

IMPROVING COMMUNITY HEALTH THROUGH CONTINUITY OF TREATMENT: A CASE STUDY OF DENTAL SERVICES IN THE MUSHKEGOWUK TERRITORY AND THE NATURAL PROGRESSION TOWARDS COMMUNITY-BASED DENTAL THERAPY

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Abstract / Résumé

This paper illustrates how continuity of dental health care treatment has resulted in significant improvement of Native health, in the Mushkegowuk Territory of northern Ontario, Canada. It is argued that positive gains accrued in this region, during a ten year period (1990-1999), should be maintained through the initiation of a community-based dental therapy program. First Nation community-based health care programs should be seen as a natural progression in health care, the end goal of all First Nation health care programs with a large preventive component. Self sufficiency is an integral part of the self-determination process.

L'article décrit comment la continuité des soins dentaires s'est traduite par une amélioration importante de la santé des Autochtones sur le territoire Mushkegowuk, au nord de l'Ontario. On peut avancer que les gains obtenus dans la région au cours d'une décennie (1990-1999) devraient être conservés en mettant en oeuvre un programme communautaire de dentothérapie. L'établissement de programmes communautaires de soins de santé des Premières nations devrait être considéré comme une étape naturelle et l'objectif final de tous les programmes de soins de santé des Premières nations qui affichent une composante préventive importante. L'autosuffisance fait partie intégrante du processus d'autodétermination.

Introduction

In Canada, the federal government recognizes a fiduciary responsibility to provide health care services, in addition to those supplied by provincial and territorial governments, to registered First Nation people (Weeneebayko Health Ahtuskaywin [WHA], 1996). These non-insured health benefits (i.e., dental services, non-emergency medical transportation, prescription drugs, and medical equipment) cost the federal government more than \$500 million annually (Weeneebayko Health [WH] 1995). Although the Canadian federal government has invested a great deal of money in Native health care programs, Aboriginal people ("Indian" [status and non-status], Inuit and Metis) still have the poorest overall health status of any group in Canada (Federal, Provincial and Territorial Advisory Committee on Population Health, 1996; National Forum on Health [NFH], 1996; MacMillan et al. 1996; Tookenay, 1996). It is apparent that the delivery of health care must change in Canada to improve the state of Native health (Tsuji, 1998).

A recent trend in the delivery of health care services in Canada emphasizes the need to move towards increased community-based services (NFH, 1996). However, it has been noted that many impediments exist for Aboriginal communities in the form of "high unemployment rates, low incomes and...the long history of external control" (NFH, 1996:3). In this paper, we will first show how Native health can be improved significantly through a dental health care program that stressed continuity of treatment and prevention. We will then describe why a community-based dental therapy program, in the Mushkegowuk Territory, is needed to maintain these positive gains in dental health. Lastly, we will describe possible applications of this type of approach to other Native environmental health issues.

Study Area

Aboriginal dental health care is administered through the First Nations and Inuit Health Branch (formerly, the Medical Services Branch) of Health Canada. The First Nations and Inuit Health Branch (FNIHB) divides Canada into prescribed regions made up zones. The Moose Factory Zone encompasses the western James Bay region of northern Ontario, Canada, and is also identified as the Mushkegowuk Territory. The Mushkegowuk Territory is home to approximately 10,000 First Nation Cree. The Dental Department of Weeneebayko General Hospital (WGH) supplies dental services to these First Nation communities of the Mushkegowuk Territory: Moose Factory, Fort Albany, Kashechewan, Attawapiskat, and Peawanuck (Tsuji, 1998). In 2001, dental staff of WGH

included: three full-time dentists residing in Moose Factory and two long-term locums; all dentists are under contract to the Faculty of Dentistry, University of Toronto. The University of Toronto is under contract with the FNIHB to provide dental services to the Moose Factory Zone. Dentists fly into the communities of Fort Albany, Kashechewan, Attawapiskat and Peawanuck to supply dental services to these communities. In addition, since the late 1990s, denturists (long-term locums) have provided prosthodontic services (i.e., dentures) to people living in the communities of the Mushkegowuk Territory.

