In the United States, low-income Americans similarly face access to care barriers that lead to oral health disparities because they do not have the financial resources, private dental insurance, or public third-party dental benefits to access timely oral health care.6

The term “access” centers on the complex factors that determine the degree to which patients can obtain timely health care services and achieve the best possible health outcomes.7 From an economic standpoint, access to dental care can be viewed as a relationship between supply (provider-driven) and demand (patient-driven).8 The prevailing economic environment for oral health care in North America is a private practice, fee-for-service model limiting low-income patients from making demands on the system because they cannot pay, directly or indirectly, for care. The inability to pay limits the availability of private-practice human resources for health (HRH) to meet demand, and the oral health social safety net cannot adequately fill this gap with publicly funded dental benefit plans or public health HRH. In short, the system fails both in terms of supply and demand,
leading to the end results of access to care barriers and oral health disparities.

To try to restore equity to the oral health care system, one solution is to use alternative providers to deliver care at a much lower cost than dentist-delivered services, making oral health care more affordable and stimulating patient demand and utilization of services. Recently, the United States has embarked on a course of exploring the utilization of what is often referred to as a new mid-level dental provider: the dental health aide therapist, or as it is more commonly known around the world, the dental therapist. Australia, New Zealand, Canada, and the United Kingdom are among more than fifty nations that utilize dental therapists to deliver diagnostic, preventive, and restorative oral health care.9

The origins of dental therapy in Canada and North America date back to 1972 with the establishment of training programs at the National School of Dental Therapy (NSDT) in Fort Smith, Northwest Territories, and the Wascana Institute of Applied Arts and Sciences in Regina, Saskatchewan, as a means of reducing access to care barriers in Canada’s northern territories and to implement the Saskatchewan Health Dental Plan (SHDP), respectively. The Canadian dental therapy experience is often referred to as a success, but that is debatable given that there are only approximately 300 dental therapists to serve the needs of vulnerable populations across the entire country.10 The SHDP ended when the Saskatchewan government ceased funding and transferred the responsibility for care to the private sector, and the NSDT, which was moved to Prince Albert, Saskatchewan, in 1981, closed on June 30, 2011, when the federal government ceased funding the program. Saskatchewan has had the most fulsome experience with a variety of dental therapy education and practice models of any jurisdiction in Canada, and lessons can be learned from its experiences.

The purpose of this study was to examine the relationship between private practice employment of dental therapists in Saskatchewan and its influence on dental therapy in Canada and, specifically, its contribution to dental therapists’ recruitment and retention disparities in Canada’s three northern territories (Northwest Territories, Nunavut, and Yukon), the closing of the National School of Dental Therapy in 2011, and ramifications for the future of dental therapy in Canada.

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Rationale for Dental Therapy Programs in Saskatchewan and the Northern Territories

Canada has a large land mass and a relatively small and concentrated population. As in many other countries, the supply of dentists is inequitably distributed, making access to care a major issue in rural and northern locales. Private practice clinics in the Canadian North rarely exist outside of major centers (Yellowknife, Northwest Territories, and Whitehorse, Yukon) and the federal government-funded dentist services have been itinerant. Canada’s First Nation and Inuit peoples experience higher oral health disparities than the rest of the Canadian population.11-14 Likewise, in Saskatchewan, access to dentist services has been severely constrained. In 1972, 185 dentists served a population of 920,000 people (1:5000), with 30 percent of the dentists located in Regina and Saskatoon.15 It was not until 1968 that a dental school was established and the first intake of ten students occurred. Clearly, it would be some time until an adequate supply of dentists could be trained and retained in the province. The genesis of public programs using dental therapists to improve access to care in Saskatchewan and the Northwest Territories grew out of the notion that, in lieu of an adequate supply and distribution of dentists, alternative providers could fill the gaps in service.

Based on a 1962 observation mission to evaluate the New Zealand dental nurse training program, the Oxbow Pilot Project was funded by the federal and Saskatchewan governments to evaluate the efficacy of a community-based dental team approach to providing preventive and restorative care. The dental team was comprised of a dentist, two dental nurses, three dental assistants, and a receptionist.15 The pilot was found to have good patient acceptance and high utilization rates, and the dental nurse-delivered restorative care was competent.16 The results of the pilot contributed to the formation of the Saskatchewan Children’s Dental Plan.

