

Dental Insurance and Treatment Patterns at a Not-For-Profit Community Dental Clinic

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Abstract

Objectives: To examine patient demographics, distance traveled and dental-related treatment provided according to type of dental insurance at a large, not-for-profit community dental clinic (CDC) in Vancouver, Canada.

Methods: Using electronic dental records, we assessed the use of private and government-sponsored (public) dental insurance at the CDC in 2014 and 2015 at the appointment and procedure levels. Study variables included patient demographics, distance traveled, type of treatment provided, type of dental insurance and cost of treatment.

Results: Examination of records from 9524 appointments involving 16 639 procedures revealed that 44% (4190 appointments) were made by patients with private insurance and 31.4% (2995) by those with public insurance. Patients with private dental insurance were 1.27 times more likely ($p < 0.001$) to have restorative treatment than those with public-sponsored dental insurance. Procedures involving tooth extraction were 14.2 times more likely ($p < 0.001$) to be performed in patients with public insurance than those with private insurance.

Conclusions: Access does not equal equity; although the CDC enables access by various populations, its ability to provide equitable treatment is compromised by external factors. CDCs may have a vital role in oral health equity; however, dental treatment continues to be dictated by financial reimbursement.

Good oral health is essential to overall health and quality of life. Yet in Canada, oral health care falls mainly outside the publicly funded health care system with most of the \$14 billion dollars spent annually on dental care coming either directly, as out-of-pocket expenses, or indirectly, through private dental insurance plans.^{1,2} Less than 6% of all dental expenditures is publicly financed in Canada, and this is limited to specific population groups at the regional and municipal levels.³ At most private dental offices, fewer than 10% of patients have publicly financed dental insurance.⁴ Only about a third of low-income Canadians have private insurance, in contrast with over three-quarters (78%) of those with higher income.³

Sufficient disposable income and the availability of dental insurance are the 2 most important drivers of dental care use for most Canadians.⁵ Those with low incomes or no insurance are 3–4 times more likely than those with higher incomes to report cost as a barrier to visiting a dentist or accessing recommended dental treatment.^{6–8} As household debt continues to soar,⁹ middle-class Canadians are now also facing affordability issues in accessing dental care, pointing to an ever-growing gradient of oral health inequities.¹⁰ However, having publicly funded dental insurance does not always guarantee access to dental care.¹¹ Some private dental offices may limit the number of patients with this type of insurance or not accept them at all, because of low reimbursement rates or troublesome paperwork¹² or simply discrimination.¹³

Overall, the capacity to purchase and benefit from oral health care services is lowest where the need for care is greatest,¹⁴ with oral disease concentrated among poor and disadvantaged groups.¹⁵ Recognizing that oral health inequities are experienced by vulnerable groups in Canada, recommendations have been made to improve access to oral health care. Some of these recommendations have included enhancing the capacity of alternative service settings, such as community dental clinics (CDCs).¹

British Columbia has experienced a province-wide proliferation of not-for-profit CDCs; more than 20 CDCs are in operation in an attempt to close the gap between services and care to those most in need.^{11,16} Although many of these clinics are located in areas where the population in need is most concentrated, some patients may have to travel long distances, as found by Dudko and colleagues.¹⁷ The location of some CDCs may require a journey longer than the 17 km suggested as an acceptable traveling distance¹⁸; the greater the distance, the less likely people are to seek dental care.¹⁹

As the ability to afford dental care seems to dictate use,²⁰ various types of insurance seem to dictate treatment modalities.¹⁹ However, little is known about the scope of treatment provided at CDCs under a not-for-profit model for the population groups facing inequities. Overall, the impact

of CDCs as an alternative service model to decrease oral health inequities remains unknown.

We set out to examine demographics (e.g., age and gender), distance traveled and dental-related treatment received according to type of dental insurance at both the appointment and procedure levels. The study hypotheses were that CDCs, such as the one studied here, are indeed an alternative service model and, therefore, more than 6% of its dental expenditures would be publicly financed, more than 10% of its appointments would be made by patients with publicly financed dental insurance and patients would travel more than 17 km on average for their appointments at the CDC.

