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## Review

## Diabetes Care Program of Nova Scotia: Celebrating 25 Years of Improving Diabetes Care in Nova Scotia

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### Key Messages

- Emulating the chronic care model, as a provincial approach to diabetes, enables standardization and ease of implementing quality improvement metrics.
- Collaboration based on early, continuous and meaningful engagement facilitates buy-in, rapid uptake and productive improvements to practice.
- A provincial, organizational approach to diabetes care levels the playing field and supports equitable access to quality diabetes care close to home.

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### ABSTRACT

The Diabetes Care Program of Nova Scotia (DCPNS)'s mission is "to improve, through leadership and partnerships, the health of Nova Scotians living with, affected by, or at risk of developing diabetes." Working together with local, provincial and national partners, the DCPNS has improved and standardized diabetes care in Nova Scotia over the past 25 years by developing and deploying a resourceful and collaborative program model. This article describes the model and highlights its key achievements.

With balanced representation from frontline providers through to senior decision makers in health care, the DCPNS works across the age continuum, supporting the implementation of national clinical practice guidelines and, when necessary, developing provincial guidelines to meet local needs. The development and implementation of standardized documentation and data collection tools in all diabetes centres created a robust opportunity for the development and expansion of the DCPNS registry. This registry provides useful clinical and statistical information to staff, providers within the circle of care, management and senior leadership. Data are used to support individual care, program planning, quality improvement and business planning at both the local and the provincial levels.

The DCPNS supports the sharing of new knowledge and advances through continuous education for providers. The DCPNS's ability to engage diabetes educators and key physician champions has ensured balanced perspectives in the creation of tools and resources that can be effective in real-world practice. The DCPNS has evolved to become an illustrative example of the chronic care model in action.

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### R É S U M É

La mission du Programme de soins aux diabétiques de la Nouvelle-Écosse (DCPNS, de l'anglais *Diabetes Care Program of Nova Scotia*) vise à « améliorer, par le leadership et les partenariats, la santé des Néo-Écossais qui vivent avec le diabète, qui sont concernés par cette maladie ou qui risquent d'en être atteints ». Le DCPNS, qui favorise la collaboration avec des partenaires locaux, provinciaux et nationaux, a permis

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d'améliorer et de normaliser les soins aux diabétiques en Nouvelle-Écosse au cours des 25 dernières années par l'élaboration et l'application d'un modèle de soins créatif et collaboratif. Le présent article décrit le modèle et fait état de ses principales réalisations.

En assurant une représentation équilibrée des prestataires de première ligne aux principaux décideurs des soins de santé, le DCPNS permet d'améliorer et de normaliser les soins aux diabétiques tout au long du continuum d'âge, veille à la mise en œuvre des lignes directrices nationales relatives à la pratique clinique et, lorsque nécessaire, donne lieu à l'élaboration des lignes directrices provinciales pour répondre aux besoins locaux. L'élaboration et la mise en place d'une documentation et d'outils de collecte de données standardisés dans tous les centres du diabète ont offert une occasion certaine de création et d'élargissement du registre du DCPNS. Ce registre fournit des informations cliniques et statistiques utiles au personnel, aux prestataires au sein du cercle de soins, aux gestionnaires et à la haute direction. Les données sont utilisées pour assurer les soins individualisés, la planification de programmes, l'amélioration de la qualité et la planification d'affaires aux niveaux local et provincial.

Le DCPNS contribue au partage des nouvelles connaissances et avancées au moyen de la formation continue des prestataires. La capacité du DCPNS à mobiliser les éducateurs en diabète et les principaux défenseurs de la médecine a assuré un équilibre des points de vue dans la création d'outils et de ressources qui peuvent être efficaces dans la pratique réelle. Le DCPNS constitue désormais un exemple concret de modèle de soins de longue durée en action.

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## Introduction

In 2016, the Diabetes Care program of Nova Scotia (DCPNS) celebrated its 25th anniversary. This government-initiated program continues to identify, corral and mobilize resources in support of equitable and accessible quality diabetes care across a province facing economic challenges, changing demographics and variable access to care providers and services.

