

Changes in Oral Health and Treatment Needs for Elderly Residents of Long-Term Care Facilities Over 10 Years

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Published April 18, 2019

Cite this as: *J Can Dent Assoc* 2019;85:j7

Abstract

Purpose: This study aimed to examine the oral health status of seniors residing in Providence Health Care (PHC) long-term care facilities in 2002 and 2012.

Methods: Staff dentists with the University of British Columbia Geriatric Dentistry Program made a complete oral health assessment of 799 elderly residents of 7 long-term care PHC facilities in 2002 and 381 residents in the 5 remaining PHC facilities in 2012. The 2012 data were divided into those for 275 residents who had received treatment in previous years and 106 new residents. All consenting residents were examined by dentists using the clinical oral disorder in elders (CODE) index detailing their medical and oral health status and medications. On completion of the oral health assessment, the dentist documented the need for specific dental treatment and reassessment.

Results: Comparing the cohorts from 2002 and 2012, the mean age of the residents who had CODE assessments increased from 85 years to 86 years, the proportion of men increased from 31% to 35%, the mean number of medical conditions per resident remained unchanged (2.6 to 2.5), but the mean number of prescribed medications has increased from 4.0 to 4.6. The percentage of residents with natural teeth increased from 56% to 76%. The proportion of edentulous residents recommended for denture-related treatment decreased from 21% to 10%. The 106 new residents in 2012 had higher treatment needs than the 275 original residents, but fewer required extractions than in 2002. Although the mean number of teeth per resident examined increased from 14.6 to 17.4 over the study period, the need for restorations remained at 20%, and the need for extraction of teeth decreased from 22% to 6%. The proportion of residents with healthy periodontium increased from 14% to 21%, but the need for dental hygiene services increased from 43% to 80%.

Conclusions: The profile of long-term care residents who consented to an oral health assessment changed over the first decade of the new millennium, with an increase in mean age and number of prescribed medications, number of retained natural teeth and the need for dental hygiene services, but a decrease in the need for extractions.

The risk of tooth loss has been decreasing over time as a result of improved access to oral health care, an increasing interest in personal mouth care (brushing and flossing of teeth) and the use of fluoride.¹⁻³ This has allowed people to retain their natural teeth later in life, especially in economically developed countries.⁴⁻⁷ The prevalence of caries among Canadian adults has decreased substantially over the last quarter century⁷; however, older adults are increasingly prescribed medications,^{8,9} and nearly two-thirds of the most commonly prescribed medications suppress saliva production, which substantially increases the risk of dental caries.^{10,11} There is evidence that people increase their consumption of sugar as they age,¹² which also elevates their risk of dental caries^{13,14} and subsequent tooth loss. The oral health of older adults can deteriorate rapidly as a consequence of the frailty accompanying physical and cognitive decline in advanced old age.^{15,16}

Since 2002, the University of British Columbia's Geriatric Dental Program (GDP) has provided dental services to elderly residents of Providence Health Care (PHC) long-term care (LTC) facilities in Vancouver, British Columbia, Canada. PHC is a publicly funded hospital group providing emergency, general and specialty medical care under the Vancouver Coastal Health Authority. They have a particular focus on comprehensive geriatric care, especially for patients with dementia and complex medical conditions.

In 1999, PHC approached the university to provide dental services for their long-term care residents. The GDP was developed to address the demand for regular oral health assessments and access to dental treatment and prevention, including daily mouth care. Funding for the initial and annual follow-up oral health assessments was provided by Vancouver Coastal Health Authority. Determining oral health status is essential to identify residents with natural teeth and dental prostheses to allow individualized daily mouth care by staff. It is also critical in identifying residents with oral infections (odontogenic infections, candida albicans infections, dental caries, periodontal infections), inflammatory conditions (gingivitis, periodontitis and denture stomatitis) and other conditions (trauma and oral cancers) for timely dental treatment, thus reducing emergency care and transfer to hospital emergency departments. The cost of dental treatment and hygiene provided by the GDP was covered by the patient, dental insurance, family and/or public trustee. The care was provided bedside with portable dental equipment, at 2 hospital-based dental clinics (Providence Health Care Hospitals) or at the University of British Columbia dental clinic.

