

The Development, Implementation, Utilization and Outcomes of a Comprehensive Dental Program for Older Adults Residing in Long-Term Care Facilities

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ABSTRACT

This paper documents the experience of the University of British Columbia's Geriatric Dentistry Program (GDP) with emphasis on the dental treatment needs of patients during its first year of operation. The GDP provided access to dental care for residents of long-term care facilities, education for hospital staff concerning daily mouth care, education of dental students and an opportunity for research. The first year of clinical activity saw a small, yet significant, improvement in oral health for residents using the dental services. We hope that the outcomes of this new dental program for long-term care facilities will encourage dentists to provide care for this vulnerable population.

MeSH Key Words: dental care for aged; health services need & demand; nursing homes; outcome assessment (health care)

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Numerous studies have documented very poor oral health and limited access to dental care among frail older adults residing in long-term care (LTC) facilities.¹⁻⁸ As more people retain natural teeth into old age and they become dependent on others for their overall care, there is an increasing need for dental services in this setting.⁹⁻¹²

In British Columbia, the adult care regulations for LTC facilities (BC Reg 536/80 amended as BC Reg 329/97) stipulate that licensed facilities must encourage residents to be examined by a dentist, dental hygienist or denturist at least once a year and to obtain treatment as needed. Delivery of dental services within the LTC environment is the preference of families and caregivers.^{12,13} Only 19% of Vancouver dentists responding to a ques-

tionnaire reported that they delivered services to older LTC residents; the major barriers included lack of equipment, limited treatment options and low financial return.¹⁴ It is difficult for LTC residents to obtain access to dental care because most dental professionals feel uncomfortable providing treatment outside the context of a traditional dental office.^{14,15} This problem is not unique to British Columbia; dental services are irregular and mainly limited to emergency care within many LTC facilities in Canada and other countries.^{1,16-19}

The University of British Columbia (UBC) Elders' Link with Dental Education, Research and Service (ELDERS) group was formed in 1998 to address the dental needs of older adults in general, but with a particular interest

Table 1 Comparison of dental treatment recommendations from the 2000 “needs assessment” and “treatment recommended” in 2002

	Need assessment in 2000 (%)	Treatment recommended in 2002 (%)	% change
Dental treatment recommended	61	58	-5
Dental hygiene	42	38	-10
Denture-related treatment	25	19	-24
Restorations	23	17	-26
Extractions	31	20	-35
Urgency of care			
Urgent	54	54	0
Elective	43	46	7
Reassessment	3	0.2	-93
Sedation			
Oral sedation	22	14	-36
General anesthesia	29	8	-72

in those who are frail and in hospital. The ELDERS group is a multidisciplinary team of dentists, dental specialists, dental hygienists, social workers, sociologists, geriatricians and statisticians.

In 1999, Providence Health Care (PHC), an amalgamation of the 7 Catholic hospitals in Vancouver, asked the faculty of dentistry to consider providing a comprehensive dental program for their 900 elderly LTC residents. As part of the ELDERS group, the program was to provide not only much-needed service, but also opportunities for education and research. Dental professionals, LTC administrators and residents had identified 3 criteria for any program to be successful: regular oral health assessment, access to dental treatment and prevention including daily mouth care.¹² UBC’s Geriatric Dentistry Program (GDP) was developed for all residents within the PHC group with these 3 themes as the service component. The GDP also provides educational and research environments for graduate and postgraduate studies in dentistry and dental hygiene.

In this paper, we document the planning, implementation, utilization and outcomes of the GDP, with emphasis on the dental treatment needs of patients in the first year of operation.