In 1991, the Nova Scotia (NS) Department of Health and Wellness (DHW) established the DCPNS as a provincial program at a time when facilities were looking for funds to establish or expand ambulatory clinics, including diabetes centres (DCs). These DCs supported primary care and specialist physicians in the care of growing numbers of Nova Scotians living with diabetes (1). While there were already DCs in NS, the DHW had determined earlier that little was known about these programs and services, their approaches to care delivery or their successes and challenges.

The DCPNS's mission is "to improve, through leadership and partnerships, the health of Nova Scotians living with, affected by, or at risk of developing diabetes" (2). Working together with local, provincial and national partners, the DCPNS improved and standardized diabetes care in NS by developing and deploying a resourceful, integrated and collaborative approach reflective of key components of the Expanded Chronic Care Model (3,4). This article describes how the DCPNS achieves its mission, and it highlights several key achievements. The Figure 1 provides a quick visual overview of key activity areas and accomplishments.

## Accomplishing the DCPNS Mission

### Program organization

In 1991, the DCPNS consisted of a medical director/diabetologist (parttime), coordinator (fulltime dietitian), nurse (parttime) and secretary. As the DCPNS's mission evolved over time, so did the composition of the team. The DCPNS now has the equivalent of 7 full-time staff and 2 part-time medical advisors (representing the pediatric and adult speciality areas of diabetes). Approximately half of the staff is devoted to information technology (IT) and information management (IM), which sustain and enhance the DCPNS registry through programming, provision of user support, analytics and reporting. Supported by registry and other diabetes data sources, the remaining staff address guideline development/dissemination, policy, knowledge translation and practice issues. Working groups and committees, consisting of both internal staff and external stakeholders, are established on an ad hoc basis.

In 1991, a board of directors was formed, specifically at arms-length from the DHW, representing major provincial stakeholders, and it included Dalhousie University (academia), the NS Medical Society, the NS Association of Health Organizations, the NS Dietetic Association, the NS Nurses Association (professional societies) and the NS Division of the Canadian Diabetes Association (now Diabetes Canada). The board was responsible for the DCPNS and accountable to the DHW. This board was replaced in 2007 by the DCPNS advisory council, which retained members from the original organizations and added representatives from senior leadership, from both the DHW and within the health authorities, who had knowledge of the health-care system, operations and service delivery.

In 2016, as part of changes in the organization of health care in NS, the DCPNS transitioned from reporting to Acute Care within the Department of Health and Wellness to reporting to Primary Care and Population Health within the Nova Scotia Health Authority, while continuing to support the interests of diabetes in children/youth and pregnant women in collaboration with the Izaak Walton Killam Health Centre.

