

The Kidney Check program – championing patient-centered, culturally safe, preventive kidney care in Canada’s rural and remote Indigenous communities

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ARTICLE INFO

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Key words:

patient-engagement, CKD, screening,
patient-centered care

ARTICLE

INTRODUCTION

The health status of First Nations, Inuit and Metis peoples reflects a disparate sociopolitical and environmental context inextricably linked to Canada’s colonial history. This health inequity is exemplified by the disproportionate burden of chronic diseases such as diabetes, hypertension, and chronic kidney disease (CKD) affecting Indigenous communities. Frequently diagnosed at a younger age and greater severity than non-Indigenous groups, the increasing prevalence of

these conditions is of particular concern in rural and remote Indigenous communities (1, 2). Often marginalized from mainstream health-care services (geographically, economically, or culturally), many of these communities lack the preventive health benefits associated with continuity of care (3). Consequently, the detection and treatment of these conditions is often delayed, resulting in an increased risk of adverse outcomes that impact quality of life and strain healthcare systems.

In 2015, the First Nations Community Based Screening to Improve Kidney Health and Prevent Dialysis (FINISHED) program in Manitoba highlighted the efficacy of mobile point-of-care testing among adults and children in 11 rural and remote First Nations communities. Importantly, the program reported that a majority (87%) of CKD cases identified by albuminuria or a decreased estimated glomerular rate were early-stage and potentially treatable, representing an opportunity to prevent or delay kidney failure (4). As the lifetime health and economic burden of CKD is dependent on the severity of the disease, early detection and management represents a crucial opportunity to reduce this burden through risk factor modification including blood pressure control, diabetes management and the use of reno-protective medications, such as Renin-Angiotensin-Aldosterone System

(RAAS) and Sodium-glucose co-transporter-2 (SGLT2) inhibitors (5).

Modelled after FINISHED, Kidney Check is an Indigenous-led screen and treat program working to bring early detection and preventive kidney care to rural and remote Indigenous communities across Canada (Manitoba, Ontario, British Columbia, Alberta, Saskatchewan) [Table 1]. Using portable diagnostic equipment, specialized Kidney Check health teams screen participating adults and children ages 10 and up for CKD, diabetes, and hypertension. True to its name, point-of-care testing (POCT) is designed for use at the site of patient care, presenting an opportunity to expand preventive healthcare to regions with diminished access. Following screening, participants are triaged according to their individualized kidney failure risk prediction scores and are referred to additional resources accordingly. An affiliate of the patient-oriented Canadians Seeking Solutions and Innovations to Overcome Chronic Kidney Disease (Can-SOLVE CKD) research network, the programs design and implementation is guided by foundational research priorities set by patient partners. These and other collaborative partnerships between Kidney Check, Indigenous healthcare providers, adult and pediatric clinician specialists and engaged policy makers contribute to the programs sustainability and success.

Table 1 Kidney Check screening communities for British Columbia, Alberta and Manitoba

Province	Number of communities	Anticipated screening participants*
British Columbia	13	1011
Alberta	3	750
Manitoba	5	959

* Anticipated screening participants refers to the number of people in each community expected to attend the screening event.

CONTEXT: CANADIAN INDIGENOUS HEALTH CARE

Contemporary Indigenous health policies cover an array of federal programs, provincially provided services, and highly bureaucratized additions best characterized by jurisdictional ambiguity. For the majority of Canadians, health services are covered by the national health insurance plan under the Canadian Health Act, administered at the provincial and territorial level. Indigenous people are covered by provincial Medicare plans, but on-reserve, some health services fall under federal jurisdiction with many people receiving supplemental federal insurance. In some cases, this coverage is adequate, but in other situations the gaps and ambiguities created by a complex policy environment have created barriers to equitable healthcare services (6,7). This is particularly relevant for the provision of subspecialty services such as diabetes and CKD care, which often falls on the provincially funded health system. The result is often a patchwork of services which differ widely across regions (8).