The Data

In this paper, continuity of treatment was defined as the supply of uninterrupted dental services, over a defined period of time. In other words, dental visits were not ad hoc, but were scheduled on a regular basis. Although a ten-year period (1990-1999) was chosen for the present study, a longer time series would have been appropriate. However, this was not possible as data had to meet these inclusion criteria: dental services data had to be complete for all the years in question, and the First Nation had to be serviced by mainly one dentist during the period 1990-1999, to negate inter-dentist variation with respect to dental services. Only one community satisfied the above-stated criteria, Fort Albany First Nation.

Data was gathered from reports filed after each trip by the Fort Albany dentist to the Moose Factory Zone Director or the Chief Executive Officer of Weeneebayko General Hospital. When these reports were unavailable, daily record sheets completed by the dentist were used. A complete record of dental services in Fort Albany was compiled for the period 1990 - 1999. Regional data for restoration to extraction and restoration to prevention ratios (performance indicators) were kindly provided by Dr. Gary Jackson (Director of Dental Services, Weeneebayko General Hospital) for the years 2000 and 2001 (Jackson, 2000, 2001).

Three variables were examined to give an indication of any changes in the annual perceived "need" for dental services in the community. The number of patients scheduled per five day period and the number of patients actually seen per five day period gives some indication of the dental needs of the community, from the perspective of the individuals of the community. A five-day period was chosen for three reasons: five days represents a typical work week; this approach allows for the standardization and measure of dental activity during a specific year, not absolute activity (i.e., more dental procedures may have been performed during a particular year only because more days were worked); and data can be presented as a whole number (cf. data on a per day basis which

might exist as a fraction). It should be noted that since the dentist would typically work only half-a-day on the day he flew into and out of Fort Albany, these travel days were counted as only a half-a-day of work in the calculations. The total number of days in a year that the dentist supplied dental services was also adjusted for events when the dentist was in the community but unable to provide dental services for the whole day (e.g., no hydro-electric power, no water). An annual show rate was also calculated as a percentage (i.e., the number of patients seen in the clinic for the year/the number of patients scheduled for the clinic for the year x 100), to give another variable related to the community's perceived need for dental services.

Five procedural variables were quantified to give an indication of the actual amount of dental services provided to individuals of Fort Albany. The number of procedures performed (in each category) per five day period gives an indication of the actual dental needs of the community. The five procedural categories were as follows: diagnostic – radiographs (x-rays) and exams; preventive – prophylaxis (tooth cleaning/polishing), fluoride treatment, oral hygiene instruction, etcetera; restorative – restorations (fillings), sedative dressings (temporary fillings), etcetera; surgical – extractions (tooth removal), incision and drainage (release of pus from an abscess), gingivoplasty (gum surgery), etcetera; and miscellaneous – prosthodontic procedures (making dentures), prescriptions, endodontic procedures (root canal therapy), etcetera.

Two performance indicators were calculated to give an indication of community health, the restoration/extraction and restoration/prevention ratios. The higher the restoration/extraction ratio, “the greater the success of the restorative program at meeting the restorative needs of the population” (Jackson, 2000:1). In other words, this ratio compares the amount of restorations (how many teeth were saved) to the amount of extractions performed; a large amount of extractions being performed would be indicative of poor oral health. However, it should be noted that this ratio could be misleading (that is, the ratio could be large) even if a large number of extractions were performed (indicative of poor oral health), as long as a disproportionate number of restorations were also completed. Thus, it is also important to calculate the restoration/prevention ratio. The smaller the restoration/prevention ratio, “the greater the success of the restorative program at meeting the restorative needs of a population” (Jackson, 2000:1). A smaller ratio would indicate that more preventive work (to save teeth) was being done rather than restorations (treatment after dental disease has become apparent). Since the disease, caries (cavities) is directly attributable to an environmental factor (i.e., changing to a diet relatively high in sugar content), it is prevent-

able (Limeback, 1996). Prevention is always desired compared to primary treatment (e.g., restoration [filling]).