## Program Operations

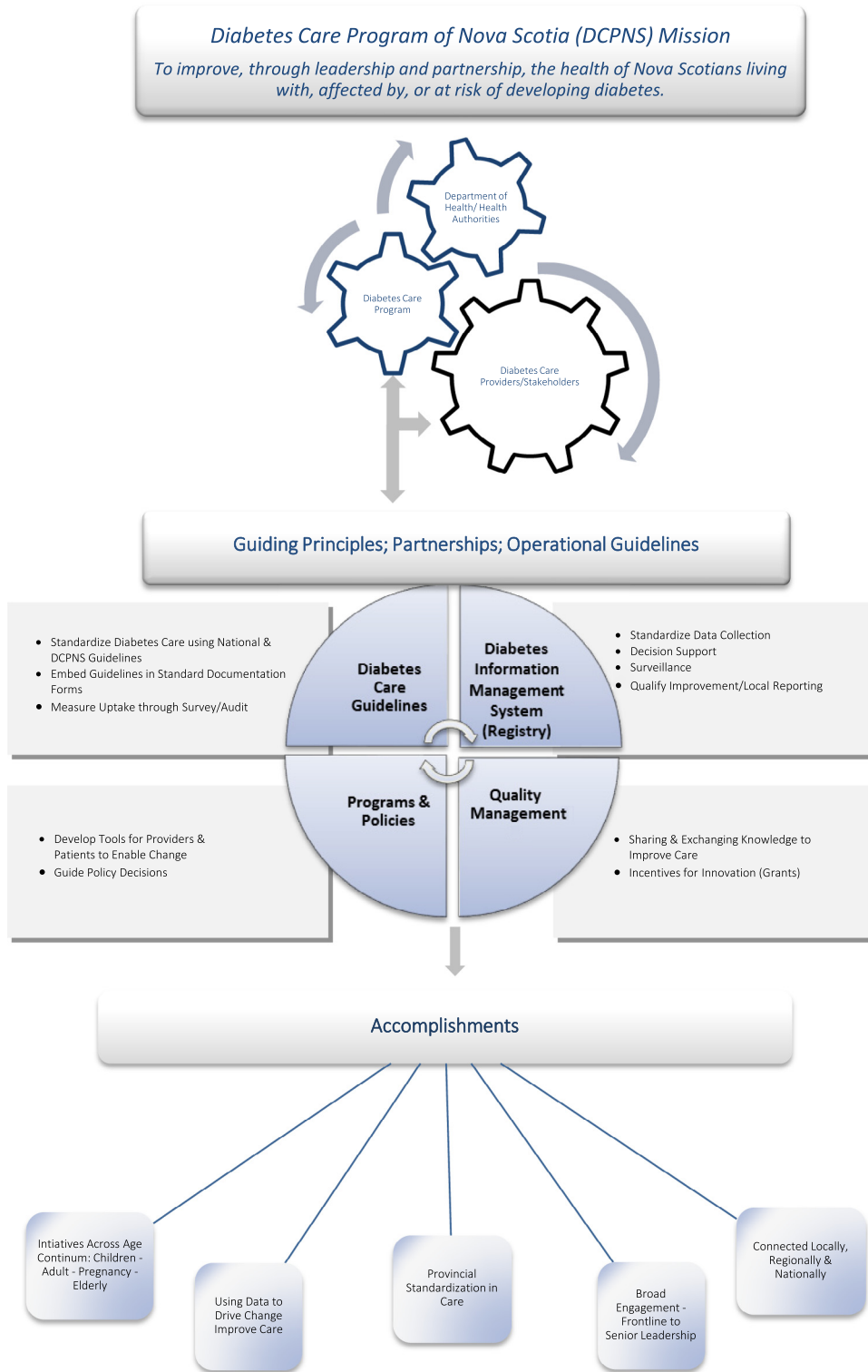
In the spirit of collaborative partnership, NS diabetes care stakeholders function as team members of the DCPNS, working toward a common goal. The DCPNS develops and operationalizes guiding principles to accomplish its mission (Table 1).

### Program activities

With a focus on diabetes stakeholders' engagement, common priority areas were established. The earliest work addressed the identified need for consistency in the provision of care and services to keep people as close to home as possible. As a place to start, consistency (standardization) was required in the:

- Tracking of patient population/visits (statistics) for comparative purposes overtime
- Approach to initial assessment and follow-up care (documentation)
- Approach to specific areas of DC practice (foundational guidelines)
- Care of specialty populations (pediatrics and pregnancy).

Working groups and committees were populated with content experts reflective of geographic practice variation and were



**Figure 1.** Overview of the Diabetes Care Program of Nova Scotia (DCPNS).

balanced with educators from both urban and more rural practices (5). The DCPNS’s ability to engage diabetes educators and key physician champions has ensured balanced perspectives in the creation of tools and resources that can be effective in real-world practice.

**Guidelines, Projects and Tools**

In 1992, the DCPNS produced 8 guideline documents aimed at standardizing specific diabetes care across NS, including surveillance elements that would enable ongoing monitoring (Table 2) (6).