Geographical isolation from mainstream health services further compounds barriers created by policy ambiguities. As of 2018, nearly half (49.3%) of First Nations people with registered Indian status live on more than 3100 reserves across Canada, most of which are in rural or remote locations (9). On reserve, health centers are mainly operated by nurses or community health workers whose limited scope of practice requires individuals to travel long distances to access advanced treatment facilities and specialized care. The impact of rural and remote dwelling location on CKD and diabetes prevalence has shown to be significant, with rates 2 to 4-fold higher compared to urban dwelling Indigenous people, respectively (2). With on-reserve populations continuing to grow, innovative models of

healthcare delivery are needed to address these barriers (10).

Over the past several decades, shifts toward pluralism and self-government have prompted policy changes aimed at transferring governance and allocation of Indigenous health services to communities and tribal councils. Today, approximately 89% of First Nations and Inuit communities manage their own community health programs on some level, either within their own community or via affiliation with tribal councils or various health authorities (8). In recognition of these communities' self-governance, Kidney Check has established standardized procedures for engaging with healthcare leadership on a local, provincial and federal level. In doing so the program aims to further collaborative relationships between engaged healthcare stakeholders while upholding culturally safe practices.

THE FINISHED PROGRAM

In 2015, the FINISHED program introduced a comprehensive screening, triage and treatment initiative in 11 rural and remote First Nations communities in Manitoba, Canada. Spanning 3-years, the programs' primary objective was to provide mobile, community-wide screening for CKD, diabetes, and hypertension followed by individualized risk-based counseling and treatment plans. Led by the Diabetes Integration Project and the Manitoba Renal Program, the project was designed in collaboration with Indigenous nurses and physicians, adult and pediatric clinician specialists and a communications expert (11). Overall, the program screened 1,700 individuals including 1,346 adults, achieving a 22.4% overall screening rate, calculated using the entire registered on-reserve population 18 years or older as the denominator (5,860). Out of 1,346 adults screened, 343 (25.5%) were found to have CKD as defined by a single measurement of elevated urine albumin-to-creatinine ratio (UACR)

or estimated glomerular filtration rate (eGFR), ($<60\text{mL}/\text{min}/1.73\text{m}^2$). Of the 343 adults with CKD, 216 (60.2%) had elevated hemoglobin A1c (HbA1c) levels ($\geq 6.5\%$) and 94 (27.4%) had elevated blood pressure (systolic blood pressure ≥ 140 mm Hg or diastolic blood pressure ≥ 90 mm Hg) (4). Additionally, of 353 children screened, 15% had evidence of early kidney disease, 17.3% had prehypertension or hypertension and 3.8% were at risk for, or had, overt diabetes (12). Importantly, the program reported that patients screened in communities accessible only by air showed a higher prevalence of CKD than communities accessible by road. Furthermore, had the program only screened participants with known CKD risk factors, such as diabetes or hypertension, 97 (28.3%) of those who were found to have CKD would have been missed (4). Overall, 90% of identified CKD patients were seen by a nephrologist following the event. Of those at risk, 8.4% are regularly monitored by a nephrologist 18 months after screening, compared to 2.5% prior to screening.

Furthermore, cost-effectiveness analysis of this program showed screening was associated with an incremental cost-effectiveness ratio (ICER) of \$23,700 per quality adjusted life year (QALY). In a usual care scenario, total costs were \$12,790 and effectiveness was 12.9869 QALYs, where screening was associated with a cost of \$13,400 and effectiveness of 13.0124 QALYs (13).

KIDNEY CHECK, CANSOLVE CKD AND PATIENT PARTNERS

Kidney Check screening procedures

Established in 2018, Kidney Check is a national iteration of the FINISHED program. Led by a project leadership team, advisory committee, community partners and patient partners, the program provides high quality, cost-effective POCT to Indigenous communities across Canada. Communities are selected in collaboration with