Methods

Vancouver houses the largest not-for-profit CDC in the province and one of the largest in the country, with an active pool of almost 7000 patients a year. At the time of the study, the clinic's paid staff included 7 dentists, 9 dental hygienists and a number of certified dental assistants and administrative personnel. It operates full time (and on weekends), providing the full scope of dental services within a community health centre alongside medical, nursing and pharmaceutical counseling services.

We collected information at appointment and procedure (e.g., type of treatment provided) levels from this CDC's computer data record system over a 2-year period. Although a limitation of this study, the focus on appointment and procedure rather than on the patient was necessary to maintain anonymity and because the electronic record available to this study was based on those two variables. That is, patients are booked for an appointment to see the dentist and/or the dental hygienist; a patient could, then, have seen both professionals on the same day, in which case, 2 appointments would be generated on the electronic record of the day. The same patient could have had more than 1 procedure done, which would imply multiple entries (e.g., an entry for 1 filling in 1 tooth, another for another filling in another tooth and another for dental cleaning; 3 procedures for the same patient with 2 appointments on the same day). However, despite the way the study was organized, we are aware that patients, not appointments, experience disadvantages and inequities.

De-identified electronic records of all appointments of patients who had been at the clinic from January 2014 to December 2015 were accessed. This period was chosen because, in British Columbia, some publicly funded dental insurance programs have a 2-year cycle commencing on January 1 of every odd-numbered year and ending on the even year to enable the exploration of clustering usage. The limit of 2 years was justified given a sample calculation of 8055 appointments to obtain a 90% confidence level and

a margin of error of 1%, assuming that at least 50% of the appointments would involve a procedure (e.g., treatment).

At the appointment level, data included such variables as patient demographics (e.g., age in years; sex: male, female or other; and the first 3 characters, 2 letters and 1 number, of the postal code of residence), type of dental insurance (e.g., public; private/employer sponsored; dual insurance, as a combination of private and public sponsored dental plans; or out of pocket/no insurance), distance traveled (calculated from the postal code of the clinic and the first 3 characters of the patient's postal code manually entered into GlobeFeed's distance calculator,²¹ types of treatments provided (including examination, preventive, restorative/endodontic, extractions and rehabilitation with fixed prosthodontics and rehabilitation with removable/complete dentures) and total cost (e.g., amount billed to insurance and to the patient and the amount that the clinic absorbed as pro-bono work if applicable). Information on patients' income, employment status and educational level, as well as oral health status (e.g., number of teeth, condition of existing teeth and prosthodontic work and mucosal and periodontal condition) was not available from the clinic's electronic recording system, and this absence constitutes another limitation of this study.

Public dental insurance included Non-Insured Health Benefits (NIHB) for First Nations and Inuit in British Columbia; the provincial Ministry Employment Income Assistance (MEIA) for those receiving income assistance and those receiving medical disability assistance; the Medavie Blue Cross for refugees under the Interim Federal Health Program; and the BC Healthy Kids Program for children under 19 years in low-income families. Although grouped altogether, these public insurance programs vary in terms of the services they cover, which can range from basic fillings and extractions for Medavie Blue Cross recipients, to fixed prosthodontics and orthodontic treatment for those who are eligible for the NIHB program; such variation likely influenced the treatments provided. Private insurance was also grouped but not distinguished given the variation in range and limitation of benefits of the various plans and member eligibility restrictions. For example, the same insurance company may offer different plans to different individuals and might have different arrangements with employers. This more detailed information was not readily available in the clinic's electronic system and could not be explored.

Data were analyzed statistically at the appointment and procedure levels to compare the two types of insurance and the following variables: gender, age, type of treatment received and distance traveled. Given the exploratory nature of the study, data were primarily analyzed with descriptive statistics (means and standard deviations), while multivariate analysis in the form of relative risk allowed us to measure probability of a given parameter (i.e., type of treatment, type of filling, etc.) occurring in 1 group

compared with another (i.e., males vs. females, private vs. public insurance, etc.). SPSS 22.0 (IBM SPSS Statistics for Windows, Armonk, NY: IBM Corp) was used for statistical analyses, and the significance level was set at $p < 0.05$.