The Geriatric Dentistry Program: Service, Education and Research

The goal of the program was to provide access to dental services for all elderly residents of PHC’s long-term care facilities. To integrate dentistry into the hospitals, attending physicians were asked to refer residents to the GDP for an oral health assessment within one month of admission and yearly thereafter as hospital policy. The

philosophy of care is outlined in *Oral Health Care for Persons in Residential Care*.²⁰

A dental hygienist played a central role in the education of the staff of the LTC facilities in daily mouth care for residents through in-service training, demonstrations and informal consultations on request. The ELDERS group’s educational material,²¹ in the form of a manual, PowerPoint presentation and interactive CD, was used. The inclusion of oral hygiene products in the hospital’s supply inventory was a key element in ensuring that care aides assisted residents in daily mouth care. These products included a 0.05% neutral sodium fluoride mouth rinse, fluoride-containing toothpaste, toothbrush, interproximal brush, dental floss, water-based lubricant, denture brush and storage container and foam mouth prop with handle.

The program provided an opportunity for dental students to observe the treatment provided by dentists and dental hygienists. This educational rotation occurred during the students’ final year, following a series of lectures and seminars that addressed aging in the context of oral health, the need for dental treatment and the provision of appropriate care for this population.

Planning: An Assessment of Treatment Need

Although previous studies have shown rampant caries, poor oral hygiene and missing teeth among those in LTC facilities, the need and the demand for dental treatment are highly variable.^{22–25} Therefore, an initial needs assessment of PHC residents was performed to estimate the potential demand for a dental service.

A comprehensive oral health assessment was provided using an index of clinical oral disorders in elders (CODE).²⁶ CODE is an Access (Microsoft Corp.,

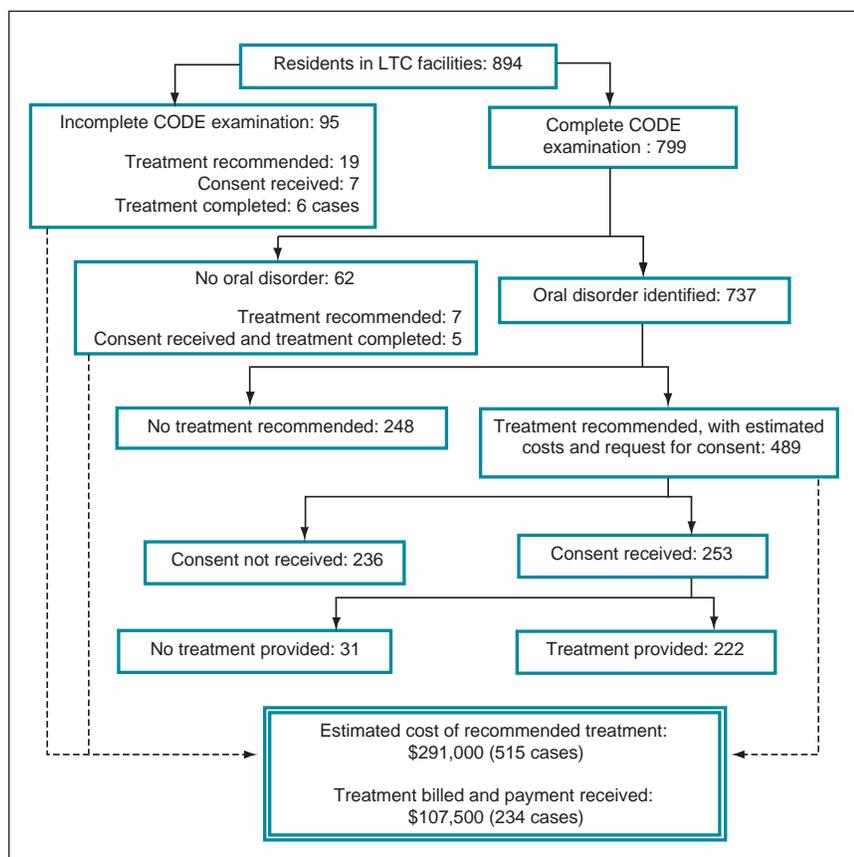


Figure 1: Outcome of initial (2002) oral health assessments. LTC = Long-term care; CODE = clinical oral disorders in elders