**Table 1**  
Guiding principles and operation guidelines

1. Learn from and involve local diabetes teams (sensitive to local context):
  - Host provincial meetings with physician leads and diabetes educators to contribute to the provincial mission, vision and strategic priorities
  - Conduct diabetes care site visits to understand important issues
  - Involve diabetes care team members in the planning, delivery and evaluation of DCPNS initiatives
  - Gain trust, build relationships and promote buy-in through frequent engagement opportunities.
2. Provide support, services and resources to diabetes care providers across the continuum in efforts to “level the playing field” and offer equal access to new knowledge, program development and clinical expertise
3. Support the implementation of national clinical practice guidelines; where care gaps exist, develop and implement provincial guidelines to facilitate best possible care and monitor uptake/impact
4. Advise on service delivery models in efforts to reduce variability
5. Build on best and most promising practices (encourage sharing and facilitate networking)
6. Recommend standardized processes and structures using an interdisciplinary team model to increase efficiency and effectiveness
7. Improve quality of diabetes care through focused, timely implementation of provincewide initiatives
8. Create knowledge-exchange opportunities through provincial/regional workshops, newsletters, annotated bibliographies and an established lending library.

DCPNS, Diabetes Care Program of Nova Scotia.

**Table 2**  
DCPNS foundational guidelines, 1992

1. Implementation of standardized documentation and database collection forms
2. Implementation of routine foot inspections
3. Implementation of standardized blood tests
4. Implementation of regular blood pressure measurements
5. Promotion of group modular instruction
6. Promotion and monitoring of self-blood-glucose monitoring
7. Adoption and implementation of strategies to promote self-care practices
8. Promotion of trained mental health therapists' involvement

DCPNS, Diabetes Care Program of Nova Scotia.

Diabetes practice in DCs has been evaluated using these guidelines in subsequent years by way of practice surveys and chart audits.

Illustrative examples (Table 3) demonstrate the continued focus on these foundational guidelines. These guidelines demonstrate the success of engagement and the ability of a provincial program to translate evidence-based clinical care guidelines (7) into practice by introducing projects, producing valued tools and influencing provincial and national agendas (6,8). These resources are located on the DCPNS website ([diabetescare.nshealth.ca](http://diabetescare.nshealth.ca)) for ease of access and sharing.

### The DCPNS Registry and Diabetes Information Management System

Since 1992, DCs across NS have used standardized forms to accept referrals from physicians and nurse practitioners, collect daily/monthly statistics and document initial and follow-up patient care using assessment forms, checklists and flow sheets (9). This approach to care and documentation has been the basis for the development and evolution of the DCPNS registry. The daily/monthly statistics forms became redundant with electronic visit capture; the referral form guided the collection of core information, and the flow sheet provided the clinical flow and collection parameters. As the registry evolved into a clinical information-management system for diabetes, adding dedicated IT and IM personnel to the DCPNS facilitated the development of content and context expertise as well as responsiveness unparalleled in other systems. The DCPNS staff continue to support users, works within their business processes and develops and maintains relationships to sustain a strong foundation essential for the continued evolution of this IM system.

The evolution profiled in Table 4 highlights key periods, the importance of standardization and engagement in supporting registry enhancements, and more sophisticated reporting to facilitate communication among providers in the circle of care, quality improvement and programming change and innovation.

### Quality Improvement to Enable Change Using the Data Locally

Quality improvement processes are integral to any chronic care model. As noted above, the registry evolved from being a registry of cases (entered manually and managed centrally) to a registry of DC encounters, collecting visit-based data via the implementation of the onsite (computerized) registry within DCs. Key partnerships were capitalized on with local DC educators, physicians and local IT departments, onsite training was offered, and user support was provided by the DCPNS IT staff.

Registry users can generate a number of reports concerning their DC population (Table 5) (10). Additional reporting features of the registry include discharge/transition fields which can be used to generate standard letters from the registry for the patient (explaining the discharge and how to be re-referred, if necessary) and for the referring provider (providing the date of discharge and a brief overview of routine care requirements for individuals with diabetes).

Following a structured process, DC users and others can also request customized reports to support local initiatives. Requests for custom reports that would be of benefit to others are considered internally for development as a standard report.

### Quality Improvement to Enable Change: Using the Data Provincially

In addition to these standard reports, the DCPNS produces annual/biannual reports (10) that include annual statistics by DC, zone and province; a Follow-up Indicator Report<sup>1</sup>; a Newly Diagnosed Report (for adults and pediatrics, separately); Under Age 19 Incidence (11) and Prevalence Reports; and a Pump User Report ( $\leq 25$  years of age).

