



Caries Arresting Approaches for Aging and Medically Complex Patients

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ABSTRACT Due to conditions such as infirmity, cognitive decline or xerostomia, older adults frequently experience increased dental disease. Those with advanced frailty or cognitive impairment and dental caries present special challenges for dentists, as comprehensive dental care can be invasive, intensely stressful and sometimes futile in the last years of life. Progressive approaches that use chemotherapeutics, such as silver diamine fluoride, can successfully be utilized to nonsurgically manage dental caries in aging or medically complex patients.

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With improvements in access to fluorides, oral hygiene products and healthy foods, older adults in the U.S. are not only living longer, but retaining their teeth longer as well.¹⁻³

There have also been gains in untreated disease rates, although still roughly 20 percent of adults aged 75 and older have untreated dental caries.³ This prevalence is arguably higher for low-income adults residing in long-term care facilities, as dental disease rates are higher in low-income populations⁴ and patients residing in long-term care facilities experience greatly restricted access to oral health care services.⁵ A 2011 study conducted in a skilled nursing facility in Minnesota describes this critical issue well.⁶ The study found that depending on cognitive status, 82 to 92 percent of patients entering the nursing home had one or more carious teeth or root retained tips and that those with impaired cognition or dementia suffered disproportionately more.

For older adults, tooth loss can be a serious issue as the presence of teeth can have a substantial impact on socialization, chewing, maintaining adequate weight and nutrition. The consequences of malnutrition in the frail elderly are great, including increased infections, poor wound healing and pressure sores. For those with advanced dementia or Alzheimer's disease, even with the presence of teeth, mealtime can be challenging, as they frequently lose interest in eating, forget how to use utensils and even experience impairments in swallowing.⁷

Caring for the elderly in the last years of life presents special challenges for dentists, particularly for those who are caring for patients who are frail or with brain failure (dementia or Alzheimer's). Foremost, patients with these conditions have a disease trajectory of prolonged dwindling resulting in a slow decline from an already low level of baseline functioning and ultimately to death. However, the time to death is quite variable and may take six to eight years.⁸ It is this variability



FIGURE 1. Jason Tanguay, DDS, assisted in a nursing home by University of Utah first-year dental student Derik Powell. (Photo courtesy of Sydney Judd)



FIGURE 2A. Second SDF application appointment: before toothbrushing and application of SDF.



FIGURE 2B. Second SDF application appointment: after toothbrushing and application of SDF.

in time to death that makes treatment decisions regarding usual comprehensive dental care versus palliative dental care difficult. The findings of a study that examined dental treatment intensity in the last years of life is revealing in this regard. The study found that most people receive no dental services, but of those who did, a significant number received full comprehensive dental care in their last three months of life.⁵ In addition to being both physically and emotionally stressful for frail elders, this type of care in the last months of life is futile.⁹

Even if dentists could reliably predict the time to death, the time-course of oral conditions (such as dental caries) has its own set of prediction difficulties. Caries is a multifactorial time-dependent disease. Accordingly, carious lesions can remain at a particular stage¹⁰ for months, if not years, or they may progress quickly to an acute phase. The time at which a carious lesion will become an acute dental condition is unknown. It is only known that it *may* sometime in the future become acute. This leaves the dentist with two nearly unanswerable questions which ultimately drive the decision of providing comprehensive dental care versus palliative dental care: When will my patient die and when, if ever, will this caries-affected tooth become an acute dental condition? These are deeply significant issues for dentists to address, because the worst outcome would be for the patient to develop an acute dental condition while at their most vulnerable stage of life.

The second factor that dramatically impacts a dentist's decision in providing comprehensive dental care versus palliative dental care is a patient's level of physical and cognitive functioning. A thorough medical history and physical exam can inform a dentist as to the intensity of treatment a patient can safely endure and any needed modifications to care. With respect to cognitive impairment, such as those with advanced dementia or Alzheimer's, Niessen et al. developed a decision support tool dentists can use to assess a patient's ability to cope through dental treatment and to guide the process of deciding appropriate treatment intensity and ongoing care.¹¹ This decision support tool advises intensive prevention at all levels of cognitive impairment, but also advises that patients with mild impairment should be restored quickly to function and patients with advanced brain disease should receive conservative maintenance of the dentition and emergent care.