Redmond, Wash.) database designed to hold such clinical information as medical condition, medications, jaw function, denture quality, oral mucosal status, periodontal health and tooth status. Coronal and root caries were diagnosed using a visual-tactile approach with a front surface mirror and a no. 5 caries explorer; individual teeth were scored as having no caries, caries or caries involving the pulp. Gingivitis and periodontitis were assessed using the following criteria: periodontal pocket depths ≥ 5.5 mm, bleeding and suppuration on probing and teeth with Class III mobility. This information was also used with other clinical information to diagnose diseases and conditions. Dentists entered recommendations for treatment, urgency, clinician (dentist or referral to a specialist), the need for sedation (oral, intravenous or general anesthesia) and treatment location (bedside, hospital-based dental clinic, UBC specialty clinic or hospital operating room). The examinations were performed at bedside or in a quiet room within the LTC hospital using a portable halogen light and chair, with a compressor to provide air, water and suction. No radiographs were taken during assessment; however, once consent had been received from residents or their guardian, the dentists were able to use intraoral and

panoramic diagnostic radiographs to refine their treatment plans.

General practice residents (dentists in a one-year residency program at Vancouver Hospital) were trained to perform the CODE examination by one of the authors. The training included an explanation of the rationale behind the CODE clinical assessment questions and a clinical demonstration. No intra- or inter-examiner reliability analyses were performed because of the difficulty and inappropriateness of performing multiple oral assessments on frail elderly residents.

Assessment of the treatment needs of two-thirds (557) of the 847 residents was carried out between September 1999 and May 2000. The mean age of the residents was 85 years; 65% were women. Dental treatment needs were high: 339 (61%) of those examined needed some form of care. Among these, 54% required urgent care, 43% were in need of elective care and 3% required reassessment of an identified condition (mostly mucosal conditions). Half of the residents in need of dental treatment also required sedation or general anesthesia (Table 1).

Clinical findings and treatment plans were stored in a portable computer at the time of the oral health assessment. Information concerning the cost estimates, contact with next of kin and consents were maintained in Microsoft Access and Excel data files by the clinic manager. The databases were stripped of patients' personal identifiers and sent to the research technician for analysis. Data of interest for analysis were verified and the clinical manager was asked to obtain missing information from the patient's clinical records. Financial information related to treatment received and billed was available from the faculty of dentistry's clinic accounting database. Data analysis was performed using the SPSS for Windows version 11.0 (SSPS, Chicago, Ill.). The use of clinical records conformed to UBC Clinical Research Ethics Board Review (certificate no. C04-0429) and UBC/PHC Research Ethics Board (reference no. P04-0258).

The needs assessment information was used to develop the GDP (staffing and facilities) and associated budget, which was successfully presented to the Vancouver Coastal Health Authority (VCHA) for funding in 2001. Capital funding from the VCHA, UBC's faculty of dentistry and St. Vincent's Foundation was used to modify a dental operatory in the UBC specialist clinic to

Table 2 Number of residents (and %) for whom treatment was recommended, consented to and provided by procedure

Procedure	Treatment recommended	Treatment consented to	Treatment provided
Hygiene	343 (38)	187 (21)	173 (19)
Denture-related treatment	172 (19)	87 (10)	75 (8)
Restorations	153 (17)	77 (9)	58 (6)
Extractions	178 (20)	73 (8)	37 (4)
All residents	515 (58)	265 (30)	234 (26)

Table 3 Outcomes of cases recommended for dental treatment

Outcome	Number (%)
No response	203 (39)
Declined recommendation	34 (7)
Saw own dentist/hygienist	13 (3)
Accepted recommendation	265 (51)

treat wheelchair bound patients. Radiographic equipment (digital intraoral and panoramic radiographic equipment) was also purchased for the program. Two dental clinics were built within 2 of the larger facilities. A smaller hospital and an operating room were equipped with mobile dental units.