In 1963, the Yukon School Dental Experiment utilized New Zealand-trained dental nurses working with the territory’s private practice dentists to provide community-based screening, referral, and preventive services. Later, the program expanded to allow the
dental nurses to provide clinical care under the direction of a dentist-prescribed treatment plan. Based on the need to improve access to care for Saskatchewan and the outcomes of the Oxbow Pilot Project, the provincial government established a training program for dental nurses (dental therapists) at the Wascana Institute of Applied Arts and Sciences in Regina in 1972 to deliver preventive and clinical restorative care for children under the Saskatchewan Children’s Dental Plan, which began in 1974. Ultimately, the program achieved a 90 percent annual utilization rate of all eligible children but was eliminated in 1987, with responsibility for care transferred to private practice clinics across the province.

In 1972, the National School of Dental Therapy (NSDT) was established in Fort Smith, Northwest Territories, by the federal government in affiliation with the University of Toronto Faculty of Dentistry to train dental therapists to work in remote Inuit and First Nations communities in Yukon and the Northwest Territories; the first class of dental therapists graduated in 1974. Later, the program would expand to other First Nations and Inuit communities in Canada. In 1984, the NSDT was moved to Prince Albert, Saskatchewan, and in 1993 First Nations University of Canada took over the affiliation agreement with the NSDT. The federal government ended funding for the NSDT in 2011, and the program was terminated.

Cost-Effectiveness, Competence, and Distribution of Dental Therapists

Nash et al. have reported on numerous studies on the cost-effectiveness and competence of dental therapists that have been carried out worldwide and have generally confirmed that dental therapists provide high-quality care in a cost-effective manner. In Canada, major independent reviews have assessed the economic value and quality of clinical care provided by SHDP and NSDT dental therapists. With respect to the SHDP and its dental therapists, the program was defined by high public acceptance as evidenced by high enrollment and utilization rates of the eligible population it served; it delivered high-quality preventive and restorative care; and it did so in a transparent, cost-effective manner.

Similar evaluations of NSDT graduates found them to be competent and to deliver high-quality care in a cost-effective manner that resulted in improvements in the oral health of the populations they treated.

An accurate number of the dental therapists in Canada can be difficult to determine, but an approximate figure of 300 is often reported. More important than the absolute number of dental therapists is the distribution across Canada as well as the ratio of private practice to public practice employment. Health Canada provides funding directly and via contribution agreements to employ dental therapists to serve First Nations communities across Canada excluding Ontario and Quebec. The federal government transferred funding and responsibility for licensing and employing dental therapists to the three northern territories. In addition to federally funded positions in Saskatchewan, dental therapists work for the provincial government and in private practice. Manitoba also has dental therapists working in private practice.

As of April 2012, the Saskatchewan Dental Therapists Association had 228 members, of which 226 (75 percent) practice in Saskatchewan while two members work out-of-province. In short, Saskatchewan is home to 75 percent of the approximately 300 dental therapist positions in the country, and 63 percent (n=144) of them work in private practice.

Recruitment and Retention in Canada’s Northern Territories

In 2007, the Assistant Deputy Ministers Working Group of Yukon, Northwest Territories, and Nunavut commissioned the Pan-Territorial Oral Health Initiative (PTOHI). The initial goal was to document existing oral health programming targeted towards children up to ten years of age across the three territories and make recommendations to improve oral health outcomes. As part of the report, recruitment and retention of dental therapists over a five-year period from 2003 to 2007 were evaluated. The report assessed the current pan-territorial dental therapist staffing levels and point-in-time vacancy rates, as well as calculated five-year vacancy factors to quantify the proportion of vacant dental therapist positions from 2003 to 2007. A vacancy factor reflects the proportion of time a position has been vacant over a sixty-month period and ranges from 0 (no vacancy) to 1.0 (sixty months vacant).
Table 1 compares the pan-territorial and territory-specific vacancy rates in 2007 and 2008. In 2008, the pan-territorial year-over-year vacancy rate had risen from 56 percent (20.5 FTE of 36.5 FTE vacant) to 67 percent (24.5 of 36.5 FTE vacant). In Yukon, the 2007 vacancy rate was 25 percent (2.0 of 8.0 FTE vacant) and increased to 38 percent in 2008 (3.0 of 8.0 FTE vacant). The Northwest Territories vacancy rate rose from 65 percent (7.5 of 11.5 FTE vacant) to 74 percent (8.5 of 11.5 FTE vacant) in those years, while in Nunavut the vacancy rate had risen to 76 percent (13.0 of 17.0 FTE vacant) from 65 percent (11.0 of 17.0 FTE vacant). The acuteness of the difficulty in maintaining the budgeted dental therapist levels across the three territories was evident. Only one-third of the pan-territorial dental therapist positions were filled.