The University of British Columbia Behavioural Research Ethics Board (H15-00316) approved this study.

Results

The 2 years of data included 9524 appointment records (average of 400 appointments/month) comprising 16 636 procedures. Some records pertain to the same patient with multiple appointments and multiple procedures.

Among the 9524 appointments, 4420 pertained to men, 5081 to women and 23 to those who self-identified as other (**Table 1**). The average age of the patients was 33.45 years (SD 9.34 years), with patients as young as 6 months and as old as 98 years. Among the appointments made by those older than 65 years, about 61.5% (1429) involved patients with no insurance and were paid for out of pocket (**Table 1**).

Table 1: Number of appointments by gender, age and distance traveled according to type of insurance.

	Type of insurance			
	Public* (n = 2995)	Private† (n = 4190)	Other‡ (n = 2339)	Total (n = 9524)
Gender				
Male	1817 (41.1%)	1498 (33.8%)	1105 (25.1%)	4420
Female	1956 (38.5%)	1891 (37.2%)	1234 (24.3%)	5081
Other	20 (86.8%)	3 (13.2%)	0	23
Age				
< 6 months	116 (58.0%)	65 (32.5%)	19 (09.5%)	200
6 months to 5 years	329 (55.9%)	235 (40.0%)	24 (04.1%)	588
6–19 years	337 (33.9%)	503 (50.7%)	152 (15.4%)	992
20–65 years	1954 (36.1%)	2449 (45.4%)	998 (18.5%)	5401
> 65 years	205 (08.7%)	709 (30.3%)	1429 (60.0%)	2343
Distance traveled (km)				
< 17	1050 (38.0%)	1543 (55.9%)	168 (06.1%)	2761
17–24	2773 (71.0%)	860 (22.0%)	272 (07.0%)	3905
25–50	1105 (55.2%)	805 (40.2%)	90 (04.5%)	2000
> 50	572 (60.0%)	350 (36.7%)	31 (03.5%)	953

*Public dental insurance includes the Non-Insured Health Benefits Program, Ministry Employment Income Assistance, Medavie Blue Cross and the BC Healthy Kids Program.
†Private dental insurance refers to employer-sponsored benefits or privately purchased dental insurance.

‡Other refers to those without insurance or with dual insurance.
Percentages refer to the rows (e.g., age, gender, distance traveled) according to type of insurance

The CDC accepts all types of public and private insurance, including co-payments, deductibles and co-insurance. Almost half of the appointments (4190) were made by patients with private insurance, personally purchased (168) or via their employers (4022). About a third (2995) of the appointments were made by patients with public insurance, while 1810 were made by patients without insurance and 539 pertained to those with dual insurance as a combination of private and public dental plans. Of appointments made by patients with public dental benefits, 1386 were MEIA benefits, 673 had NIHB coverage, 898 had BC Healthy Kids benefits and 37 were from the Interim Federal Health Program.

Appointment records indicated that patients traveled, on average, 19.5 km to access the clinic (range 0–250 km). Appointments made by patients with an out-of-province postal code were excluded to avoid skewing the data. About 20% of the appointments were made by patients traveling 25–50 km (of these, 1105 had public insurance). Among the appointments made by those who traveled more than 50 km (953), 572 were covered by public insurance (Table 1). Among appointments where patients traveled ≥ 50 km, there was a non-significant difference between those with publicly sponsored dental plans and those with private dental plans (RR 1.05; 95% CI 0.93–1.19; $p = 0.38$). Inversely, for appointments covered by private dental insurance, patients were 2.27 times more likely (95% CI 2.12–2.42; $p < 0.001$) to reside < 17 km from the clinic compared with publicly sponsored dental plans.