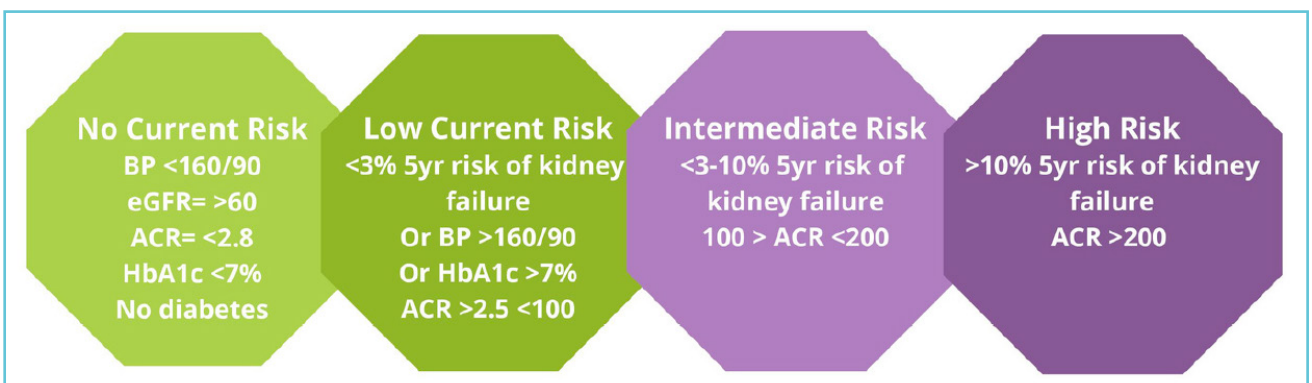
patient partners at the discretion of the provincial teams. Various community characteristics including population size, accessibility to urban hubs of care, travel accessibility and consideration of recent kidney screening programs are all taken into consideration [Table 2]. In most cases, screening teams consist of two registered nurses and a healthcare aid. Screening takes place at a variety of different locations depending on the community. Methods of the screening process have been described in detail previously (14). In brief, finger prick droplet blood samples are collected and analyzed for blood chemistry on an i-STAT Alinity analyzer (Abbott Point of Care Inc., Princeton, NJ). An additional blood sample is used to analyze for HbA1c and a urine sample is provided to determine uACR on a DCA Vantage analyzer (Siemens, Erlangen, Germany). Blood pressure is averaged using 6 measurements taken over 6 minutes according to best practices outlined by the Canadian Hypertension Education Program (CHEP). Patients clinical values are inputted into a secure, custom iPad application built for Kidney Check that automatically calculates their eGFR. These values are further utilized to provide participants with their 2 and 5-year risk of developing kidney failure as calculated by the Kidney Failure Risk Equation (KFRE). Validated in more than 700,000 adults across 30 countries, the KFRE predicts risk of requiring dialysis or kidney transplant for individuals whose eGFR $<60\text{ml}/\text{min}/1.73\text{m}^2$ (15). Pediatric (<18 years) patients are triaged using a separate algorithm developed in collaboration with pediatric nephrologists and endocrinologists (11).

Immediately following screening, every participant is offered risk-based counseling and additional resources accordingly [Figure 1]. These discussions follow scripts developed in collaboration with Indigenous patient partners that outline the patient's current risk and what steps need to be taken to preserve kidney health. A critical component of these discussions is upholding

Community	Urban/ Rural	Distance from nearest service centre	Travel accessibility	Accessibility to follow-up care	Means of transportation
1.	Rural	10 km	Not convenient	Not accessible	Airplane/ boat
2.	Urban	10 km	Not convenient	Somewhat accessible	Car/ ferry
3.	Rural	1 hour drive	Not convenient	Not accessible	Car/ airplane
4.	Rural	1 hour drive	Not convenient	Not accessible	Car
5.	Rural/ Remote	More than 1 hour drive	Somewhat convenient	Accessible	Car/ ferry
6.	Rural/ Semi-Remote	1 hour drive	Convenient	Somewhat accessible	Car
7.	Remote	More than 1 hour drive	Not convenient	Somewhat accessible	Airplane/ ferry
8.	Mix	Mix	Mix	Mix	Car/ ferry
9.	Urban	10 km	Somewhat convenient	Somewhat accessible	Car/ ferry

* **Accessibility/non accessible** is defined as the travel costs associated with getting to the community, the distance to the community and how difficult it is to access the community via air, car or boat.