Table 1. Vacancy rates for Canada's three northern territories, 2007 and 2008

<table>
<thead>
<tr>
<th>Territory</th>
<th>2007 Vacancy Rate</th>
<th>2008 Vacancy Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percentage</td>
<td>FTE</td>
</tr>
<tr>
<td>Yukon (8.0 FTE)</td>
<td>25.0%</td>
<td>2.0</td>
</tr>
<tr>
<td>Northwest Territories (11.5 FTE)</td>
<td>65.2%</td>
<td>7.5</td>
</tr>
<tr>
<td>Nunavut (17.0 FTE)</td>
<td>64.7%</td>
<td>11.0</td>
</tr>
<tr>
<td>Pan-Territorial (36.5 FTE)</td>
<td>56.2%</td>
<td>20.5</td>
</tr>
</tbody>
</table>

Table 2. Five-year vacancy factors for Canada's three northern territories, 2007

<table>
<thead>
<tr>
<th>Territory</th>
<th>5-Year Vacancy Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>VF</td>
</tr>
<tr>
<td>Yukon (8.0 FTE)</td>
<td>0.20</td>
</tr>
<tr>
<td>Northwest Territories (11.5 FTE)</td>
<td>0.28</td>
</tr>
<tr>
<td>Nunavut (17.0 FTE)</td>
<td>0.56</td>
</tr>
<tr>
<td>Pan-Territorial (36.5 FTE)</td>
<td>0.35</td>
</tr>
</tbody>
</table>

VF=vacancy factor, which ranges from 0 (not vacant over the 60-month period) to 1.0 (vacant for 60 months or more). FTE=mean full-time equivalent positions that have been vacant for 60 months or more. Percentage reflects the percentage of total FTEs that have been vacant for 60 or more months.

It is instructive to note that the pan-territorial 36.5 FTE allotment represents approximately 12 percent of the total Canadian dental therapist workforce, 27 percent of Canada’s dental public health workforce, and almost 50 percent of all non-Saskatchewan dental therapists. The National School of Dental Therapy was established in 1972 to supply dental therapists to serve communities in the Northern Territories to improve access to care. In the 1980s and 1990s, research demonstrated that graduates of the NSDT provided high-quality, cost-
effective preventive and clinic care that improved the oral health of Inuit and First Nations Canadians. A decade later, recruitment and retention difficulties had turned the cornerstone of federal dental therapy practice into a shambles.

**Practice Profiles of NSDT Graduates, 2003 to 2007**

Based on the severe recruitment and retention issues in the northern territories, a study was undertaken to assess and track the employment trends and determinants influencing practice choices of First Nations University of Canada National School of Dental Therapy (NSDT) graduates over the same five-year period covered by the PTOHI to measure the impact on pan-territorial dental therapy program recruitment and retention rates. Moreover, the results could be extrapolated to the rest of the country with respect to ensuring the adequacy of dental therapists for public practice.

Graduate records were obtained from the NSDT and cross-referenced with the Saskatchewan Dental Therapists Association membership roster. A telephone survey of NSDT graduates between 2003 and 2007 was conducted to determine where they were currently practicing and whether they were in private or public practice. Graduate records showed that there were a total of seventy-three graduates from the NSDT between 2003 and 2007 or approximately fifteen graduates per year (attrition rate of five students per year or 25 percent). Sixty-four graduates took part in the telephone study (nine non-respondents), resulting in an 87.7 percent response rate.

Of the respondents, fifty-five of sixty-four (85.9 percent) had remained in Saskatchewan. A total of fifty-two (81.2 percent) were in practice, and of those, forty-three practiced in Saskatchewan (67 percent; Figure 1). Figure 2 shows the practice choices of those graduates. Thirty-two (62 percent) of the total graduates worked in private practice. Of the employed Saskatchewan-based graduates, thirty-two (74 percent) were in private practice (Figure 3). In the five-year review period, almost 70 percent (n=44) of the sixty-four graduates surveyed were not participating in dental public health practice, which was one of the founding tenets of the NSDT. In 2008, the pan-territorial vacancy rate was 24.5 FTE, and many communities in the Northwest Territories, Nunavut, and Yukon had experienced chronic vacancy factors. At the same time, the NSDT graduated enough dental therapists to fill the vacancies, but instead, thirty-two graduates selected private practice over dental public health.

**Remuneration of Dental Therapists**

What influences NSDT graduates to pursue employment in a particular geographic region or to choose between public or private practice? Dental therapists in the three Northern Territories are re-
employed by the provincial government as entry-level dental health educators (DHEs) range between $61,709 ($31.67 hourly) and $75,454 ($38.72 hourly). Most of the DHEs are at a senior-level designation and earn between $66,645 ($34.20 hourly) and $81,489 ($41.82 hourly). There are also dental therapist and senior dental therapist designations within the provincial government's collective bargaining agreement. The dental therapist base salary ranges between $50,762 ($26.05 hourly) and $62,034 ($31.83 hourly). Senior dental therapist remuneration ranges between $54,822 ($28.13 hourly) and $67,970 ($34.88 hourly).