Implementation: A Comprehensive Dental Program

UBC’s faculty of dentistry appointed a professor as director of the GDP. A manager was employed 5 days a week to coordinate clinical activities. The manager was also responsible for scheduling students and facilitating research activities. Coordination included converting the dentist’s treatment plan into a letter outlining the recommended treatment and estimated costs. Consent for care usually involved the resident’s guardian or public trustee; rarely was a resident able to provide consent for treatment and payment. The manager scheduled treatment with the dentists and dental hygienists and billed for their services. Three experienced dentists, 3 dental assistants, 1 dental hygienist and 6 general practice residents provided oral health assessments and dental treatment.

Dentists and dental hygienists participating in the program were remunerated a percentage of net payments for treatment. The dental assistants were paid on an hourly basis. The dental hygienist was also paid one day a week to develop and implement a program to educate the hospitals’ nurses and care aides in the provision of daily mouth care. A research assistant was hired one day a week to compile and analyze the data generated from the CODE oral health assessments.

The oral health assessments were provided at no cost under the GDP program, but treatment was billed to residents on a fee-for-service basis. Costs were based on the

Association of Dental Surgeons of British Columbia’s 2002 *Fee Guide for Dental Treatment Services for Patients in Long-Term Care Facilities*, which are approximately 20% to 30% higher than those in the general practitioners’ fee guide.

Utilization of the GDP

In January 2002, the GDP began delivering dental services. In the first year, 894 residents in the 7 PHC hospitals received an oral health assessment (Fig. 1). Residents affected by Alzheimer’s disease were less likely to receive a complete CODE examination (80% compared with 90% of other residents, $p < 0.05$ by chi-square test). The mean age of the residents seen was 86 years (range 53–104); two-thirds were female. On average, they had 3 medical disorders — mostly strokes, hypertension and dementia — and were taking 4 medications per day.

A total of 515 (58%) residents were recommended for dental treatment by the dentists, 265 (30%) accepted the recommendation and 234 (26%) received treatment (Table 2). Only 7% of residents or their guardians refused treatment but 39% did not respond to written or telephone contact (Table 3). In almost two-thirds of cases, consent for treatment was given by close relatives, mostly by children and grandchildren. Public trustees responded to 10% of the requests for treatment consent, with consent provided by the residents themselves in only 10% of cases (Table 4). A third of the residents for whom treatment plans and costs were accepted did not receive care. They were identified in the dental charts as uncooperative during attempts to treat, change of treatment plan by dentists or deceased before care provided (Table 5).

Fifty-eight per cent of residents were recommended for reassessment or referral to a dental specialist, mostly for oral medicine consultation (12 cases). The dentist considered that 268 residents required urgent care, 225 required elective treatments and one resident was to be reassessed for a specific condition. Fewer than a quarter of the residents needing dental treatment were referred for intravenous sedation or general anesthesia (Table 1).

Among the 234 residents who received treatment during the year, 66 received treatment at bedside, 145 in

Table 4 Consent for treatment and payment

	Number consenting to treatment (%)	Number consenting to payment (%)
Self	27 (10)	14 (5)
Spouse	27 (10)	27 (10)
Siblings	15 (6)	15 (6)
Children (and grandchildren)	129 (49)	127 (48)
Other relatives	32 (12)	29 (11)
Public trustee/ guardian	26 (10)	41 (16)
Health insurance carriers		2 (1)
Others	3 (1)	3 (1)

Note: Percentages may not total 100% due to rounding.

hospital-based dental clinics, 11 were referred to the UBC specialty clinic and 12 received care in an operating room under general anesthesia. Throughout the year, additional examinations (emergency and reassessment examinations) were performed for 24 residents, 12 of whom received treatment.