Along with the benefits at the local level (by DC site and referring provider and for quality improvement), the richness of the registry (with ~104 000 cases through March 31, 2016, plus ~3500 new cases and >45 000 encounters added annually) has contributed to many other aspects of the program:

- Validation of the Canadian Chronic Disease Surveillance System case definition in specific populations (i.e. <20 years of age) (12)
- Improved understanding, through linkages with administrative databases, of procedures in persons with diabetes, such as lower-extremity amputations, by allowing the application of

<sup>1</sup>This report provides data as snapshots in time. Based on the calendar year, it includes data for a cohort of follow-up adults (excluding newly diagnosed patients) seen in this 12-month period (types 1 and 2 diabetes only, ages  $\geq 19$  years) by DC, with comparison to zone and provincial totals. It includes descriptive statistics, such as percent by treatment categories of diabetes, average number of visits by treatment categories, as well as clinical/care measures (number, mean and percent)—A1C levels, blood pressures, lipid profiles, estimated glomerular filtration rates and percent who have had eye and foot examinations.

**Table 3**  
Illustrative examples of initiatives and tools

Areas of focus	Illustrative examples
<b>Standardizing approach to preventive care</b>	<p><b>Foot care (17)</b></p> <ul style="list-style-type: none"> <li>Standardized foot assessment tools and forms in use since 1992; now include foot-risk stratification criteria and a patient-knowledge questionnaire</li> <li>Discussion documents have informed policy and practice, built stakeholder networks, led to provider- and public-awareness campaigns and influenced the core curriculum of health professional training and education</li> </ul> <p><i>Measures of success:</i> Foot-assessment tools are part of routine care (embedded in the Electronic Medical Record), and rates of foot assessments in DCs continue to improve.</p> <p><b>My Blood Pressure Card (18)</b></p> <ul style="list-style-type: none"> <li>Now a provincial initiative jointly supported by the DCPNS, Cardiac and Renal Provincial Programs, this initiative is aimed at keeping blood pressure awareness and management on the provincial agenda</li> </ul> <p><i>Measures of success:</i> Annual My Blood Pressure Challenges have been held in May since 2011. More than 20,000 people across NS have been screened</p>
<b>Looking for efficiencies and changing unnecessary practices</b>	<p><b>Self-monitoring of blood glucose (19)</b></p> <ul style="list-style-type: none"> <li>A provider decision tool and accompanying videos support the reduction of unnecessary testing in the low-risk diabetes population (well-controlled, non-insulin using), while supporting more focused testing when needed</li> <li>Many partners have supported this work, including the DHW, Dalhousie University Academic Detailing and the NS Health Authority Drug Evaluation Unit</li> </ul> <p><i>Measures of success:</i> Diabetes educators have embedded the decision tool into practice and report a perceived change in practice by other health-care providers</p> <p><b>Triage and Discharge Guidelines (20)</b></p> <ul style="list-style-type: none"> <li>With growing numbers of people with diabetes, more complex care regimens and growth in primary care collaborative teams, there is a need for DCs to streamline their services</li> <li>Frequency of visits will increase for some (case management approach), with decrease or discharge for others (well-managed with good self-care practices)</li> </ul>
<b>Policy development to safely expand patient self-management</b>	<p><b>DCPNS Insulin Dose Adjustment Policies &amp; Guidelines Manual (21)</b></p> <ul style="list-style-type: none"> <li>Since 2002, this resource has provided policies, procedures and guidelines to assist diabetes educators to attain and maintain competence in performing insulin dose adjustment (level 1 and specialty certification)</li> </ul> <p><i>Measures of success:</i> Prince Edward Island (PEI), New Brunswick (NB) and the western region of Newfoundland have adopted these guidelines and the NS certification process. To date, approximately 190 educators have been certified in insulin-dose adjustment across the 3 Maritime Provinces (100 in NS, 70 in NB and 20 in PEI).</p> <p><b>Nova Scotia Insulin Pump Program (NSIPP), 2013 (22)</b></p> <ul style="list-style-type: none"> <li>The DCPNS guided the clinical infrastructure, operational procedures and related policy, forms and communications for this new provincial program</li> <li>The DCPNS is responsible for the formal evaluation (clinical and other outcomes) and provider education and for ensuring that DCs maintain their NSIPP-approved status</li> </ul> <p><i>Measures of success:</i> NSIPP processes are working well. More than 170 individuals 25 years old or younger have benefited from NSIPP, and 13 DCs are recognized as NSIPP-approved sites.</p>