Table 3 shows the remuneration for Saskatchewan dental therapists in public and private practice and provides a comparison to dental hygienists working in private practice. From the perspective of private practice employment, dental therapists out-earn dental hygienists at every stage of the professional practice cycle. Despite a substantial total remuneration package for entry-level dental therapists in Tuktoyaktuk ($102,606) and Aklavik ($100,857), these two positions have been chronically vacant since the PTOHI report was delivered.

In Yukon, dental therapists’ salaries range between $62,000 ($31.79 hourly) and $75,000 ($38.46 hourly). There is no cost of living adjustment for Whitehorse, where all dental therapist positions are based. Yukon has the least expensive cost of living of the three northern territories, which may explain why recruitment and retention issues have not impacted the dental therapist workforce there as much as in the Northwest Territories and Nunavut.

In Saskatchewan, remuneration varies between private and public practice. Dental therapists employed by the provincial government as entry-level dental health educators (DHEs) range between $61,709 ($31.67 hourly) and $75,454 ($38.72 hourly). Most of the DHEs are at a senior-level designation and earn between $66,645 ($34.20 hourly) and $81,489 ($41.82 hourly). There are also dental therapist and senior dental therapist designations within the provincial government’s collective bargaining agreement. The dental therapist base salary ranges between $50,762 ($26.05 hourly) and $62,034 ($31.83 hourly). Senior dental therapist remuneration ranges between $54,822 ($28.13 hourly) and $67,970 ($34.88 hourly).

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ated Indian College, later to become First Nations University of Canada (FNUC), took over sponsorship of the National School of Dental Therapy from the University of Toronto. Had the NSDT not left the Northwest Territories, this event would not have occurred. Over time, the NSDT moved from a secular dental therapist program with a national focus to an institution that reflected the First Nations culture of Saskatchewan.

Recruitment of students folded inward such that the vast majority of applicants were from Saskatchewan. It is important to ensure that students become culturally and clinically competent, but the focus on Saskatchewan signaled the end of the dental therapist focus on Canada’s northern territories. The NSDT’s model never changed over the years and thus became a program frozen in time. The federal government solely funded it; students paid no tuition and patients were not charged fees. This model worked well prior to private practice employment of dental therapists in Saskatchewan as the only place for employment was in remote Inuit and First Nations communities. However, once a free-market environment is superimposed onto the practice of dental therapy, it streams providers away from the places they are needed most. With respect to dental therapy, this was a perfect example of the Inverse Care Law in action.

Neither the NSDT nor Health Canada paid attention to the fact that graduates were selecting private practice in Saskatchewan over public health and especially avoiding job opportunities in the three northern territories. The NSDT and Health Canada used the metric that the investment in a proportion of dental therapists is below the remuneration of dental therapists in Saskatchewan. Clearly, Nunavut and the Northwest Territories cannot effectively recruit and retain dental therapists because the cost of living is outstripping the remuneration packages.

### State of Dental Therapy in Canada Today

When the various economic and legislative factors that have impacted dental therapy over time are looked at chronologically, a pattern emerges of the forces that have pushed dental therapy to the brink of extinction in this country. The SHDP was dismantled in 1987, leaving the National School of Dental Therapy as the only dental therapist training institution in the country. In Saskatchewan, legislative changes were enacted in 1987 permitting dental therapists to work in private practice. This is not likely a coincidence. With the transfer of responsibility for treating SHDP enrollees from provincially employed providers to private practice, there was an incentive to enable dental therapists to work in private practice to continue their activities. Dental therapists had proven their worth, and their addition to the private practice dental team was seen as advantageous as it enhanced the delegation of patient care among dentist, dental hygienist, and dental therapist.

The National School of Dental Therapy was moved from Fort Smith, Northwest Territories, to Prince Albert, Saskatchewan, in 1981 ostensibly because the school had exhausted the supply of patients. Later, in 1993, the Saskatchewan Federated Indian College, later to become First Nations University of Canada (FNUC), took over sponsorship of the National School of Dental Therapy from the University of Toronto. Had the NSDT not left the Northwest Territories, this event would not have occurred. Over time, the NSDT moved from a secular dental therapist program with a national focus to an institution that reflected the First Nations culture of Saskatchewan. Recruitment of students folded inward such that the vast majority of applicants were from Saskatchewan. It is important to ensure that students become culturally and clinically competent, but the focus on Saskatchewan signaled the end of the dental therapist focus on Canada’s northern territories.