The GDP initially worked with 7 PHC facilities, but that number was reduced to 5 by 2012. In the Vancouver Coastal Health Authority, the estimated average stay at an LTC facility is 18 months; the GDP recommends examination of residents within 6 weeks of admission and

yearly thereafter. The GDP has tracked admissions and has had access to medical and dental records since 2002. An oral health assessment tool, clinical oral disorder in elders (CODE) score,¹⁷ was used in developing, implementing and assessing the GDP comprehensive dental program after 1 and 5 years.^{18,19}

Over time, the GDP dentists, dental hygienists and administration noticed a change in the resident population served under the program. Reviewing internally generated reports showed that residents have become older, more medically complex and retaining an increasing number of teeth over the past decade. This study aims to clarify changes in the oral health status of LTC residents over 10 years.

Methods

We used cohort data previously reported in 2002¹⁸ for 799 elderly residents of 7 LTC facilities, who had complete initial CODE oral health assessments carried out by the GDP. All GDP patients receive an annual oral health assessment using the same CODE tool, allowing for comparison over time. A cohort of 381 elderly residents of the remaining 5 LTC facilities from 2012 was used for comparison; none of the 2002 residents was available (likely due to death) to be included in the 2012 cohort. The 2012 data were further divided into 275 residents who had previously received dental care through the GDP and 106 newly admitted residents receiving an initial examination.

Residents' mean age, gender ratio, average number of medical disorders, average number of prescribed medications, oral health status (CODE score) and the proportion recommended for various dental treatments were included in the analysis.

The CODE oral health assessment is an Access database (Microsoft Corp. Redmond, Washington, USA) that guides the clinician through a systematic examination.¹⁷ Clinical information, such as medical conditions, medications, jaw function, denture quality, oral mucosal status, periodontal health and tooth status are included. Coronal and root caries were diagnosed using a visual-tactile approach with a front surface mirror and no. 5 caries explorer; individual teeth were scored as having no caries, caries or caries involving the pulp. Health of the gingiva and periodontium were assessed by bleeding on periodontal probing, periodontal pocket depths ≥ 5.5 mm, suppuration on probing and teeth with class III mobility.

The attending dentist used the CODE score and other clinical information from the medical record to diagnose diseases and conditions. No radiographs were taken during the assessment. The dentists determined treatment needs (dental hygiene related treatment, denture related treatment, restoration and extraction), location for care and urgency.

Table 1: Changes in dentition status of residents of long-term care facilities in British Columbia between 2002 and 2012.

Dentate/edentate status	2002	2012		
	All residents (n = 799)	All residents (n = 381)	Existing residents (n = 275)	New residents (n = 106)
Completely edentulous, no. (%)	354 (44)	92 (24)	77 (28)	15 (14)
Dentate, no. (%)	445 (56)	289 (76)	198 (72)	91 (86)
Edentate in one arch, no. (%)	160 (20)	69 (18)	51 (19)	18 (17)
Partly dentate in both arches, no. (%)	285 (36)	220 (58)	147 (53)	73 (69)
Mean no. natural teeth/dentate resident	14.56 (n = 445)	16.92 (n = 289)	16.71 (n = 198)	17.36 (n = 91)

Table 2: Changes in the clinical oral disorder in elders (CODE) score of residents of long-term care facilities in British Columbia between 2002 and 2012.

CODE score	2002	2012		
	All residents (n = 799)	All residents (n = 381)	Existing residents (n = 275)	New residents (n = 106)
0 (no problem), no. (%)	120 (15)	23 (6)	19 (7)	4 (4)
1 (mild problem), no. (%)	16 (2)	12 (3)	8 (3)	4 (4)
2 (moderate problem), no. (%)	375 (47)	194 (51)	138 (50)	56 (53)
3 (severe problem), no. (%)	288 (36)	152 (40)	110 (40)	42 (40)

All of the dentists working with the GDP received a half day of CODE training with patients from 1 of the authors. No intra- or inter-examiner reliability analyses were performed because of the difficulty and inappropriateness of performing multiple oral assessments on frail elderly residents.