<b>Addressing care gaps across the age continuum</b>	<p><b>Transition from pediatric to adult care (23)</b></p> <ul style="list-style-type: none"> <li>Successful transition from pediatric to adult care has been a focus for many years; the first related working group was established in 2006</li> <li>Titled Moving on...with Diabetes, providers' and patients' tools were released starting in 2012 and are influencing practice across the province</li> </ul> <p><i>Measures of success:</i> In 2015, funds were secured for a parttime transition project coordinator; this position is active across the province</p> <p><b>Pregnancy and Diabetes Guidelines: Approaches to Practice, 2014 (3rd ed.) (24)</b></p> <ul style="list-style-type: none"> <li>These current guidelines provide supported recommendations for all aspects of pregnancy. With 13 chapters, topics include, among others, preconception care, screening, medical management, nutrition, breastfeeding and newborn care</li> <li>Since its release in the fall of 2014, continuing medical education and health-care provider education events have been offered across NS, with additional emphasis on First Nations and on African NS communities</li> </ul> <p><i>Measures of success:</i> Screening for gestational diabetes has been standardized across the province, and standard provider/patient tools are in place</p> <p><b>Diabetes Guidelines for Frail Elderly Residents in (or awaiting) Long-Term Care (LTC): Using a frailty lens to improve quality of life (25)</b></p> <ul style="list-style-type: none"> <li>Based on a 2002 needs assessment of LTC facilities, guidelines were developed and released in 2010 and were revised in 2016. In efforts to improve patient safety and quality of life, these guidelines address appropriate glycemic targets and hypoglycemia prevention/management, as well as the frequency of bedside capillary and glycated hemoglobin (A1C) monitoring</li> </ul> <p><i>Measures of success:</i> LTC facilities report positive benefits for both residents and staff</p>
<b>Partnerships and contributions to the Maritime and national agenda</b>	<p><b>Physical activity and exercise (26)</b></p> <ul style="list-style-type: none"> <li>In 2008, the DCPNS released the first edition of the Diabetes Physical Activity and Exercise Toolkit. Working closely with the Department of Recreation Management and Kinesiology at Acadia University, the DCPNS developed this toolkit to offer providers (primarily diabetes educators) tools and resources to access safety, physical-activity appropriateness and client readiness</li> <li>Initially implemented and evaluated in the Atlantic Provinces, the use of this resource nationally now plays a significant role in patient self-management education</li> </ul> <p><i>Measures of success:</i> The copyright for this resource was signed over to the Canadian Diabetes Association in 2012 and is now used across Canada</p> <p><b>Canadian Chronic Disease Surveillance System (CCDSS) (27,28)</b></p> <ul style="list-style-type: none"> <li>All provinces and territories in Canada contribute to national surveillance efforts. The DCPNS, in partnership with the DHW, contributes to reporting and an enhanced understanding of the case definition used to identify diabetes by using administrative databases</li> </ul> <p><i>Measures of success:</i> The Nova Scotia Diabetes Statistics Report is prepared every 3 to 5 years (most recent, 2016) using the Public Health Agency of Canada methodology to describe the burden of diabetes; this report provides information for each of the District Health Authorities/Zones and the province as a whole</p>

DCs, Diabetes Centres; DCPNS, Diabetes Care Program of Nova Scotia; DHW, Department of Health of Wellness; LTC, Long-term care; NS, Nova Scotia; NSIPP, Nova Scotia Insulin Pump Program.



