quality of life but also to his nutritional status. The dentist should inform him about the potential risk of caries and periodontal disease and make a special assessment of salivary flow that might be disturbed by his medication for blood pressure. Ravi needs an oral healthcare plan for self-care and professional management. He should be informed about the risk of oral health on diabetes and multiple medications (polypharmacy), placed on a more frequent recall schedule, and prescribed a high-fluoride toothpaste along with a professional applied fluoridated varnish to lower his risk of caries. The dentist should know how to contact

Ravi's children in case Ravi fails to attend his recall appointments.

Medium dependency

Crisanna is 71 years old and lives in an assisted-care facility about 20 min by car from a dental clinic. She used to attend a dentist every 6 months, but she has difficulty arranging transport since she moved into the facility. She takes several medications for rheumatoid arthritis and chronic obstructive pulmonary disease, and she uses steroids to control a dermatological disorder. With the aid of a walker, Crisanna can walk a short distance, but she feels breathless when reclining in a dental chair. Although she has most of her natural teeth, there are carious lesions associated with several dental restorations, and she has newly exposed root surfaces on her canines and premolars. She complains that her mouth is dry quite often but has not mentioned this to her dentist, physician or pharmacist (Fig. 3).



Figure 3 Medium dependency. Patient with an identified chronic systemic condition that is currently impacting on oral health and who receives or requires 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 transport to a dental clinic.



Figure 4 High dependency. Patient with a complex medical condition who cannot be transported to receive dental care. This category differs from a mid-dependency where there the patient demands to be seen at home. These patients cannot be moved easily because of unstable health.

The pathway recommends. Crisanna is a patient with medium dependency. Her chronic disorders have increased her risk of caries and periodontal disease. A support network must be identified to enable her to visit the dentist on a regular schedule to stabilise the effect of the systemic disorders and the polypharmacy. Contact between the dentist and other healthcare personnel supplemented by the care of her family are essential to maintain her oral health. In addition, she must be prescribed a high-fluoride toothpaste to reduce the risk of caries and ease the dry mouth and given special instructions on how to remove plaque from the root surfaces of the canines and premolars. The carious teeth might need fluoride-releasing restorations to prevent further demineralisation. She needs also a fluoride varnish applied to all dental surfaces, especially the newly exposed roots. The nursing staff providing her daily care must be advised about her unstable oral condition, and they should be shown how to provide oral care. Any additional restorative treatment must be designed for easy maintenance.

High dependency patient 1

Ronald is 59 years of age with vascular dementia, diabetes and advanced mesothelioma. He lives in a palliative care unit and has not attended a dentist for several years. The staff of the care unit contacted a local dentist because Ronald has a severe toothache that disturbs his ability to eat (Fig 4).

The pathway recommends. The immediate objective of dental care for Ronald is pain management. This could involve antibiotics, a tooth extraction, endodontic treatment or more simply dental sealants depending on the source and aetiology of the pain. Treatment will most likely be delivered in the palliative care unit if the problem is relatively simple to manage or in a dental clinic preferably near an acute-care hospital if the dental treatment is likely to destabilise his health even more. His attending physician, other carers and his family must be informed fully about all possible treatment options and possible outcomes. When the toothache is eliminated, Ronald must be managed carefully to prevent a recurrence, probably by prescribing a high-fluoride toothpaste and acidulated mouthrinse, and instructing the nursing staff about caries and periodontal disease. A chlorhexidine mouthrinse and varnish will also help if optimal tooth brushing is compromised. The dentist or dental hygienist must maintain regular contact with Ron-



Figure 5 High dependency. Patients whose complex medical condition prevents them from being moved to receive dental care. This category differs from those in medium dependency where there is a demand to be seen at home. These patients cannot be moved without substantial difficulty.

ald and the nurses to prevent recurrence of dental problems that can exacerbate his dependency.

While Ronald is best managed by a dentist specialising in geriatrics or experienced in managing patients who are medically compromised. Not everyone in the high dependency category will require this specialised care.

High dependency patient 2

Helen is 88 years old. She was diagnosed with Alzheimer's disease 7 years previously. Now she has severe cognitive impairment and needs a hoist to move from her wheelchair. She lives in an assisted living facility with special facilities for residents with impairment. Two years ago, Joe, her husband, took her to their dentist of 34 years. She maintained a 6-month recall schedule in the past and has a well-restored dentition; however, Helen became very anxious and confused during the last visit to the dentist. Over the past 8 months, Joe brushed her teeth after lunch, but she recently rejects his care and he is worried about the dark stains on her teeth. She does not

always let the staff help her with daily oral care and cannot be moved agreeably from the facility to receive care at a dental clinic (Fig 5).

The Pathway recommends. The immediate objective of dental care for Helen is to review her medical and dental history, and examine and clean her mouth and teeth, and take radiographs as indicated. A review of her medications shows that she began taking liquid ferrous sulphate 2 months ago for an iron deficiency that probably explains the tooth stains that Joe notices. The examination revealed a molar with extensive caries and fracture of a lingual cusp.

Although staff and family help Helen with daily oral care, additional preventive therapies are needed, such as brushing with high-fluoride toothpaste twice daily supplemented by application of a fluoride gel to her teeth in the evening. Given her anxiety and confusion, sedative medication may be required prior to dental treatment. Obviously the risk of caries is very high, which needs further investigation to identify possible pharmaceutical and dietary contributors. However, Helen will benefit from regular dental examination and professional cleaning every 3 months if possible. Other more invasive procedures, such as extracting or restoring the fractured molar, will depend on her wish, or if she cannot express this wish and give consent, Joe can act as her guardian if confirmed by the attending medical team. Her husband elected to remove the tooth because he believed that it would not significantly impact her function or comfort²¹.

Wider influence

The dental community must inform policymakers and others about the epidemic of poor oral health among older people and about specific threats to oral health, such as sugars in medicine, xerostomic medications and the appropriate deployment of the dental workforce. Working with other organisations, such as those in the voluntary sector, medical administrators, nursing home managers) will help this process, as will interprofessional education in undergraduate and graduate courses

relating to management of the older patient^{22,23}. There is also a need to encourage funding agencies in each country to support research in gerodontology. Clinical research involving participants who are frail and dependent is challenging, but there is clearly a need for a stronger evidence base to support interventions for this growing population.

Vulnerable population

Elder abuse is appropriately included in this pathway. As with younger patients, abuse can take many forms – physical, sexual, psychological or financial and that poor oral health can be an indicator of neglect²⁴. Dental professionals must be vigilant for signs of abuse and must make themselves aware of both the duty to report and the means of doing so in their locality.

Summary

The Seattle Care Pathway is a first step in developing an organised, outcome-led approach to ensuring that older people who are dependent receive evidence-based care to protect, maintain and optimise their oral health.

Acknowledgements

The authors would like to thank Mr Ian Mackay for producing the cartoons used in the scenarios. These images are used with permission from the University of Manchester Dental Health Unit who retains copyright. We would like to recognise the support of Colgate Palmolive in sponsoring the workshop and making this special edition freely accessible.

Conflicts of interest

The Seattle Care Pathway conference was supported by funding from Colgate Palmolive who have also made this publication freely available. Professor Roger Ellwood is an employee of Colgate Palmolive.

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