In terms of services provided per appointment, it is important to note that the numbers and percentages presented in Table 2 are non-cumulative, as the same patient might have received multiple procedures during the same appointment. In turn, data were analyzed per procedure, and 988 out of 5584 (17.7%) publicly insured procedures involved preventive services, such as dental hygiene compared with 3330 out of 8069 (41.3%) privately insured procedures (Table 2). Far more extractions were carried out on patients with public insurance compared with those with private insurance. In terms of procedures involving tooth extraction compared with all other procedures combined, those with public dental insurance were 14.2 times more likely to have a tooth extracted compared with those with a private dental plan (95% CI 11.29–17.43; $p < 0.001$).

There were no statistical differences between genders (male and female) or age groups within an insurance group when looking into the type of fillings received at the appointment level.

Comparing removable versus fixed prosthodontic treatments (to replace missing teeth), appointments by patients with private insurance were 4.67 times more likely (95% CI 4.08–5.34; $p < 0.001$) to include fixed prosthodontic treatment compared with those by patients with public

insurance. Appointments made with publicly insured patients were 4.92 times more likely (95% CI 4.38–5.52; $p < 0.001$) to involve removable prosthodontic treatments compared with those with privately insured patients.

Discussion

At the CDC studied here, more than 30% of procedures are provided to patients with public insurance. Although analysis was at the appointment and procedure levels, this percentage exceeds the 10% average for Canadian dental offices.⁴

Appointments made by patients with public dental insurance involved longer distance traveled to access dental services at the CDC (based on patient postal codes) compared with those made by patients with private insurance. The average distance traveled to access dental services in this study was 19.5 km compared with the average of 17 km suggested by Dudko and co-workers,¹⁷ and by Probst and colleagues.¹⁸

In terms of the type of tooth fillings on posterior teeth (molars), the vast majority of teeth were restored with white composite resin (which is more expensive than the alternative silver amalgam) despite some insurance not covering the additional cost.

People with publicly sponsored dental insurance were more likely to have a tooth extracted compared with those with private dental insurance. This discrepancy may suggest a social gradient in dental care treatment, as found by La Torre and colleagues²² and others.²³

As discussed by Manski and colleagues²⁰ and by Higuera and Prada,¹⁹ if the delivery of dental care remains private and for-profit, then dental treatment may continue to be dictated by financial reimbursement and not by need.

Table 2: Procedures according to type of insurance.

Services provided	Type of Insurance*		
	Public† (n = 5584)	Private‡ (n = 8069)	Total (n = 13 653)
Preventive services (including dental hygiene)	988 (22.8%)	3330 (77.2%)	4318
Tooth extraction	974 (90.7%)	99 (09.3%)	1073
Restorative treatment	2612 (45.6%)	3118 (54.4%)	5730
Silver amalgam	209 (52.7%)	187 (47.3%)	396
White composite	2403 (45.0%)	2931 (55.0%)	5334
Prosthodontic treatment	1010 (39.9%)	1522 (60.1%)	2532
Removable prosthesis	830 (76.5%)	254 (23.5%)	1084
Fixed prosthesis	180 (12.4%)	1268 (87.6%)	1448

*Includes only public and private insurance data, and excludes 2987 procedures for people without insurance or with dual insurance. The numbers presented are non-cumulative, as the same patient might have received multiple treatment modalities at the same appointment.

†Public dental insurance includes the Non-Insured Health Benefits Program, Ministry Employment Income Assistance, Medavie Blue Cross and the BC Healthy Kids Program.

‡Private dental insurance refers to employer-sponsored benefits or privately purchased dental insurance.

Percentages refer to the rows (e.g., services provided) according to type of insurance.

Perhaps, it is time for dental education and the profession to consider the impact of the decreasing number of dental health professionals who are community minded²⁴ and who may go beyond the drill-fill-bill philosophy.²⁵ In fact, Nash²⁶ cautioned about the danger of monetary gain being in tension with evidence-based and cost-effective clinical care, which poses further ethical concerns in the practice of dentistry. However, it remains unknown whether CDCs alone will be able to provide health care interventions to reduce oral health inequities within the current business model of dentistry²⁷ despite efforts of organized dentistry “to work closely with the private sector to ensure that dental care is adequately insured and funded and that there are minimal barriers to care”² and that patients can benefit from dental treatments.²⁸ Although the results of this study show a different pattern of care for those with public insurance compared with those with private insurance, such patterns might be influenced by the extent of coverage offered by each insurance plan, by the philosophy of care of providers, by patients' preferences and by the provision of care established by the clinic guidelines. Further studies are needed to unravel such pattern discrepancies.