The Statistical Package for the Social Sciences (SPSS) was used to analyze the data. Descriptive statistics were used to present the results as means and standard deviations (SD) of the variables measured. Independent samples *t* tests were used to test for significant differences between mean values. A χ^2 test was used to test for significant differences between proportion values. The 5% level of probability was considered significant for all statistical tests in this study.

The use of clinical records to extract data for analysis conformed to guidelines of the University of British Columbia Behavioral Research Ethics Board, which approved this research (reference no. H15-02348).

Results

Comparing the resident cohorts from 2002 and 2012, mean age had increased significantly from 84.9 (SD 8.8) years to 85.7 (SD 8.8) years (independent samples *t* test, $p = 0.007$), the proportion of men had increased from 31% to 35%, the mean number of medical conditions per resident had remained unchanged (2.6, SD 1.2 in 2002 compared with 2.5, SD 1.1 in 2012), but the mean number of prescribed medications had increased significantly from 4.0 (SD 1.3) to 4.6 (SD 1.0) (independent samples *t* test, $p < 0.001$). Hypertension, stroke and dementia were the most common medical disorders in LTC residents in 2002.¹⁸ The proportion of

residents who had these medical disorders in 2012 was still high: 38% for dementia, 30% for stroke and 44% for hypertension.

The percentage of new residents with some natural teeth had increased significantly from 56% to 76% (χ^2 test for comparison of proportions, $p < 0.001$) (Table 1). The mean number of teeth per new resident had significantly increased from 14.6 (SD 8.3) to 17.4 (SD 8.3) ($p < 0.001$).

Outcomes of the CODE assessment varied slightly between 2002 and 2012 (Table 2). Overall, the percentage of residents with no clinical disorders (CODE 0) decreased significantly from 15% to 4% (χ^2 test for comparison of proportions, $p < 0.001$), but those with moderate and severe conditions (CODE 2 and 3) remained high. The percentage of residents with remaining natural teeth affected by caries declined from 65% to 51%. The percentage of residents with healthy periodontium increased from 14% to 21%. The percentage of residents with natural teeth who had periodontal disease (pocket depths ≥ 5.5 mm or signs of infection) was higher in 2002 (86%) than in 2012 (79%).

Overall, the proportion of residents with a need for dental treatment increased from 62% to 75% over the 10 years, although fewer residents who were seen previously had need of care in 2012 (Table 3). The percentage of edentulous residents recommended for denture-related treatment significantly decreased (21% to 16%) between 2002 and 2012 (χ^2 test, $p < 0.001$); the need for denture-related treatment among new residents in 2012 was double that of existing residents (χ^2 test, $p < 0.004$). For residents new to the GDP, the need for restorations remained steady at 20%, with a lower percentage of existing residents requiring

Table 3: Changes in recommended treatment for residents of long-term care facilities in British Columbia between 2002 and 2012.

Treatment recommendation	2002	2012		
	All residents (62% of all residents, n = 500)	All residents (75% of all residents, n = 287)	Existing residents (72% of all residents, n = 195)	New residents (87% of all residents, n = 92)
Dental hygiene, no. (% of dentate residents)	351 (43)	263 (69)	178 (65)	85 (80)
Denture-related treatment, no. (% of edentate residents)	168 (21)	39 (10)	22 (8)	17 (16)
Restorations, no. (% of dentate residents)	165 (20)	64 (17)	43 (16)	21 (20)
Extractions, no. (% of dentate residents)	178 (22)	11 (3)	5 (2)	6 (6)

restorations (χ^2 test, $p = 0.05$). The need for extraction of teeth decreased overall from 22% to 3% (χ^2 test, $p < 0.001$), with the need for dental hygiene services increasing overall from 43% to 69% (χ^2 test, $p < 0.001$) and 80% of new residents requiring professional cleaning in 2012.