While the paradigm shift toward treating dental caries as a chronic disease through a medical management approach is not new,¹² dentistry has had a renewed interest in the topic with the relatively recent introduction of Food and Drug Administration-approved silver diamine fluoride (SDF). Silver diamine fluoride, along with other chemotherapeutics, is a valuable treatment option for those caring for aging patients. These nonsurgical approaches for managing dental caries are low-cost, have minimal adverse effects and are easily applied. Silver

diamine fluoride when used alone or in combination can arrest or significantly slow down the caries disease process.

The impact of this rapid halting of the disease is that the unpredictable nature of time to death is no longer an issue. It removes the concern that the patient will endure expensive, stressful and futile surgical care in their last months of life. If the patient's disease trajectory is such that they reach death in five years, the nonsurgical therapy of SDF will have been low-cost and easy for the patient to receive and will have avoided the progression of caries to an acute condition. For a patient with a shorter disease trajectory, if death occurs in the near future, the nonsurgical therapy of SDF will have again been low-cost and easy for the patient to receive and will have avoided the progression of caries to an acute condition in their last, frailest months of life.

Chemotherapeutics for Preventing and Arresting Dental Caries in Older Adults

SDF, alone or in combination with other chemotherapeutics, can successfully treat and prevent dental caries in aging populations. A study evaluating the effects of SDF in arresting root caries in community-dwelling adults found that SDF alone arrested root caries at a rate of 90 percent.¹³ Arguably, those residing in long-term care facilities require special considerations due to their complex medical conditions, severely limited access to routine dental care and insufficient facility-provided daily mouth care.¹⁴ Accordingly, dentists



FIGURE 3A. Third SDF application visit: before toothbrushing and application of SDF.



FIGURE 3B. Third SDF application visit: after toothbrushing and application of SDF.

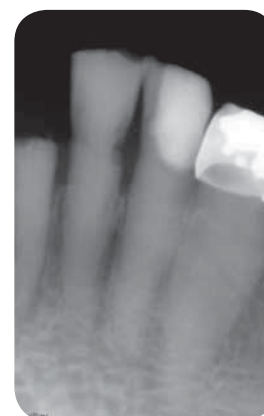


FIGURE 3C. Radiograph of tooth No. 25 shows periapical pathology.

caring for this population additionally use complementary chemotherapeutics such as fluoride varnish, high-dose daily fluoride mouth rinse, chlorhexidine varnish and even povidone-iodine.

For decades, topical fluoride has been the primary approach for preventing and arresting caries. Evidence suggests that three applications per year of 22,500 ppm sodium fluoride varnish may reduce caries in older adults.¹⁵ Daily 0.2% neutral sodium fluoride mouth rinse may have benefits as well, both in terms of preventing and arresting caries. A study conducted in institutionalized adults that compared daily high-dose fluoride mouth rinse to chlorhexidine and placebo reported a 24 percent decrease in new caries and that caries was arrested at a rate of 59 percent.¹⁶ While chlorhexidine mouth rinse in this study was found to increase caries, other evidence suggests that a 1:1 mixture of chlorhexidine/thymol varnish may be effective for managing root caries.¹⁷ Povidone-iodine is another agent that is easy and inexpensive and, if applied at two-month intervals, may have some benefit as well,^{18,19} although studies that have evaluated this approach have been conducted mainly in children. Lastly, though not a caries preventing or arresting agent, pilocarpine lollipops (5g pilocarpine/2g xylitol), which help increase saliva production in patients with xerostomia, have been gaining in popularity. In this technique, patients suck on the lollipop for 15 seconds any time they have the sensation of mouth dryness and/or before meals.

Clinical Technique for Arresting Caries in Older Adults

Federal law requires that skilled nursing facilities ensure that a dentist is available for residents, either by employing a staff dentist or by having a contract with a dentist to provide care. Facilities are additionally required by federal law to ensure residents have access to both 24-hour emergency services and routine dental care (i.e., diagnosis of dental disease, restorations, minor denture care).²⁰ Accordingly, dentists are frequently part of a skilled nursing facility's care team (**FIGURE 1**). The following two cases highlight treatment approaches commonly used by dentists caring for patients in skilled nursing facilities.