The cost of the recommended treatment for the 515 residents totaled \$291,000; treatment consented to and delivered to the 234 who received treatment was valued at \$107,500. The recommendation for treatment was a clinical decision made by the attending dentist irrespective of the completion of a CODE examination; 19 of the 95 residents with an incomplete CODE examination received a recommendation for treatment (Fig. 1). Direct restorations, dental hygiene and denture relining or repair each generated approximately 20% of the total revenue (Table 6).

Outcomes of the GDP

The LTC residents who had a CODE oral health assessment in 2002 and were re-examined in 2003 were included in the analysis of the program’s clinical outcomes. Change in oral health status was evaluated by measuring CODE scores, including caries and periodontal health status, and other aspects of dentition (teeth, prostheses, etc.). Caries status was the score for the most severe caries and periodontal status was the most severe periodontal score (Table 7). An upward change in the most severe score was considered an improvement and a downward change was considered worsened. If there was no change in the worst score, the numbers of teeth with the worst score were compared to assess differences between the 2 oral health assessments.

Of the 894 residents seen in 2002, 564 (63%) were re-examined using the CODE oral health assessment tool in

Table 5 Reason for no treatment after consent

Reason	No. of residents
Change in treatment plan	4
Uncooperative resident	4
Resident deceased	4
General anesthesia inappropriate	3
Resident too ill	3
Resident discharged from hospital	2
Transportation problem	1
No treatment yet performed	10
Total	31

2003; of these, 509 had complete CODE scores available for analysis. In 70% of cases, the same dentist carried out the 2 examinations. Of the 330 residents not available for re-examination in 2003, 59% had deceased, 14% had been transferred to other facilities, 3% had been discharged and 24% had incomplete examinations or were too ill to be examined.

The dentition, CODE scores, caries and periodontal status of the 509 residents were similar at baseline and after 1 year. Overall 86% of residents showed no change in their CODE scores; no changes were seen in the prevalence of caries (60%) or periodontal disease (77%) (Table 8). The proportions of residents with overall CODE improvements and deteriorations were similar. However, more residents who received treatment showed improvement than deterioration in caries and periodontal status.

Discussion

The outcomes of the first year of GDP activity were based on assessment of residents in a mixed intermediate and extended LTC hospital, thus may not be applicable to other populations in residential care. Almost all residents in the PHC LTC hospitals received an oral health assessment as part of the hospital admittance policy; this approach may not work in other LTC institutions.

The proportion of residents recommended for treatment in 2002 (58%) was similar to that identified during the initial needs assessment (61%). The recommendation for denture-related treatment was 24% lower and for extraction of teeth and roots was reduced by 35%. This may reflect a more pragmatic approach taken by the experienced dentists providing care for frail elders compared with the inexperienced dentists (general practice residents) who performed the initial needs assessment in 1999.

The GDP provided the oral health assessment, dental hygiene and most denture-related treatment within the LTC facilities. For restorative and surgical procedures, the dentists preferred to treat patients in a clinic setting, as has

Table 6 Treatments and associated payment

Treatment	No. of treatments	Payment	
		\$	% of total
Restoration	58	22,775	21.2
Dental hygiene — scaling	173	21,821	20.3
Denture relining and repair	53	20,408	19.0
New denture	19	19,821	18.4
Extraction	37	17,700	16.5
Dental hygiene — fluoride application	160	2,882	2.7
Extraction	34	1,342	1.2
Other	10	389	0.3
Dental hygiene — root planing	3	284	0.3
Denture adjustment	3	76	0.1
Total	234	107,500	100.0

