

# Oral Health is Cost-Effective to Maintain but Costly to Ignore

Yoneyama et al.<sup>1</sup> have demonstrated the role of a familiar, straightforward intervention—providing regular oral hygiene care—on reducing the incidence of pulmonary disease in institutionalized older people. Pneumonia, “the old man’s friend,” is a leading cause of death in nursing home residents and among the most common cause of hospitalizations in this group.<sup>2</sup> In the nursing home setting, pneumonia may account for as many as 48% of the infections, with mortality as high as 44%.<sup>3</sup> As such, pneumonia is a prominent contributor to the climbing costs of long-term care in older persons in the developed world. Employing data reported by Muder<sup>2</sup> that the median rate of nursing home-acquired hospitalization for pneumonia is one case per 1,000 patient days and from Dempsey<sup>4</sup> that the average cost of such a hospitalization is approximately \$14,000 (in 1993 dollars), the annual cost of nursing home-acquired pneumonia among the 1.5 million nursing home residents in the United States easily exceeds \$8 billion. The data of Yoneyama et al. support the use of modest resources for the provision of daily oral care to avoid these substantial healthcare costs and the increased mortality and morbidity associated with pneumonia.

Epidemiological studies have demonstrated that not only medical but also dental/oral diseases are risk factors for the development of aspiration pneumonia. In multiple logistic regression analyses, medical factors identified included needing help feeding, diabetes mellitus, and chronic obstructive pulmonary disease. Oral risk factors included increased numbers of decayed teeth, presence of decay-causing organisms, and presence of periodontal disease-associated dental plaque organisms.<sup>5</sup>

It has long been suspected that pneumonia is related to oral pathogens. The infection of the lung via aspiration of oral pathogens, particularly anaerobic organisms, was investigated by Finegold who verified the presence of anaerobes in transtracheal aspirates.<sup>6</sup> The link between oral pathogens and respiratory infection has been discussed in a number of recent reviews concerning oral colonization.<sup>5,7-10</sup> Several common oral organisms show epidemiological links to the development of pneumonia.<sup>11</sup> Colonization of the oral cavity in older persons, especially those in nursing homes, includes nosocomial pathogenic organisms such as *Staphylococcus aureus*,<sup>11</sup> yeast,<sup>12,13</sup> and enteric gram-negative bacilli.<sup>11,13-16</sup> Such colonization is particularly prevalent in older persons who are in medical intensive care.<sup>14</sup>

Correlations between pneumonia and the presence of pathogens associated with natural teeth raise particular concern because a dramatically increasing proportion of older Americans, and therefore of nursing home residents, is retaining a growing proportion of their teeth into old

age. The National Center for Health Statistics reported in 1957 that 68% of Americans aged 75 and older were edentulous (had no remaining natural teeth),<sup>17</sup> but the National Institute for Dental Research reported in 1986 that this figure had dropped to below 40%.<sup>18</sup> More-recent regional studies<sup>19</sup> support the observation that this trend for increasing tooth retention in older people has continued. The presence of even a single natural tooth puts an individual at risk for the diseases associated with the presence of teeth, such as decay and periodontal disease.

Self-care impairment is endemic in the nursing home population, virtually by definition. Even in healthy seniors, effective daily oral hygiene is commonly complicated by one or more of a host of factors, including impaired visual acuity; diminished manual dexterity; arthritic conditions affecting grip strength and range of motion in the wrist, elbow, and shoulder; decreased salivary flow rate and impaired salivary buffering capacity secondary to a broad variety of drugs and diseases; increased surface area of teeth and the exposure of dental roots due to prior periodontal disease; and the presence of permanent and removable dental prostheses replacing missing teeth.<sup>20</sup> A growing proportion of older persons in nursing homes possesses natural teeth and is therefore subject to all of these impairments to effective daily hygiene. In addition, members of this group may be expected to be partially or fully dependent on nurses’ aides for self-care activities, and it has been widely documented that aides typically place a low priority on oral health (both for themselves and for their patients), receive little to no rebuke if oral care is overlooked, have multiple other tasks that do invoke a reaction if omitted, express distaste for the task on a continuum of descriptions that range from unpleasant to dangerous, and receive little to no training in its provision.<sup>21</sup> Because the few regulations about oral care are often unenforced,<sup>22</sup> there is little motivation to play any role in residents’ daily oral care regimens.

The suggestion has been made that specific aides be trained and assigned to provide oral care, to the exclusion of other responsibilities. There are indications that such training could be effective,<sup>23</sup> but the model is generally viewed as incurring additional, unnecessary expense. The work by Yoneyama et al. opens the door to demonstrating the merits of such an approach, and the fallacy of characterizing it as additional expense, for to do so would overlook the potential cost savings. For instance, in the United States there are approximately 19,000 nursing homes. If each hired a nurses’ aide to do nothing but perform oral hygiene, and each was paid (with benefits) \$25,000 annually, the total cost would be under \$500 million. If the rate

of pneumonia were decreased by only 10% through this intervention, the savings would be over \$800 million annually, with a net benefit of over \$300 million—and the preliminary figures of Yoneyama et al. reflect a likely decrease in disease rate three times this magnitude.

The article raises a few questions. For instance, the authors employed several measures for the oral hygiene intervention, including brush and dentifrice, povidone iodine Betadine® scrubs, and weekly professional cleanings. Might the results have been the same with any of these alone, or any two? In the United States, povidon iodine Betadine® has low acceptability among patients, but other oral hygiene rinses, such as chlorhexidine 0.12%, have been shown to be effective disinfectants in vitro.<sup>24,25</sup> This antiseptic formulation has shown some clinical promise,<sup>26</sup> as have other forms.<sup>27,28</sup>

Yoneyama et al. also acknowledge shortcomings in their definition of pneumonia, in that much of their data are based on “febrile days” in long-term care. Not all febrile days are due to pneumonia, but many other causes, if they can be identified, can be traced back to an oral origin. A recent study that used a stricter definition of aspiration pneumonia has demonstrated significant correlations between aspiration pneumonia and dental decay and periodontal disease.<sup>29</sup>

In summary, the paper by Yoneyama et al. highlights the association between poor oral hygiene and respiratory disease at a time when persons in long-term care are retaining their teeth and generating high costs from pneumonia morbidity. The paper points to the likelihood that relatively low-cost interventions in oral hygiene could reduce some of the higher-cost outcomes of aspiration pneumonia. Although improvement in oral hygiene is not accomplished without cost, this may be an excellent goal for the improvement of long-term care quality, the reduction of undesirable outcomes, and measurable cost savings.

*Margaret Terpenning, MD  
Ann Arbor GRECC  
Ann Arbor VA Health Care System  
Division of Geriatric Medicine  
Department of Medicine  
University of Michigan Medical School  
Ann Arbor, MI*

*Kenneth Shay, DDS, MS  
Ann Arbor GRECC  
Ann Arbor VA Health Care System  
Geriatrics and Extended Care Service Line  
Veterans Integrated Services Network  
U.S. Department of Veterans Affairs  
Department of Periodontics/Prevention/Geriatrics  
University of Michigan School of Dentistry  
Ann Arbor, MI*

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