**Table 4**  
DCPNS registry evolution and milestones

Dates/milestones	Description
<b>1992</b>	
Juvenile ( $\leq$ age 18) diabetes database	The registry was first developed in 1992 in FoxPro software to collect information about incident cases of juvenile diabetes (pediatric cases $\leq$ age 18) and to capture common statistics from across DCs
Centralized entry (DCPNS)	At the same time, DCs used standardized manual-collection tools to count and report on encounters (by visit type, diabetes type, diabetes treatment and age category (adult or youth); all provincially funded DCs provided copies of their referral forms and statistics to the DCPNS monthly for centralized entry
<b>1994</b>	
Expansion to all ages	A common referral form for all physicians expanded registry use to include all new referrals to DCs. This provided core information to the registry, including patient demographics (e.g. age, gender, date of diagnosis, type of diabetes) and information related to comorbidities, complications and treatments
Centralized entry (DCPNS)	
<b>1996–1998</b>	
Expansion to collect indicators of care	The registry was rewritten using dBase software. It was enhanced in 1998 by dedicated DCPNS IT staff to collect information about indicators of care as recorded on standardized flow sheets (used in the province since 1992); additional information included clinical measures: medications used to control blood glucose, blood pressure, and lipids as well as self-care practices
Centralized Entry (DCPNS)	
<b>2002</b>	
Capture of encounters	The registry evolved from being a registry of cases to a registry of DC encounters
Decentralized, on-site DC capture	Implementation of the on-site computerized application for individual DCs enabled collection of visit-based data
Enhanced reporting capabilities	Implementation of longitudinal data collection enabled the opportunity to correct or update records
	The onsite registry application created the opportunity for local reporting and enabled DC staff to generate an array of standardized reports used for patient management, quality improvement, service/program planning and targeted interventions
<b>2006–2012</b>	
Interface capabilities: automated flow of registration and lab information	In 2006, the registry started to receive demographic (registration) and laboratory information through an interface with 1 of the 3 provincial hospital information systems (used by approximately 60% of the province)
	By 2012, demographic and visit information were received through similar interfaces, and the remaining provincial health information systems and interfaces for laboratory information were in the development and testing phase
<b>2014</b>	
Web-based application	The registry was rewritten using the CAISIS platform, and users migrated to this new version in 2014. This open source, web-based application offers an attractive user interface, dashboard features and graphing capabilities in support of patient teaching. This web-based application facilitates viewing of information across sites for patients for whom shared care is in place
<b>2014–2016</b>	
Advanced reporting capabilities	Registry users have the ability to run a number of reports on their DC population (see <a href="#">Table 5</a> ).

DCs, Diabetes Centres; DCPNS, Diabetes Care Program of Nova Scotia.

**Table 5**  
DCPNS registry user-generated reports (onsite)

Report category	Name and purpose
<b>Quality checks</b>	<p><b>Summary of visits:</b> Allow comparison of data entered into the registry to the DC appointment book/schedule; provide a means to ensure that no one has been missed or misclassified as well as to ensure that visits from hospital information systems have been confirmed prior to running the month-end report</p> <p><b>Month-end report:</b> Provides a summary of patient visits by diabetes type, area of contact (outpatient, inpatient and telephone) and age group (adult and youth [<math>&lt;</math>age 19]).</p> <p><b>Exception report:</b> Provides a list of record requiring additional information to enable completion of the month-end report</p>
<b>Reports for referring providers</b>	<p><b>Physician/nurse practitioner report</b> Provides report to provider, following a patient visit to the DC. This report retrieves data from the demographic, visit and indicators of care sections of the registry; allows for the recording of a brief narrative to highlight patient progress and recommendations for action/reinforcement; can provide up to 4 of the most recent laboratory testing dates</p> <p><b>Family physician/nurse practitioner patient list</b> Provides a confidential report to the referring provider concerning patients seen by the DC during a specified period of time (i.e. the past 12 months) Includes date of last DC visit, last recorded blood pressure, glycated hemoglobin, urine albumin-to-creatinine ratio and lipid results as well as the foot exam date and risk rating, flu shot and eye exam date and discharge date, if applicable; intended to be generated annually and provided confidentially to referring physician (with accompanied generated-in-confidence letter)</p>
<b>Reports to support quality practice</b>	<p><b>Active and inactive patient lists</b> Provide a list of active or inactive patients seen by DC staff (i.e. the past 2 years) at the time of the report generation and a grand total count; this report can be used to identify patients for future contact</p> <p><b>Advanced clinical indicator report</b> Allows registry users to run a real-time report for a specific patient population (selected by cohort by age, diabetes type, gender or visit type) on up to 4 indicators (with specific values; i.e. <math>&lt;</math>, <math>&gt;</math>, <math>=</math> to, or range) during a specified period of time Is intended to assist with quality improvement and to help understand the patient population of interest; includes ability to generate mailing labels for individuals identified within the specified cohort of interest</p>