Limitations

This study uses a nonconventional method to compare utilization by appointment and procedure, as entered into an electronic database, rather than by patient. Some patients likely had multiple appointments and procedures, which might have skewed the data. The broad classification of plans as private or public may also pose issues, as the benefits and eligibility requirements for those plans varies greatly. This study focuses on the comparison between public and private insurance payers; thus, appointments made by people with dual (public and private) insurance or no insurance were excluded, and this likely influenced the data.

Because patients' charts were not accessed, there was no information on the initial oral health status of the 2 insurance groups. There was also no information on whether all recommended or needed treatments were received.

Most of the variables that are primary drivers of utilization were not available, including income, employment status, education level and oral health status. Hence, this study did not aim to discuss whether patients seen at the CDC did actually face care challenges or even discrimination from other dental practices; the extent to which the dental providers working at the CDC were actually community minded and went beyond the drill-fill-bill philosophy to maximize patients' limited insurance plans; or whether CDCs are the right choice for dental providers who are graduating with significant educational debts.

This study involved only one CDC; thus, comparison with and generalizability to other clinics is not warranted.

Conclusions

The study hypotheses were confirmed: at the CDC studied, more than 6% of dental expenditures were publicly financed, more than 10% of its patients had publicly financed dental insurance and patients traveled > 17 km, on average, to reach the clinic. Although the CDC might have enabled access to care, its ability to provide equitable treatment appears to be compromised by external factors, mainly insurance benefits. CDCs may have a vital role to play in oral health equity, but dental treatments continue to be dictated by financial reimbursement. Attention to the limits of public dental insurance is necessary for equitable access to include equitable treatment and, ultimately, equitable oral health outcomes.

