Association between Dental Status and Time-to-Death among Nursing Home Residents in Eastern Iowa

Abstract

In a retrospective cohort study of 586 residents of nursing homes in Eastern Iowa, the relationship between dental status and time-to-death was evaluated. Time-to-death is defined as the time period from the date of screening to date of death. Health conditions of the patient at screening were recorded and no interventions were done. Two years after the screenings, a follow up was done. Of the 586 residents screened, there had been 372 deaths. All residents screened were classified into 6 different groups based on the presence/absence of teeth and presence/absence of dentures. The highest percentage of deaths occurred in residents classified as having ‘no dentures and no teeth.’ Time-to-death in this group of residents was also the shortest with 73% of deaths occurring less than a year after screening.

Introduction

Worldwide there are 600 million people over the age of 60 years and this figure is expected to double by 2025 (PRB, 2008). The U.S. Census Bureau (International Data Base, 2008) estimated that, in 2050, the number of Americans aged 65 and older will be 88.5 million, more than double its projected population of 40.2 million in 2010 (U.S. Census Bureau, 2010). With the increase in life expectancy, and changing medical, economic, and social factors, more attention is being paid to disease prevention activities for the elderly in order to improve the quality of life in elderly populations.
One area of growing interest is the oral health of older adults. Dental treatment needs for the elderly have changed in part because the patterns of oral diseases have changed. The Healthy People 2010 indicates that about 30 percent of adults 65 years and older are edentulous, compared to 46 percent 20 years ago. The proportion of edentulous seniors has decreased over the past 20 years; however the periodontal disease and caries has increased (NIDR, 2010).

Consequences of oral disease and tooth loss in older adults include poor food selection, impaired mastication, weight loss, difficulty in speaking and social isolation. In addition, esthetical and facial alterations can lead to anxiety and depression (Gershen, 1991). Geriatric dentistry plays an important role for the assessment and maintenance of beneficial oral health conditions which will enhance the quality of life of older patients; regular dental visits may help to reduce the incidence of systemic diseases, including cardiovascular diseases, diabetes, pneumonia infections, and osteoporosis. The effects of oral and dental disease are not limited to the oral cavity, as oral pathogens can directly or indirectly effect systemic conditions (Adachi et al, 2002).

Findings about the health status of the elderly support increased prevalence of cognitive impairment. Functional deficits such as bladder incontinence were also noticed. Residents needed help most with ADLs (Activities of Daily Living) like bathing, personal hygiene and dressing (Quinn et.al., 1999). Research into the dental health status of the elderly revealed that about 45% of the nursing home residents required assistance with eating. Oral care was not mentioned specifically but it was conservatively estimated that residents who required assistance with eating also required assistance with mouth care (Jablonski, 2010).
The greatest need among dentate elderly was for routine oral hygiene (about 72%) (Kiyak et al., 1993). Barriers to good oral health were estimated to be an inability to pay, extended periods of time without direct access to dental care delivery system and serious chronic medical conditions (Gift et al., 1997). Poor oral health is associated with an increased risk of aspiration pneumonia and ventilator-associated pneumonia (Haumschild et al., 2009). In gerontological population studies of four 70-year-old cohorts, it was found that each remaining tooth at age 70 decreased the 7-year mortality risk of the individual by 4%. The number of teeth was a significant predictor of mortality independent of health factors, socio-economic status and lifestyle (Osterberg et al., 2008).

Tooth brushing at night, using dental floss every day and visiting the dentist were significant factors for longevity. Edentulous individuals (even with dentures) had a 30% higher risk of death compared to those with 20+ teeth (Paganini-Hill, 2011). The more teeth or filled teeth a subject had, the smaller was their risk of death (Hamalainen et al., 2003).