Statistics

The data was analysed by univariate procedures in the SPSS package of statistical routines. Seven variables (number of patients scheduled per five-day period, number of patients seen per five-day period, annual show rate, number of diagnostic procedures per five-day period, number of preventive procedures per five-day period, number of surgical procedures per five-day period, number of miscellaneous procedures per five-day period) were found to be normally distributed, while three variables (number of restorative procedures per five-day period, restoration/extraction ratio, restoration/prevention ratio) required transformation to natural logarithms to meet the requirement of being normally distributed at the $\alpha = 0.05$ level (Shapiro-Wilk's test; Shapiro and Wilk, 1965). Linear-regression analysis was used to examine the following relationships between patients scheduled per five-day period and year; patients seen per five-day period and year; annual patient show rate and year; diagnostic procedures per five-day period and year; preventive procedures per five-day period and year; restorative procedures per five-day period and year; surgical procedures per five-day period and year; miscellaneous procedures per five-day period and year; annual restoration/extraction ratio and year; and annual restoration/prevention ratio and year.

Results

There were significant negative relationships between number of patients scheduled per five-day period and year ($p = 0.005$; Figure 1), number of patients seen per five-day period and year ($p < 0.001$; Figure 2), annual show rate and year ($p < 0.001$; Figure 3), number of preventive procedures per five-day period and year ($p = 0.004$; Figure 4), number of restorative procedures per five-day period and year ($p < 0.001$; Figure 5), number of surgical procedures per five-day period and year ($p = 0.005$; Figure 6), and restoration/extraction ratio and year ($p = 0.02$; Figure 7). Further, linear regression analysis revealed that 66% ($r = 0.81$) of the variation in the number of patients scheduled per five-day period was attributable to variation in year; 93% ($r = 0.96$) of the variation in the number of patients seen per five-day period was attributable to variation in year; 92% ($r = 0.96$) of the variation in the annual show rate was attributable to variation in year; 68% ($r = 0.82$) of the variation in the number of preventive procedures per five-day period was attributable to variation in year; 87% ($r = 0.93$) of the variation in the number of

restorative procedures per five-day period was attributable to variation in year; 65% ($r = 0.81$) of the variation in the number of surgical procedures per five-day period was attributable to variation in year; and 50% ($r = 0.71$) of the variation in the restoration/extraction ratio was attributable to variation in year. There was no relationship between the number of diagnostic procedures per five-day period and year ($r = 0.58$; $p = 0.08$), the number of miscellaneous procedures per five-day period and year ($r = 0.41$; $p = 0.24$), and the restorative/preventive ratio and year ($r = 0.56$; $p = 0.09$).

Figure 1. Relationship between the number of patients scheduled per five-day period in Fort Albany, Ontario, and year.

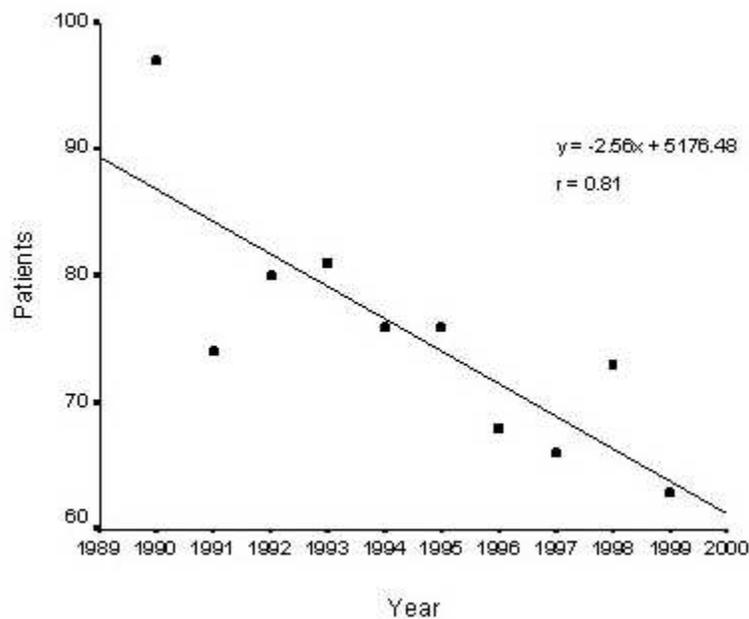


Figure 2. Relationship between the number of patients seen per five-day period in Fort Albany, Ontario, and year.