Table 7 Comparison of the oral health status of LTC residents in 2002 and 2003

Measure of oral health	Number of residents (%)	
	2002	2003
Dentition		
Completely edentate	214 (42)	221 (44)
Edentate in one arch	99 (20)	92 (18)
Partially edentate or dentate in both arches	193 (38)	193 (38)
Dentures (complete and partial)		
No denture	273 (54)	282 (56)
Denture(s)	233 (46)	224 (44)
CODE score		
0	44 (9)	37 (7)
1	10 (2)	11 (2)
2	272 (54)	280 (55)
3	180 (36)	178 (35)
Caries		
No caries	96 (33)	106 (36)
Caries not involving pulp	83 (28)	68 (23)
Caries involving pulp	113 (39)	118 (40)
Periodontium		
Healthy	110 (38)	111 (38)
Bleeding gingiva on probing pockets	163 (56)	159 (54)
Deep pocket(s), ≥ 5.5 mm	11 (4)	14 (5)
Purulent discharge	3 (1)	3 (1)
Vertically depressible tooth (teeth), Class III mobility	5 (2)	5 (2)

CODE = clinical oral disorders in elders
 Note: In some groups, percentages do not total 100% due to rounding.

been noted by MacEntee and others.¹⁴ The GDP facilitated treatment delivery by building satellite dental clinics in 2 hospitals and equipping another designated room with mobile dental equipment. The GDP's ability to provide dental treatment under intravenous sedation or general anesthesia created a comprehensive service.

The consent for treatment and payment for LTC residents typically involved the resident, resident's family, public trustee and others; thus, the dental team had to ensure effective communication among the various parties.^{27–29} The consent process is time consuming but critical in providing appropriate care in a timely manner. The GDP clinical manager was responsible for communication among the residents, their families, the LTC personnel and the dental team, allowing the dentists and dental hygienists to focus on delivering care. Despite multiple attempts to contact non-responding family members by mail and telephone, 40% did not respond — a considerable barrier to providing dental treatment for LTC residents.

Treatment acceptance rate was 51% (256 out of 515 recommendations), similar to Mojon and MacEntee's¹⁰ theoretical determination of the propensity for treatment among residents of LTC facilities. Treatment most often consisted of dental hygiene with scaling and topical fluoride application. Prosthodontic services (denture fabrication, repair and relining) were recommended for a third of the residents, considerably fewer than noted in previous reports.^{10,13,30} Dental hygiene, restorative and denture-related treatment generated similar revenues. This emphasis on tooth-related treatment may reflect the trend toward retention of natural teeth into old age.

Although the GDP achieved its goal of providing access to dental services for all PHC's LTC facilities, only a quarter of the residents received treatment. Further analysis is needed to explain why a third of the residents with identified oral disorder were not recommended for

Table 8 Change in oral health and treatment status between 2002 and 2003

	Number of residents (%)			Total
	Improved	No change	Worsened	
CODE score	27 (5)	440 (86)	42 (8)	509
Receiving treatment	21 (14) ^a	118 (78) ^a	12 (8) ^a	151
No treatment	6 (2) ^a	322 (90) ^a	30 (8) ^a	358
No disorder (CODE score 0)	N/A	27 (61)	17 (39)	44
Treatment not recommended	3 (2)	150 (96)	3 (2)	156
Treatment not received	3 (2)	145 (92)	10 (6)	158
Caries status				
Dentate residents	54 (18)	175 (60)	63 (22)	292
Receiving treatment	27 (22) ^b	78 (64) ^b	17 (14) ^b	122
No treatment	27 (16) ^b	97 (57) ^b	46 (27) ^b	170
No caries in 2002	N/A	9 (82)	2 (18)	11
Treatment not recommended	3 (8)	26 (72)	7 (19)	36
Treatment not received	24 (20)	62 (50)	37 (30)	123
Periodontium				
Dentate residents	36 (12)	226 (77)	30 (10)	292
Receiving treatment	20 (16) ^c	93 (76) ^c	9 (7) ^c	122
No treatment	16 (9) ^c	133 (78) ^c	21 (12) ^c	170
No periodontal disease in 2002	N/A	10 (91)	1 (9)	11
Treatment not recommended	3 (8)	31 (86)	2 (6)	36
Treatment not received	13 (11)	92 (75)	18 (15)	123

CODE = clinical oral disorders in elders; N/A = not applicable.

Note: In some groups, percentages do not total 100% due to rounding.