Discussion

Over the decade from 2002 to 2012, the percentage of residents with some natural teeth increased from 56% to 76%, with the mean number of retained teeth per resident increasing from 14.56 to 16.92. Other studies have also found increasing numbers of natural teeth among elderly residents in LTC.²⁰⁻²³ A study of elderly Norwegian inpatients found that edentulism declined from 71% in 1988 to 43% in 2004.²⁰ In Western Australia, the proportion of edentulous residents of nursing homes was 74% in 1987²¹ and 53% in 2000.²² A more recent Australian study found that fewer than half (46.1%) of nursing home residents were edentate in 2005–2006.²³

The 24% prevalence of edentulism reported in this study was markedly lower than the results of other studies.²⁰⁻²⁴ The Canadian Health Measures Survey (CHMS), which investigated overall health status, including dental health, in 1093 community-dwelling Canadians aged 60–79 years in 2007–2009, reported that 21.7% were edentate,⁷ which was only slightly lower than our report of 24% for 86-year-old LTC residents in 2012. The CHMS study reported that the mean number of teeth among 60–79 year-olds was 19.4 compared with our 16.9.⁷

In our study, the percentage of LTC residents with dental caries declined from 65% in 2002 to 51% in 2012. CHMS⁷ figures for the prevalence of coronal caries and root caries were 16.0% and 11.2%, respectively, for participants aged 60–79 years within the community. Thus, the prevalence of dental caries is still considerably higher in LTC residents compared with community dwellers.⁷ The prevalence of dental caries has been correlated with diets high in carbohydrates, xerostomia and poor daily mouth care among elderly LTC residents.²⁵ Chalmers and colleagues²⁶ have suggested that oral health deteriorates before admission to residential care, which may explain the difference in the prevalence of dental caries between our LTC residents and younger community-dwelling elders.

The percentage of residents with natural teeth who had periodontal disease (pocket depths ≥ 5.5 mm or signs of infection) was higher in 2002 (86%) than in 2012 (79%). A survey of elderly Nova Scotians also reported a high prevalence of severe periodontal disease: 66% of LTC residents had moderately or severely inflamed gingiva, 36% had gingival recession and 36% had deep periodontal pockets.²⁴ Based on the results of the CHMS,⁷ the proportions of older adults (60–79 years) residing in the community who had bleeding on probing and periodontal pockets > 4 mm were 23% and 30%, respectively. Treatment and prevention of gingivitis and periodontal disease continue to be a challenge for older adults both in the community and LTC, especially with their increasing number of retained natural teeth.

The challenge for nursing staff to provide daily mouth care to frail elderly LTC residents has been well documented.^{27,28-31} Residents with cognitive impairment pose a particular problem in terms of brushing teeth, let alone interdental cleaning.³²⁻³⁴ In our study, 38% of residents had dementia and 30% were affected by strokes. This high dependency on assistance for daily mouth care explains the reason for the high proportion (69%) of residents in our study who were recommended for dental hygiene treatment in 2012. Among newly admitted residents, this percentage was even higher (80%), likely reflecting neglect of self-care over a number of months or years before admission and the increased dependence on care and increased comorbidity on admission compared with 10 years earlier.

The provision of much needed dental care and dental hygiene services has become considerably more challenging in LTC settings over the years because of an increase in mean age and number of prescribed medications, number of retained natural teeth and comorbidities. It takes an experienced dental team to provide care in consultation with family, nursing staff and medical specialists.

The education and clinical training of dental professionals with respect to caring for the frail older adult must be addressed. Universities and colleges should supplement their curriculum to include geriatrics for all dental students, dental specialty students (especially dental specialists in prosthodontics) and dental hygiene students. Government funding for comprehensive dental programs to serve frail

older adults residing in LTC settings and those who receive care services at home must be considered to improve their oral health.

A limitation of this study was that only those residents consenting to an oral health assessment by the GDP in a single urban hospital group were included. Edentulous residents and those not perceiving a need for dental care are likely underrepresented. In terms of analysis, data generated by multiple dentists is problematic without inter- or intra-operator reliability. However, the use of a systematic oral health assessment tool, such as CODE, might have helped to address some variability.

Conclusion

The profile of LTC residents consenting to an oral health assessment has likely changed over the first decade of the new millennium, with an increase in mean age, number of prescription medications, number of retained natural teeth and need for dental hygiene services, but a decrease in the need for extractions.

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Acknowledgements: We wish to thank Ms. Shunhau and Mr. Wei Zhang for their invaluable help in compiling the clinical data for analysis.

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The authors have no declared financial interests.

This article has been peer reviewed.

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