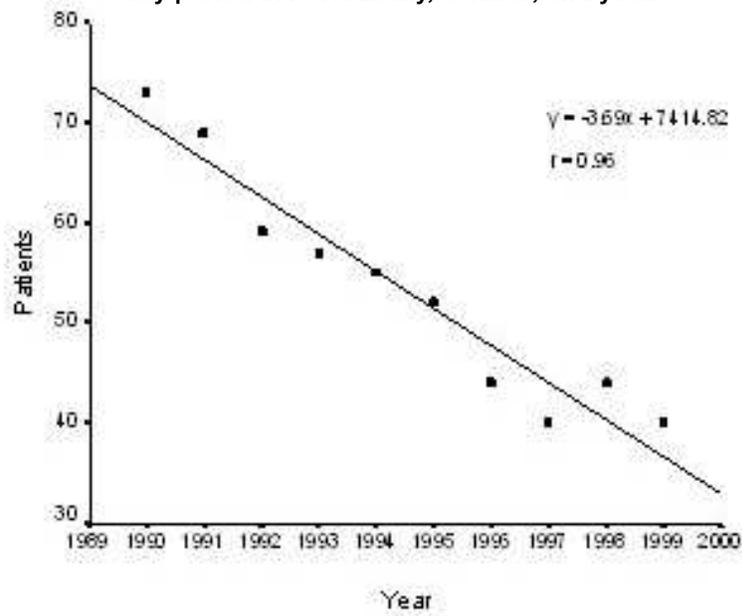


Figure 3. Relationship between annual patient show rate in Fort Albany, Ontario, and year.

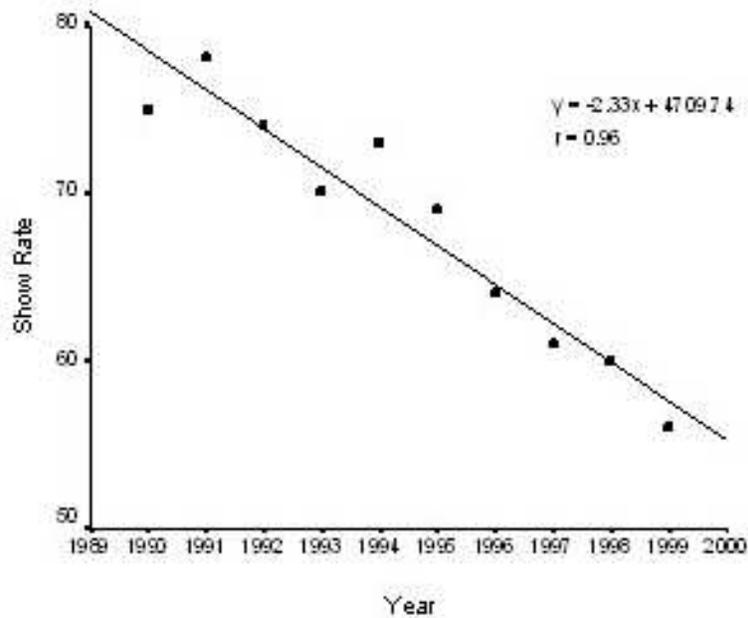


Figure 4. Relationship between the number of preventive procedures per five-day period in Fort Albany, Ontario, and year.

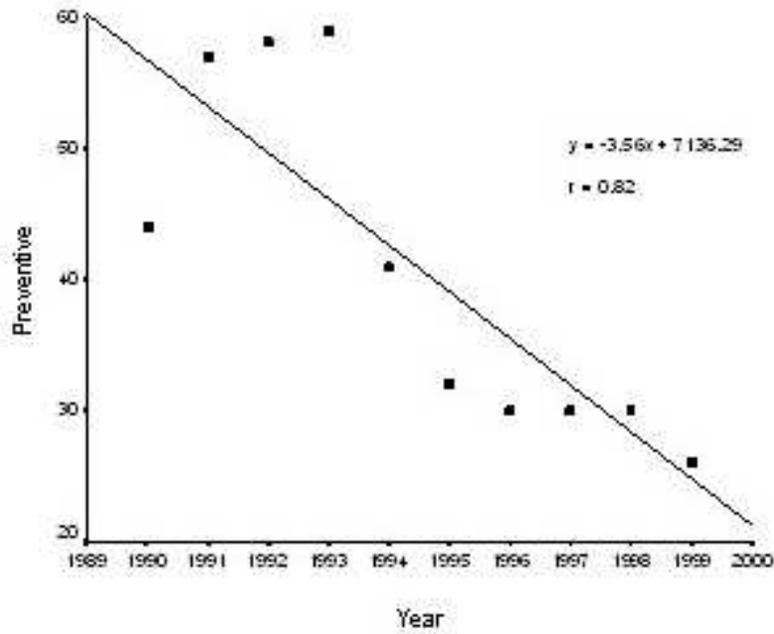


Figure 5. Relationship between the log of the number of restorative procedures per five-day period in Fort Albany, Ontario, and year.