**Materials and Methods**

The participants were 586 residents of 10 nursing homes in Eastern Iowa. They were screened (screening exams of 1-3 minutes’ duration) by the faculty of the College of Dentistry at the University of Iowa through the ‘Geriatric Mobile Dental Unit.’ Both extraoral and intraoral exams were conducted and data recorded on screening forms provided by the College of Dentistry.
The study was designed to be a retrospective cohort study. Data collected during dental screenings are used to match individuals with entries in the IDPH death certificate database. Residents were screened from 2006 through 2008. Screening data were maintained as patient records at the University of Iowa. Death certificates were match on 06/06/2010 through the IDPH death certificate database in cooperation with Dr. Chuck Lynch, University of Iowa College of Public Health, Dept. of Epidemiology.
All residents screened were classified into 6 different groups based on presence/absence of teeth and presence/absence of dentures. Residents classified into the groups ‘17-24 teeth’ and ‘25-32 teeth’ were groups of residents both with and without dentures. The numbers for these groups were not significant enough to merit classifying them into individual groups.

Univariate and Bivariate frequency distributions were generated using SAS (Statistical Analysis Software, Version 9.2 for Windows).

**Results**

Of the 586 residents screened, death records were matched to 372 individuals. The mean age at screening was 83.8 (10.7) years.

**Residents Screened - Residents Who Died and Residents Who Did Not Die**

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Mean age at Screening</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screened</td>
<td>586</td>
<td>(83.8)</td>
</tr>
<tr>
<td>Residents who died</td>
<td>372</td>
<td>(85.4)</td>
</tr>
<tr>
<td>Residents who did not die</td>
<td>214</td>
<td>(81.0)</td>
</tr>
</tbody>
</table>
Mean age at death was 86.7 (5.2) years and mean time-to-death was 1.26 (0.8) years.

<table>
<thead>
<tr>
<th>Dental Status</th>
<th>N (%)</th>
<th>Mean (SD) Age at Screening (Years)</th>
<th>% Male</th>
<th>% Deaths</th>
<th>Time to Death (Years) of % Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Denture, No Teeth</td>
<td>26 (5)</td>
<td>80.2 (14.2)</td>
<td>35</td>
<td>73</td>
<td>0.88</td>
</tr>
<tr>
<td>Denture, No Teeth</td>
<td>136 (27)</td>
<td>84.7 (8.9)</td>
<td>27</td>
<td>69</td>
<td>1.08</td>
</tr>
<tr>
<td>No Denture, 1-16 Teeth</td>
<td>47 (9)</td>
<td>82.7 (11.7)</td>
<td>38</td>
<td>47</td>
<td>1.39</td>
</tr>
<tr>
<td>Denture, 1-16 Teeth</td>
<td>63 (12)</td>
<td>85.0 (10.3)</td>
<td>27</td>
<td>63</td>
<td>1.41</td>
</tr>
<tr>
<td>17-24 Teeth</td>
<td>131 (26)</td>
<td>85.1 (9.6)</td>
<td>34</td>
<td>69</td>
<td>1.26</td>
</tr>
<tr>
<td>25-32 Teeth</td>
<td>105 (21)</td>
<td>81.8 (12.7)</td>
<td>32</td>
<td>53</td>
<td>1.21</td>
</tr>
<tr>
<td>Total</td>
<td>508 (100)</td>
<td>83.8 (10.7)</td>
<td>31</td>
<td>63</td>
<td>1.26</td>
</tr>
</tbody>
</table>

Highest percentage of deaths occurred in residents classified as ‘having no dentures and no teeth.’ This group also had the lowest mean age at screening among the entire resident population.
**Discussion**

Findings support literature review that edentulous individuals had a higher risk of death compared to those individuals who had teeth.

**Limitations**

1) Socio-economic factors of the individuals as well as the nursing homes were not considered for analysis

2) Time-to-Death does not reflect quality of life

3) Medical conditions at the time of screening were not considered a factor for analysis

4) Some potentially important variables were not available for analysis (e.g., utilization of health services)

**Strengths**

1) Some variables were collected that could be analyzed later (e.g., medical conditions)

2) Some variables were available that have not yet been collected (e.g., medications)
References

1) http://www.prb.org/pdf08/08WPDS_Eng.pdf


4) http://missourifamilies.org/quick/agingqa/agingqa7.htm


8) Jablonski RA. Examining Oral Health in Nursing Home Residents and Overcoming Mouth Care–Resistive Behaviors. Annals of Long-Term Care 02/12/2010