Figure 1 Kidney Check Risk Prediction Counseling is based on the below risk parameters



the principles of shared decision making and the traditional values and medicines unique to each community. Treatment plans are discussed with input from Elders and traditional healers in order to incorporate traditional medicines and diets. If patients have a primary care provider their results and treatment plan are provided to them. All individuals determined to be at intermediate or high risk of kidney failure are immediately referred to a multidisciplinary CKD clinic where they are followed by a specialized team and undergo a long-term treatment plan.

QUALITY ASSURANCE PROGRAM

Kidney Check relies on a comprehensive quality management program to ensure patient results can be confidently reported for use in clinical decision making. This program covers pre-analytical quality and staff competency, POCT equipment quality control, and external proficiency testing. Overseen by Shared Health Diagnostic Services, quality management procedures are based on the Accreditation Canada Qmentum Guidelines on Point-of-Care testing (16). To perform screening procedures, all POCT device operators must complete initial training and pass competency assessments annually. Only staff whose training and competence has been established, recorded, and regularly updated are permitted to perform and supervise screening. Screening staff are responsible for the regular maintenance of POCT devices, including consumables and reagents, at their respective sites. Day-to-day quality control procedures include checking the performance of POCT devices against pre-determined criteria. Kidney Check utilizes two high-quality POCT devices, the i-STAT Alinity® (Abbott Point of Care Inc., Princeton, NJ, USA) and the DCA Vantage®. Both systems are designed with sophisticated internal quality control measures and additional quality control checks are run daily by device operators. In addition, the program subscribes to an external proficiency testing program through the College

of American Pathologists, CAP (<https://www.cap.org/laboratory-improvement/proficiency-testing>). External proficiency testing provides regular, independent assessments of POCT devices to ensure results meet quality standards. Challenge samples are sent to be analyzed twice each year, with three samples spanning different measurement ranges.

KEY PERFORMANCE INDICATORS

Kidney Check uses several key performance indicators to measure its performance. From a patient perspective, an Indigenous patient group meets regularly to provide qualitative feedback on the program and an Indigenous patient meets with the leadership team on a biweekly basis ensuring the patient voice is considered in all aspects of the program. A second KPI involves the concept of “personalized care”. This quantitative metric ensures that 100% of patients entering the program have a customized treatment plan activated according to their level of calculated risk. A third KPI considers “patient wellness” measuring the number of patients in each risk category which can be scored in real time. In terms of clinician confidence, metrics were evaluated in the form of qualitative interviews by an independent body collecting feedback from clinical stakeholders participating in the program finding near universal agreement that the early detection and treatment of CKD in this format was helpful. Other KPI's have addressed health system administration and cost effectiveness. Importantly, a well-developed cost effectiveness model was published in a reputable nephrology journal based on this program finding this yielded excellent value for money for healthcare payers.

CONCLUSION

CKD, hypertension and diabetes are potent risk factors for multiple comorbidities such as kidney

failure and cardiovascular disease that greatly impact mortality.

Canadian Indigenous populations are disproportionately affected by these conditions, with prevalence rates reaching epidemic levels in some communities. This is of particular concern in rural and remote communities, who face significant health inequities that prevent them from receiving optimal care. In 2015, the FINISHED screening initiative proved the efficacy of POCT for these chronic conditions in rural and remote Indigenous communities.

The Kidney Check program represents a national iteration of this program. Fostering collaborative partnerships between patients, clinicians, communities and policy makers, Kidney Check aims to help bridge these gaps in health equity.



Acknowledgement

Many thanks to all multidisciplinary team members associated with this project who collectively helped us achieve a healthcare excellence award as one of the top three winners of the UNIVANTS of Healthcare Excellence™ awards in 2020 (17).

The authors would like to thank the British Columbia Kidney Check Team for their help in compiling critical information for this manuscript, as well as the continued work and commitment to the project by all provincial teams.



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