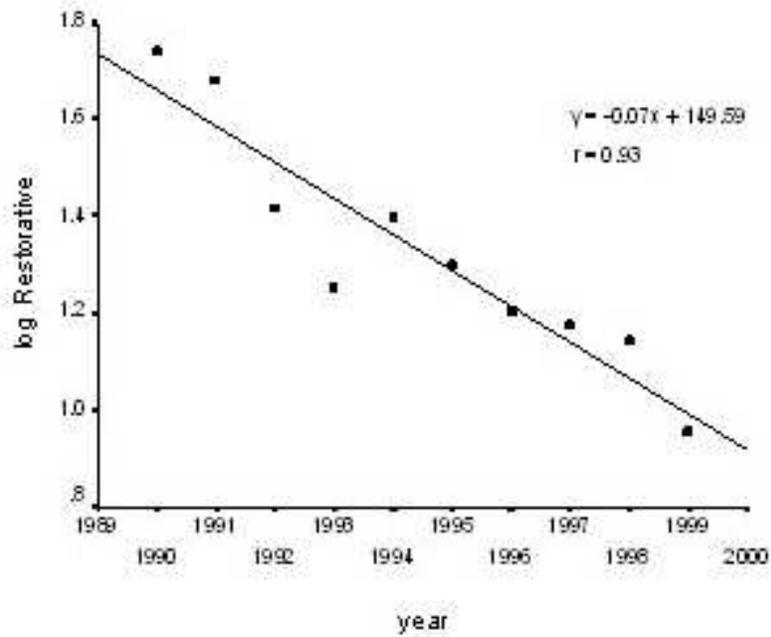


Figure 6. Relationship between the number of surgical procedures per five-day period in Fort Albany, Ontario, and year.

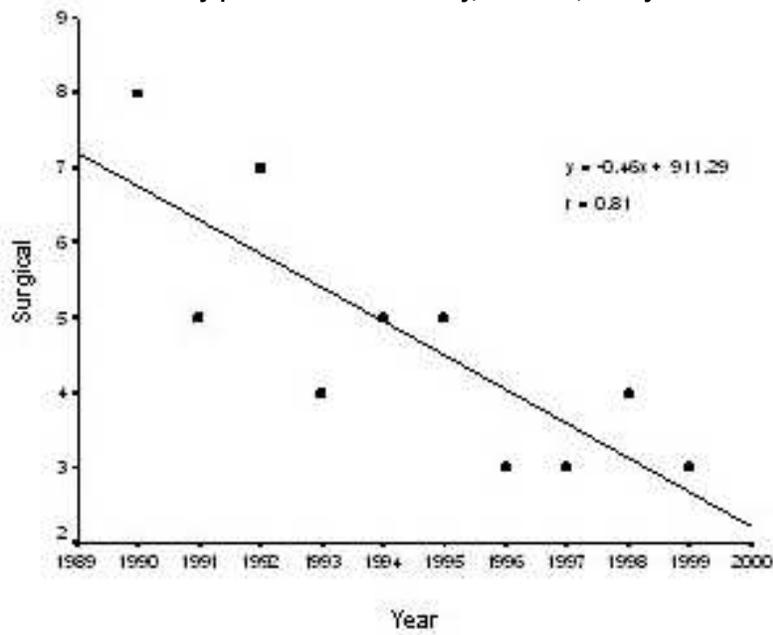


Figure 7. Relationship between the log of the restoration/ extraction ratio in Fort Albany, Ontario, and year.