^aSignificant difference between those receiving treatment and those not treated: $p < 0.01$ (chi-squared = 31.69; $df = 2$).

^bSignificant difference between those receiving treatment and those not treated: $p < 0.05$ (chi-squared = 7.73; $df = 2$).

^cNo significant difference (chi-squared = 4.56; $df = 2$).

treatment. Finances may be a barrier to consenting to dental care at any age, but may be a particular problem for those on fixed incomes. Although it is generally agreed that appropriate treatment for older LTC residents should be based on realistic treatment need,^{24,31} the question of what constitutes appropriate treatment remains unresolved. Recommendations for dental hygiene were more acceptable than those for restorations and extractions.

The dentist and dental hygienist were remunerated on a fee-for-service basis, which was an incentive to provide care and protected the program from budgetary overruns. Dentists providing services to LTC populations have been motivated by a sense of professional and public responsibility.¹⁴ However, innovative financial schemes such as the GDP need to be considered to attract dentists and dental hygienists while maintaining affordability of care for LTC residents.

The overall CODE scores, caries and periodontal disease status were similar for residents examined in 2002 and 2003. However, more residents receiving dental treatment showed an improvement in overall CODE scores, a decrease in caries and an improvement in periodontal

health. Oral diseases may have progressed (worsened) or regressed (improvement) over the year with or without dental intervention. Deterioration in oral health was observed among the residents over the first year of operation. This is in agreement with longitudinal studies on oral health among older adults.³²⁻³⁴ The program gathered statistics on the residents receiving treatment under the program; however, some residents (3%) received care from community dentists. The observed changes in oral health status might also be the result of inter- and intra-examiner inconsistencies because oral health assessments were not calibrated or standardized.

The GDP was seen by PHC staff as valuable, delivering excellent quality of care and having positive impact on residents' quality of life.³⁵ The hospital staff (care aides, nurses and administrators) reported that the most significant component of the program was the provision of oral health assessment to all PHC residents and informing residents and their families when dental treatment was deemed necessary. Although the nursing staff supported our efforts, they continue to provide nursing oral health assessments independent of our program. The nursing



Figure 2: Dr. Sandra Huish and Melanie Rockwell provide dental care to a resident of a long-term care facility at the UBC specialty clinic.

assessment form has been modified with our input and a referral mechanism is in place to the GDP.

As so few residents used the dental service for treatment of existing caries and periodontal disease, perhaps emphasis should be placed on prevention of these diseases. This may be difficult given the time constraints on nursing staff, the low priority of daily mouth care and the poor oral hygiene among LTC residents.^{12,36–39} Ultimately, the GDP should be evaluated with respect to improving the quality of life of the PHC LTC residents

Informal feedback from GDP staff has been positive and their attitude is reflected in their willingness to work within the program.

Another approach to evaluating the effect of the GDP would be to use sociologic indicators in the form of patient satisfaction.^{39,40} However, this may not be practical as it is difficult to solicit the subjective appraisal of functional capacities and impact given the various degrees of cognitive impairment in this population.

The GDP attempted to address the 3 criteria for success identified by dental professionals, LTC administrators and residents — regular oral health assessment, access to dental treatment, and prevention including daily mouth care¹² — and has been well received by the PHC hospital staff, our dental team and residents' families. We hope to refine the program over time to create a centre of excellence in geriatric dentistry for VCHA that could be adapted for use in other jurisdictions.

Conclusion

Development and implementation of a comprehensive dental service within the LTC setting is possible. The GDP provided access to dental care for residents, education for hospital staff concerning daily mouth care, education of dental students and general practice residents and an opportunity for research. A better understanding of factors influencing use of the GDP would be of value. The first year of clinical activity showed a small, yet significant

improvement in oral health among the PHC residents using the dental services. We hope that our report on this new program for LTC facilities will encourage dentists to provide care for this vulnerable population (Fig. 2). ♦

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