Case Presentation One

Palliative care using a caries arrest technique (FIGURES 2A and 2B): Patient is a widowed American Indian who is an 88-year-old female with moderate dental anxiety and has lived in a nursing home for four years. She was diagnosed with advanced dementia, hypertension, hypothyroidism and chronic obstructive pulmonary disease. The patient is being treated with nine medications for her medical conditions, which is resulting in xerostomia. She has restricted mobility, especially in her neck. The maxillary arch is completely edentulous and the remaining teeth on the mandible, Nos. 22, 27, 28 and 29, are carious but not pulpally involved. She has a maxillary denture but does not wear it.

Treatment goals: To provide minimally stressful or invasive care by the delivery of caries arresting chemotherapeutics.

Treatment:

- Apply 38% SDF at three-month intervals. Remove debris with toothbrush. Isolate area with cotton rolls and dry tooth surface with gauze. Dispense one drop of 38% SDF into dappen dish and wet microtip brush. Apply SDF to affected tooth surface for 30 to 60 seconds. Blot dry and apply 5% NaF sodium fluoride varnish.
- Apply 5% NaF sodium fluoride varnish at three-month intervals. Dry teeth and apply fluoride varnish to all surfaces of teeth.

Prescriptions:

- Fluoride dental rinse 0.2%
Disp: 16-ounce bottle
Sig: Nursing staff to brush and swab off of teeth one teaspoon once upon waking, once before bed and after staff-assisted toothbrushing. If possible, avoid eating or drinking for 30 minutes after use.
- 5g pilocarpine/2g xylitol lollipop
Disp: One lollipop
Sig: Suck on lollipop 15 seconds before each meal.

Case Presentation Two

Palliative care using a caries arrest technique and active disease monitoring (FIGURES 3A-3C): Patient is a widowed Caucasian 91-year-old female who has

lived in a nursing home for two years. She has a history of stroke and was diagnosed with a urinary tract infection, hypertension, complete blindness and no use of her right dominant hand. The family and nursing home are discussing beginning “comfort care” (withholding futile curative therapies and relieving suffering during the dying process). The patient is being treated with 12 medications for her medical conditions, which is resulting in xerostomia. The maxillary arch is completely edentulous. The remaining teeth on the mandible are Nos. 22–27 and 22, 23 and 25 are carious. Tooth No. 25 is pulpally involved, but without acute signs or symptoms. She has a maxillary full denture and a mandibular partial denture, which she wears.

Treatment goals: To provide minimally stressful or invasive care by the delivery of caries arresting chemotherapeutics and avoid surgical extraction of tooth No. 25.

Treatment:

- Apply 38% SDF at three-month intervals.
Remove debris with toothbrush. Isolate area with cotton rolls and dry tooth surface with gauze. Dispense one drop of 38% SDF into dappen dish and wet microtip brush. Apply SDF to affected tooth surface for 30 to 60 seconds. Blot dry and apply 5% NaF sodium fluoride varnish.
- Apply 5% NaF sodium fluoride varnish at three-month intervals. Dry teeth and apply fluoride varnish to all surfaces of teeth.
- Active disease monitoring of tooth No. 25.*
Nursing staff to assess daily for changes in clinical signs or symptoms. Dentist to provide limited exam including radiographs at three-month intervals to monitor disease state. Extract tooth No. 25 if it develops into an acute condition.

Prescriptions

- Fluoride dental rinse 0.2%
Disp: 16-ounce bottle
Sig: Nursing staff to brush and swab off of teeth two teaspoons once upon waking and once before bed after staff-assisted toothbrushing. If possible, avoid eating or drinking for 30 minutes after use.
- 5 g pilocarpine/2 g xylitol lollipop
Disp: One lollipop
Sig: Suck on lollipop 15 seconds before each meal.

Conclusion

As the U.S. population rapidly ages, dentists are faced with the increased need to conservatively manage dental caries in their frail elderly patients. Variabilities in time to death and the progression of caries to an acute condition make care planning challenging in this population. Progressive techniques for medically managing the disease of dental caries now makes it possible for dentists to conservatively care for patients, even in their most vulnerable stage of life. Silver diamine fluoride, one of the newest available chemotherapeutics in the U.S., can arrest or greatly slow disease progression. This approach can be used as an alternative to surgical care, which can be invasive and stressful for the elderly. Other more traditional modalities that can be used as well include fluoride varnish, daily high-dose fluoride mouth rinse, chlorhexidine-thymol varnish, povidone-iodine and pilocarpine. Avoiding surgical care in the elderly can enhance quality of life, health and happiness in the last stages of life. ■

REFERENCES

1. Whitmore Schanzenbach D, Nunn R, Bauer L. The Changing Landscape of American Life Expectancy. June 2016.
2. Johnson ES, Kelly JE, Van Kirk KE. Selected Dental Findings in Adults, by Age, Race and Sex United States – 1960–1962. Washington, D.C.: U.S. Department of Health, Education and Welfare; 1965. PHS publication 1000, Series 11, No.7.
3. Dye BA, et al. Dental caries and tooth loss in adults in the United States, 2011–2012. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National

Center for Health Statistics, 2015.