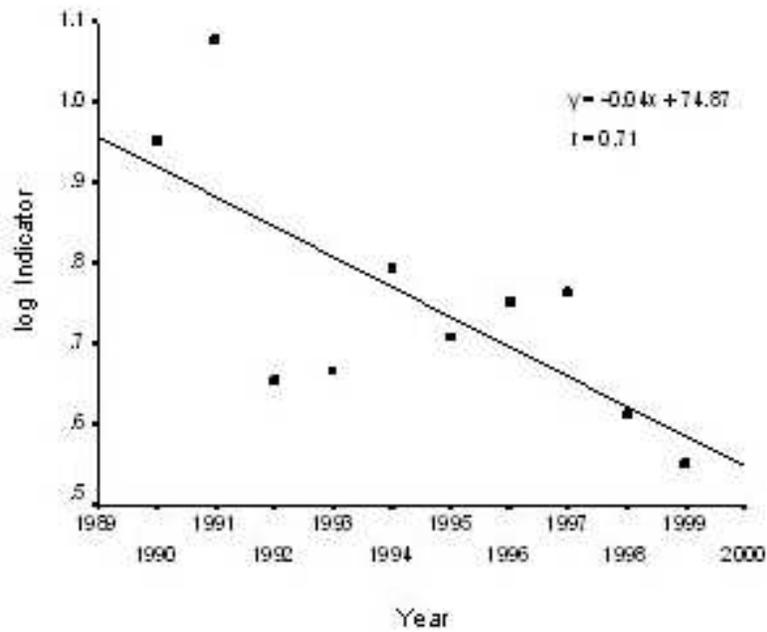


Table 1. The restoration/extraction ratio, a dental performance indicator, for First Nations of the Mushkegowuk Territory.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000 ^a	2001 ^b
Restoration/extraction ratio^c												
<i>Fort Albany</i>												
	8.95	11.95	4.50	4.64	6.22	5.10	5.66	5.80	4.10	3.56	2.66	3.43
<i>Kashechewan</i>												
	—	—	—	—	—	—	—	—	—	—	.83	1.15
<i>Attawapiskat</i>												
	—	—	—	—	—	—	—	—	—	—	.83	.80
<i>Peawanuck</i>												
	—	—	—	—	—	—	—	—	—	—	3.52	3.26
<i>Moose Factory</i>												
	—	—	—	—	—	—	—	—	—	—	2.06	1.79
Restoration/extraction ratio raw data												
<i>Fort Albany</i>												
	<u>743</u>	<u>705</u>	<u>392</u>	<u>255</u>	<u>423</u>	<u>306</u>	<u>249</u>	<u>255</u>	<u>213</u>	<u>121</u>	<u>120</u>	<u>48</u>
	83	59	87	55	68	60	44	44	52	34	45	14
<i>Kashechewan</i>												
	—	—	—	—	—	—	—	—	—	—	<u>167</u>	<u>215</u>
											201	187
<i>Attawapiskat</i>												
	—	—	—	—	—	—	—	—	—	—	<u>208</u>	<u>235</u>
											252	292
<i>Peawanuck</i>												
	—	—	—	—	—	—	—	—	—	—	<u>88</u>	<u>114</u>
											25	35
<i>Moose Factory</i>												
	—	—	—	—	—	—	—	—	—	—	<u>1632</u>	<u>1347</u>
											790	752

^a Data from Jackson (2000).

^b Data from Jackson (2001).

^c The larger the number, the greater the success of the dental program at meeting the restorative needs of the community (Jackson, 2000).

Table 2. The restoration/prevention ratio, a dental performance indicator, for First Nations of the Mushkegowuk Territory.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000 ^a	2001 ^b
Restoration/prevention ratio^c												
<i>Fort Albany</i>	1.26	.84	.44	.30	.61	.63	.53	.50	.48	.37	.22	.26
<i>Kashechewan</i>	—	—	—	—	—	—	—	—	—	—	1.70	2.13
<i>Attawapiskat</i>	—	—	—	—	—	—	—	—	—	—	1.02	1.94
<i>Peawanuck</i>	—	—	—	—	—	—	—	—	—	—	.49	.41
<i>Moose Factory</i>	—	—	—	—	—	—	—	—	—	—	.84	.74
Restoration/prevention ratio raw data												
<i>Fort Albany</i>	<u>743</u>	<u>705</u>	<u>392</u>	<u>255</u>	<u>423</u>	<u>306</u>	<u>249</u>	<u>255</u>	<u>213</u>	<u>121</u>	<u>120</u>	<u>48</u>
	586	836	879	840	697	485	470	514	447	330	523	186
<i>Kashechewan</i>	—	—	—	—	—	—	—	—	—	—	<u>167</u>	<u>215</u>
											98	101
<i>Attawapiskat</i>	—	—	—	—	—	—	—	—	—	—	<u>208</u>	<u>235</u>
											203	121
<i>Peawanuck</i>	—	—	—	—	—	—	—	—	—	—	<u>88</u>	<u>114</u>
											177	280
<i>Moose Factory</i>	—	—	—	—	—	—	—	—	—	—	<u>1632</u>	<u>1347</u>
											1922	1819