DC, Diabetes Centre.

- diabetes type and duration of disease, where possible, to the analysis (13)
- Linkage with other provincial program databases that have a focus on chronic disease (heart and renal programs) to understand the degree of multimorbidity in various patient populations (14)

- Evaluation of a screening program for prediabetes (15)
- Provision of information on provincial referral patterns and practice changes
- Estimates of the number of insulin pump users when planning the Nova Scotia Insulin Pump Program

- Tracking and reporting of diabetes incidence in the under-19 age group and rates of successful transition
- Establishment of care indicators by age group (e.g. A1C, blood pressure levels) for provincial and local initiatives.

### Knowledge Transfer and Exchange

Advances in diabetes care progress rapidly. The DCPNS created opportunities for knowledge exchange (e.g. regional and provincial workshops, educator-sharing features in routinely released newsletters, Best Practice Working Group) to support best and most promising practices, change clinical practices, introduce new findings and evidence and, ultimately, to improve care and outcomes at the local, regional and provincial levels (16).

The DCPNS has also fostered innovation and creativity through grants aimed at DCs to enable them to move on ideas for improving specific outcomes, expanding partnerships and measuring the effectiveness of quality-improvement initiatives (29). Since 2006, more than 30 such grants have been given, and some projects have led to provincial application and change.

Finally, DCPNS staff members and clinical advisors have presented papers at national and international diabetes conferences (30), published their finding in diabetes-related journals (31) and contributed their experiences to the growing world of diabetes and chronic disease management through the development and review of clinical practice guidelines and the review of national and regional grant applications.

### Achievements of the Program

Together with local, provincial and national partners, the DCPNS has been improving diabetes care in NS since 1991. With balanced representation, from frontline providers to senior health-care decision makers, the DCPNS has improved and standardized the approach to diabetes care by using clinical practice guidelines across the age continuum, from pediatrics to geriatrics. Standardized documentation and data collection in the DCPNS registry by all DCs made provincial and local diabetes surveillance possible. Through linkages with administrative databases, the registry has also contributed to a better understanding of procedures in persons with diabetes and has contributed to an increased understanding of the Canadian Chronic Disease Surveillance System.

The DCPNS supports the sharing of new knowledge and advances through continuous education for providers. The DCPNS's ability to engage diabetes educators and key physician champions has ensured balanced perspectives in the creation of tools and resources that can be effective in real-world practice. The DCPNS is an illustrative example of the chronic-care model in action.

### Conclusions

The 2013 Canadian Diabetes Association Clinical Practice Guidelines Expert Committee recently stated, "Diabetes care should be evidence based and supported by a clinical information system that includes electronic patient registries, clinician and patient reminders, decision support, audit and feedback" and identified several strategies that have best evidence for improved outcomes (32). The DCPNS has all the elements of a chronic care model, integrated with quality improvement for managing diabetes to accomplish its mission and realize its vision.

### Acknowledgements

A special thanks to the NS DHW for establishing and supporting this provincial program over the past 25 years. We thank past

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### Author Disclosures

Jennifer Payne, Margaret Dunbar and Pamela Talbot are currently employed by DCPNS. Meng H. Tan was Medical Director of DCPNS (1991–1996).

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