4. Dye BA, Li X, Beltrán-Aguilar ED. Selected oral health indicators in the United States, 2005–2008. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics, 2012.
5. Chen X, et al. Dental treatment intensity in frail older adults in the last year of life. *J Am Dent Assoc* 2013 Nov;144(11):1234–1242.
6. Chen X, Clark JJ, Naorungroj S. Oral health in nursing home residents with different cognitive statuses. *Gerodontology* 2013 Mar;30(1):49–60. doi: 10.1111/j.1741-2358.2012.00644.x. Epub 2012 Feb 26.
7. Humbert IA, et al. Early deficits in cortical control of swallowing in Alzheimer’s disease. *J Alzheimers Dis* 2010;19(4):1185–97. doi: 10.3233/JAD-2010-1316.
8. Murray SA, et al. Illness trajectories and palliative care. *BMJ* 2005 Apr 30; 330(7498): 1007–1011. doi: 10.1136/bmj.330.7498.1007.
9. Kasma DL. When is medical treatment futile? *J Gen Intern Med* 2004 Oct;19(10):1053–1056
10. Young DA, et al. The American Dental Association caries classification system for clinical practice: A report of the American Dental Association Council on Scientific Affairs. *J Am Dent Assoc* 2015 Feb;146(2):79–86. doi: 10.1016/j.adaj.2014.11.018.
11. Niessen LC, et al. Dental care for the patient with Alzheimer’s disease. *J Am Dent Assoc* 1985 Feb;110(2):207–9. (1985):207–209.
12. Anderson MH, Bales DJ, Omnell KA. Modern management of dental caries: the cutting edge is not the dental bur. *J Am Dent Assoc* 1993 Jun;124(6):36–44.
13. Li R, et al. Randomized clinical trial on arresting dental root caries through silver diamine fluoride applications in community-dwelling elders. *J Dent* 2016 Aug;51:15–20. doi: 10.1016/j.jdent.2016.05.005. Epub 2016 May 18.
14. Coleman P, Watson NM. Oral care provided by certified nursing assistants in nursing homes. *J Am Geriatr Soc* 2006 Jan;54(1):138–43.
15. Gluzman R, et al. Prevention of root caries: A literature review of primary and secondary preventive agents. *Spec Care Dentist* 2013 May-Jun;33(3):133–40. doi: 10.1111/j.1754-4505.2012.00318.x. Epub 2012 Dec 10.
16. Wyatt CC, MacEntee MI. Caries management for institutionalized elders using fluoride and chlorhexidine mouth rinses. *Community Dent Oral Epidemiol* 2004 Oct;32(5):322–8.
17. Rethman MP, et al. Nonfluoride caries-preventive agents: Executive summary of evidence-based clinical recommendations. *J Am Dent Assoc* 2011 Sep;142(9):1065–1071.
18. Lopez L, et al. Topical antimicrobial therapy in the prevention of early childhood caries: A follow-up report. *Pediatr Dent* 2002 May-Jun;24(3):204–6.
19. Tut OK, Milgrom PM. Topical iodine and fluoride varnish combined is more effective than fluoride varnish alone for protecting erupting first permanent molars: A retrospective study. *J Public Health Dent* 2010 Summer;70(3):249–52. doi: 10.1111/j.1752-7325.2010.00163.x.
20. State Operations Manual Appendix PP – Guidance to surveyors for long-term care facilities 2017. Centers for Medicare & Medicaid Services (CMS). www.cms.gov/Regulations-and-Guidance/Guidance/Transmittals/2017Downloads/R168SOMA.pdf. Accessed June 30, 2017.

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*Active disease monitoring is the purposeful, careful and patient/caregiver-informed monitoring of a significant dental condition that could become acute. It requires an education and monitoring plan for the nursing staff, regular nurse-assisted monitoring of the dental condition, regular dentist-nursing staff communication and informed consent of the patient or power of attorney.