^a Data from Jackson (2000).

^b Data from Jackson (2001).

^c The smaller the number, the greater the success of the dental program at meeting the restorative needs of the community (Jackson, 2000).

Discussion

Data for Fort Albany clearly shows the positive health benefits that can be gained by a community through continuity of dental services (e.g., Figure 6). In any health profession, continuity allows follow-up treatment, that is, the health care practitioner is not always starting from square one with a patient. Once an acceptable level of health is reached, practitioner continuity allows maintenance of this level. The lack of a trend in the long-term restoration/prevention ratio for Fort Albany illustrates this point and explains why Fort Albany has the best restoration/prevention ratios in the Mushkegowuk Territory (Table 2). Adding further, during 1988 and 1989, the long-term dentist made dental trips to Fort Albany for a week at a time, every other week. This front-end loading of dental services allowed emergency type of treatment (i.e., it was not uncommon to do 10 - 20 extractions per day; LJST, BK, personal observation) to be addressed quickly, allowing for the delivery of mostly restorative and preventive services in the early 1990s (Table 2; Figure 4, 5). This scenario helps to explain why the restoration/extraction ratio showed a negative trend in the present study, being influenced by the relative disproportionate number of fillings done in Fort Albany, after the initial period, when a large number of extractions were performed (Table 1; Figure 7). However, the recent restoration/extraction ratios for Fort Albany are still relatively high compared to the other communities of the Mushkegowuk Territory and especially in comparison to those who use short-term locums exclusively (Table 1).

Short-term locums (dentists and dental interns who supply services for only several weeks) have been and are still used in Kashechewan and Attawapiskat, with these two communities having the poorest performance indicators of the coastal communities of the Mushkegowuk Territory (Table 1, 2). Indeed, the restoration/extraction and restoration/prevention ratios suggest that the dental health of Kashechewan and Attawapiskat is more than a decade behind Fort Albany (Table 1, 2). By contrast, data from Tables 1 and 2 indicate that benefits derived from continuity of treatment is not restricted to a single-health-care-practitioner approach (i.e., Fort Albany); a team approach appears equally as effective, as is evident when one refers to the performance indicators for the communities of Moose Factory and Peawanuck, where several long-term dentists (and locums) have been supplying services to these communities.

It is apparent that a reorganization of dental services is required to address the inequality of dental health in the communities of the Mushkegowuk Territory. Data for Fort Albany suggest how this reorganization could take place. The negative relationship between the number

of patients scheduled per five-day period and year, the number of patients seen per five-day period and year, and annual show rate and year, all indicate that the perceived need for dental services in Fort Albany has decreased significantly over the 1990s (Figure 1-3). Annual show rates decreased from a high of 78% in 1991 to a low of 56% in 1999 (Figure 3). It is assumed that if a patient really wanted to be seen for treatment, they would be present for their appointment. Other health clinics in the Mushkegowuk Territory have also reported no show rates that range from 26 to 38% (WH, 2000). Similarly, the actual amount of dental services performed per five-day period (another indicator of community need) also decreased over time, for three variables examined (preventive procedures, Figure 4; restorative procedures, Figure 5; surgical procedures, Figure 6). These relationships indicate that there was an actual decrease in the need for dental services in the community. The lack of a relationship between the number of diagnostic procedures per five-day period and year, and the number of miscellaneous procedures per five-day period and year was not unexpected, as there was no reason for these two variables to vary over time. Diagnostic procedures are still required even with recall appointments, while miscellaneous procedures cover all procedures that do not fall into one of the other categories.