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### Table 3. Saskatchewan dental therapist-dental hygienist remuneration comparisons

<table>
<thead>
<tr>
<th>Dental Therapist Remuneration</th>
<th>Dental Hygienist</th>
</tr>
</thead>
<tbody>
<tr>
<td>$41.35 Mean hourly wage (private practice)</td>
<td>$37.54</td>
</tr>
<tr>
<td>$35.75 Mean hourly wage (private &amp; public)</td>
<td>n/a</td>
</tr>
<tr>
<td>$40.00 Median hourly wage</td>
<td>$37.00</td>
</tr>
<tr>
<td>$35.00 10th percentile</td>
<td>$33.00</td>
</tr>
<tr>
<td>$37.00 25th percentile</td>
<td>$35.00</td>
</tr>
<tr>
<td>$44.00 75th percentile</td>
<td>$40.00</td>
</tr>
<tr>
<td>$50.00 90th percentile</td>
<td>$43.00</td>
</tr>
<tr>
<td>37.5% Mean % (in lieu of salary)</td>
<td>36.2%</td>
</tr>
<tr>
<td>159 (70.4%) Full-time (private &amp; public)</td>
<td>n/a</td>
</tr>
<tr>
<td>67 (29.6%) Part-time (private &amp; public)</td>
<td>n/a</td>
</tr>
<tr>
<td>25 Average hours/week (private)</td>
<td>20</td>
</tr>
</tbody>
</table>

Sources: College of Dental Surgeons of Saskatchewan. 2011 dental personnel wage report. Saskatoon: College of Dental Surgeons of Saskatchewan, 2011; and Personal communication with C Reed, Registrar, Saskatchewan Dental Therapists Association, May 11, 2012.
dental therapist’s education was repaid after 2.5 years in public service. If this metric holds true, then given that thirty-two NSDT graduates between 2003 and 2007 selected private practice over public practice, this equals eighty provider years of service lost. Clearly, Health Canada’s investment in the front end of dental therapists’ education at the NSDT was not being returned in service to the underserved, and it announced that the NSDT would close in 2011. Since education is a provincial responsibility, Health Canada would reinvest resources into bursaries to support First Nations and Inuit students in pursuing health care careers like dental therapy.

**Future of Dental Therapy in Canada and Lessons for the United States**

To date, it is uncertain as to whether a new dental therapist training program or programs will emerge in Canada. The FNUC has made proposals to the federal and Saskatchewan governments, but as yet no decisions have been made. Unless a new school or schools of dental therapy emerge soon, the profession may well be lost in Canada. In Saskatchewan, almost 60 percent of dental therapists are forty years of age or older, with the fifty-five years of age or older segment representing 25 percent of the total workforce. Many in this demographic are graduates of the Wascana program and will be retiring soon. Unless a mechanism is devised to sustain a new generation of dental therapists, even Saskatchewan’s robust dental therapist workforce will fade away.

Quiñonez and Locker suggested three key considerations for the United States as it moves forward with dental therapist programming. First, all stakeholders need to realize the potential that dental therapists have for both the public and private sectors. The dental therapist is a primary oral health care provider who can reduce access to care barriers for vulnerable populations as well as enhance the private practice dental team. Outside of the Canadian North and Saskatchewan, dental therapists are almost invisible in Canada—one of the reasons that a meaningful national debate over their future has never occurred. Second, dental therapy must be cognizant of indigenous self-determination but not be controlled by it. The NSDT’s move from a secular training institution to one that reflected a particular cultural ethos was one of the reasons it failed. Third, to be successful, dental therapist education and practice must be linked with HRH planning. Training programs must consider mechanisms that will create a sustainable recruitment and retention plan for dental therapists in both public and private practice. Stakeholders did not anticipate the integration of dental therapists into the private practice dental team in Canada and, moreover, failed to appreciate the magnitude of its impact on recruitment and retention of the dental therapist workforce in the public service.

In short, Canada’s experience with dental therapy has been mixed. While both the NSDT and the SHDP models were proven to be effective, they were not flexible enough to weather political change. The SHDP arose out of an era of universal social programs. Those times are long past. The NSDT failed to anticipate, recognize, and adapt to the economic forces that enabled dental therapists to work in private practice. The United States has the opportunity to look back on the Canadian dental therapy experience and learn from its successes and its challenges. Taking the time now to ensure that all segments of the oral health stakeholder community understand the potential for dental therapy to positively impact public and private practice and to actively engage them in moving the profession forward will enable the United States to avoid the mistakes that have crippled dental therapy in Canada.

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