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References

1. Improving access to oral health care for vulnerable people living in Canada. Ottawa: Canadian Academy of Health Services; 2014 [accessed 2018 Mar. 2]. Available from: http://cahs-acss.ca/wp-content/uploads/2015/07/Access_to_Oral_Care_FINAL_REPORT_EN.pdf
2. The state of oral health in Canada. Ottawa: Canadian Dental Association; 2017 [accessed 2019 Oct. 3]. Available from: <http://www.cda-adc.ca/stateoforalhealth/files/TheStateofOralHealthinCanada.pdf>
3. Report on the findings of the oral health component of the Canadian Health Measures Survey 2007–2009. Ottawa: Health Canada; 2010 [accessed 2017 Dec. 14]. Available from: <http://publications.gc.ca/site/eng/369649/publication.html>
4. Quiñonez CR, Figueiredo R, Locker D. Canadian dentists' opinions on publicly financed dental care. *J Public Health Dent.* 2009;69(2):64-73.
5. Locker D, Maggiri J, Quiñonez C. Income, dental insurance coverage, and financial barriers to dental care among Canadian adults. *J Public Health Dent.* 2011;71(4):327-34.
6. Brondani M, Ahmad SH. The 1% of emergency room visits for non-traumatic dental conditions in British Columbia: misconceptions about the numbers. *Can J Public Health.* 2017;108(3):e279-81.
7. Wallace BB, MacEntee MI, Pauly B. Community dental clinics in British Columbia, Canada: examining the potential as health equity interventions. *Health Soc Care Community.* 2015;23(4):371-9.
8. Figueiredo RL, Hwang SW, Quiñonez C. Dental health of homeless adults in Toronto, Canada. *J Public Health Dent.* 2013;73(1):74-8.
9. Parkinson D. Canadian household debt soars to yet another record. *Globe and Mail.* 2016;11 Mar. [accessed 2017 Dec. 11]. Available from: <http://www.theglobeandmail.com/report-on-business/economy/canadians-debt-burden-still-growing-hits-record-in-fourth-quarter/article29172712/>
10. Ramraj C, Sadeghi L, Lawrence HP, Dempster L, Quiñonez C. Is accessing dental care becoming more difficult? Evidence from Canada's middle-income population. *PLoS One.* 2013;8(2):e57377.
11. Bedos C, Brodeur JM, Boucheron L, Richard L, Benigeri M, Olivier M, et al. The dental care pathway of welfare recipients in Quebec. *Soc Sci Med.* 2003;57(11):2089-99.
12. Wallace BB, MacEntee MI. Access to dental care for low-income adults: perceptions of affordability, availability and acceptability. *J Community Health.* 2012;37(1):32-9.
13. Bedos C, Brodeur JM, Levine A, Richard L, Boucheron L, Mereus W. Perception of dental illness among persons receiving public assistance in Montreal. *Am J Public Health.* 2005;95(8):1340-4.
14. Leake JL, Birch S. Public policy and the market for dental services. *Community Dent Oral Epidemiol.* 2008;36(4):287-95.
15. Hart JT. The inverse care law. *Lancet.* 1971;1(7696):405-12.
16. Wallace BB, MacEntee MI. Perspectives on community dental clinics and oral health inequities in British Columbia. *J Health Care Poor Underserved.* 2013;24(2):943-53.
17. Dudko Y, Kruger E, Tennant M. Geographic distribution of point-in-time access to subsidised dental services in Western Australia. *Aust J Prim Health.* 2016;22(6):569-75.
18. Probst JC, Laditka SB, Wang JY, Johnson AO. Mode of travel and actual distance traveled for medical or dental care by rural and urban residents. Columbia, S.C.: South Carolina Rural Health Research Center; 2006 [accessed 2018 Feb. 21] https://sc.edu/study/colleges_schools/public_health/research/research_centers/sc_rural_health_research_center/documents/61modeoftravelandactualdistancetraveled2006.pdf
19. Higuera L, Prada SI. Barrier to access or cost share? Coinsurance and dental-care utilization in Colombia. *Appl Health Econ Health Policy.* 2016;14(5):569-78.
20. Manski RJ, Hyde JS, Chen H, Moeller JF. Differences among older adults in the types of dental services used in the United States. *Inquiry.* 2016;53.
21. Distance calculator and driving directions Canada. Wanawadi, Pune, Maharashtra, India: GlobeFeed; 2018. Available from: https://distancecalculator.globefeed.com/Canada_Distance_Calculator.asp
22. La Torre G, Romeo U, Iarocci G, Brugnoletti O, Semyonov L, Galanakis A, et al. Socio-demographic inequalities and teeth extraction in the last 12 months in Italy. *Ann Stomatol (Roma).* 2014;5(4):131-5.
23. Neto JM, Nadanovsky P. Social inequality in tooth extraction in a Brazilian insured working population. *Community Dent Oral Epidemiol.* 2007;35(5):331-6.
24. Brondani MA, Pattanaporn K, Aleksejuniene J. How can dental public health competencies be addressed at the undergraduate level? *J Public Health Dent.* 2015;75(1):49-57.
25. Raven G. Professional responsibility [letter to the editor]. *Br Dent J.* 2002;192(12):668-9.
26. Nash D. Money in tension with ethics: a commentary. *Pediatr Dent.* 2017;39(7):431-3.
27. Wallace B, Browne AJ, Varcoe C, Ford-Gilboe M, Wathen N, Long PM, et al. Self-reported oral health among a community sample of people experiencing social and health inequities: cross-sectional findings from a study to enhance equity in primary healthcare settings. *BMJ Open.* 2015;5(12):e009519.
28. Maroneze MC, Ardenghi DM, Brondani M, Unfer B, Ardenghi TM. Dental treatment improves the oral health-related quality of life of adolescents: a mixed methods approach. *Int J Paediatr Dent.* 2019;29(6):765-74.