From the present study of Fort Albany, it becomes apparent that most of the dental services provided by the dentist involves restorations and preventive procedures or in other words, the dentist is not being optimally used servicing Fort Albany, taking into consideration the dental health of Kashechewan and Attawapiskat. This type of reasoning is also applicable to long-term dentists servicing Peawanuck and Moose Factory, excluding the Director of Dental Services who has to stay in Moose Factory for administrative reasons. However, if long-term dentists are reassigned to Kashechewan and Attawapiskat, community health gains made in Fort Albany, Peawanuck and Moose Factory must be protected. Assigning dental therapists to these communities would give dental services in the region a community-based presence and be the first step in alleviating the inequality in community health. Continuity of treatment would be maintained.

The National School of Dental Therapy trains dental therapists over a two-year period to provide basic dental services such as, “dental cleanings and routine fillings and extractions” (First Nations University of Canada, 2007). Dental therapists provide dental treatment of similar quality as a dentists, but dental therapists cannot provide services related to prosthodontics (dentures), endodontics (root canal treatment), complicated surgery, diagnosis and treatment planning (WH, 1996b). Although dental therapists can practice in many First Nations and Inuit

communities in northern Canada, there are provinces where they are not allowed to practice (Saskatchewan Indian Federated College [SIFC], 1998).

In 1995, a trial dental therapy clinic was scheduled for Kashechewan, but was cancelled due to the fact that any dentist that participated would have had their licence revoked by the Royal College of Dental Surgeons of Ontario. Participation by a dentist would have contravened the Ontario Ministry of Health's *Regulated Health Profession Act 1991* (WH, 1996a). Only three ways exist whereby dental therapists would be allowed to practice in Ontario:

1. ministerial interpretation or exemption,
2. regulatory change or legislative exemption, or
3. legislative change to the *1991 Regulated Health Profession Act* (WH, 1996b:10).

Dr. G. Jackson has worked extremely hard for the dental therapy program but cannot do everything himself; he has taken the initiative as far as he could. First Nation leaders of the Mushkegowuk Territory must now take it upon themselves to lobby for the dental therapy program. This initiative has more relevance in light of the fact that the long-term Director of Dental Services now works only part-time, the long-term locum for Fort Albany has left, and the Assistant Director of Dental Services has retired, and the recruitment of dentists becomes more difficult each year. Part of the problem is that dentists are relatively underpaid in the Mushkegowuk Territory and demand for dentists is high in the rest of Ontario, because only a small number of new dentists (approximately 125) graduate each year (Brown and Raborn, 2001). Moreover, as noted by Brown and Raborn (2001:373), "a drastic reduction in the number of dentists in Northern Canada" is already evident. If nothing is done, the worst case scenario would be the one that existed in 1987, in this region, where the dental staff included only one University of Toronto, Faculty of Dentistry intern living in Moose Factory, one long-term locum dentist, and visiting senior dental students and interns (Tsuji, 1998).

Our recommendations are as follows: 1. The dental therapy program would be more palatable to dental organizations if restrictions were contemplated. For example, stipulations requiring dental therapists work only in First Nation fly-in communities above a certain latitude. This restriction would alleviate fears of dentists working in the north that their livelihood is being jeopardized. 2. Pilot dental therapy programs should be initiated in Fort Albany, Peawanuck and Moose Factory. Set up therapy clinics where you know they have the greatest probability of success. 3. All clinics should be located in either a hospital or a nursing station to ensure patient safety in case of a medical emergency. Clinics in hospi-

tals and nursing stations would also allow for easier access to medical charts and consultation with other medical personnel. It should be added that the employment of dental therapists in the Mushkegowuk Territory should be seen as a natural progression in health care, similar to the role of nurse practitioners (i.e., an expanded duty nurse) at Weeneebayko General Hospital (WH, 1997).

Lastly, other types of community health programs that have a large preventive component (e.g., diabetes, fetal alcohol syndrome) would benefit by the approach taken in the present study, that is, front-end load services and stress continuity of treatment to get acute problems under control, raise health indicators to a certain acceptable standard, and then use community-based programs to keep community health at a steady state. It should be emphasized that a community-based program with First Nation personnel should always be the final goal. As stressed by Tsuji et al. (2000), remote First Nation communities should not be solely dependent upon external "experts," self-sufficiency is an important part in the self-determination process.

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