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Electronic Advice Request System for Nephrology in Alberta: Pilot Results and Implementation

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Abstract

Background: Residents of rural areas of Alberta face significant barriers regarding access to specialist care, resulting in delays in provision of optimal care. Electronic referral and consultation systems are promising tools for facilitating timely access to specialist care, especially for people living in rural locations.

Objective: To report our initial experience with the launch of an electronic advice request system for ambulatory kidney care in Alberta, Canada.

Methods: We analyzed electronic advice requests for nephrology services in Alberta after the system's pilot launch, from October 2016 to December 2017. Data for province-wide advice request utility by primary care providers (PCPs) were extracted from Alberta Netcare for analysis.

Results: The total number of electronic advice requests directed to nephrology was 118 (mean number of requests: 2 per week). Only 31 (26.3%) of the cases required a face-to-face clinic visit with a nephrologist. Most (87; 73.7%) cases were managed by PCPs with ongoing nephrologist support via the advice request tool. Typical nephrologist response time was 5.7 $\pm$ 0.6 (mean $\pm$ SEM) days.

Conclusion: These preliminary data suggest that the electronic advice request program has potential to enhance timely access to specialist kidney care and minimize unnecessary nephrologist visits while reducing response time. Broad implementation of this system may have a substantial positive impact on health outcomes and improve cost-effectiveness for nephrology care in the long term, particularly in rural communities of Alberta.

Abrégé

Contexte: Les résidents des zones rurales de l'Alberta se heurtent à des obstacles importants en ce qui concerne l'accès aux soins spécialisés, ce qui entraîne des retards dans la fourniture de soins adéquats. Les systèmes électroniques de référence et de consultation sont des outils prometteurs qui peuvent faciliter un accès rapide à des soins spécialisés, en particulier pour les personnes résidant en milieu rural.

Objectif: Présenter notre première expérience avec le lancement d'un système de demande de consultation électronique en soins rénaux ambulatoires en Alberta, Canada.

Méthodologie: Nous avons analysé les demandes de consultation électroniques pour des services de néphrologie en Alberta, entre octobre 2016 et décembre 2017, après le lancement pilote du système. Les données sur la pertinence des demandes de consultation à l'échelle provinciale, et selon les fournisseurs de soins primaires, ont été extraites du registre Alberta Netcare pour fins d'analyze.

Résultats: Le nombre total de consultations électroniques adressées en néphrologie était de 118 (moyenne de 2 demandes/semaine), et 31 cas seulement (26,3%) ont nécessité une visite en clinique avec un néphrologue. La majorité des cas (87), soit 73,7%, a été prise en charge par des fournisseurs de soins primaires qui bénéficiaient du soutien permanent d'un néphrologue par l'entremise de l'outil électronique. Le temps de réponse moyen des néphrologues était de 5,7 $\pm$ 0,6 jour (moyenne $\pm$ SEM).

Conclusion: Ces données préliminaires suggèrent que le program de demande de consultation électronique pourrait faciliter l'accès rapide à des soins par un néphrologue et minimiser les visites inutiles en clinique, tout en réduisant le

temps de réponse. La mise en œuvre à grande échelle de ce système pourrait avoir une incidence très positive sur les résultats de santé et améliorer la rentabilité des soins en néphrologie à long terme, en particulier dans les communautés rurales de l'Alberta.

Keywords
chronic kidney disease (CKD), electronic advice (eAdvice), electronic referral, eReferral advice request, primary care providers

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What was known before

Chronic kidney disease (CKD) is highly prevalent in Canada, and timely access to care is hampered by long wait times for specialist care.

What this adds

The electronic advice request system has the potential to enhance timely access to specialist kidney care and limit unnecessary nephrologist visits by allowing patients to be managed by primary care within their own communities.

Introduction

Optimal management of chronic disease requires strong input from primary care, timely access to specialists for referrals, and ongoing communication between primary and specialist physicians.[1] Traditional paper-based referrals are associated with several challenges, such as lack of complete documentation, miscommunication among physicians, and delayed specialist responses.[2] Increasingly, web-based electronic referral and consultation systems with a formal triage process are recommended as a way to streamline communication between primary care and specialist practices which enhances quality of care, ensures timely referral of patients to specialists, and thus matches the patient need with the right format of visit.[3,4] Electronic referral and consultation systems have been tested as a tool for primary care providers (PCPs) to obtain timely access to specialist input[5,6]; these systems appear to decrease wait times and improve specialist access.[7,8]

In Canada, care for patients with chronic diseases is affected by long wait times for specialist care.[9,10] Patients with chronic diseases living in rural areas suffer from lack of timely and high-quality health care services compared with those in urban areas, especially people living with CKD.[11,12] Specialist access for patients with advanced CKD is hampered by increase in referrals of patients with milder forms of CKD that can be managed by PCPs in their communities.[13] It is estimated that up to 30% of patients with end-stage renal disease (ESRD) do not receive specialist care before starting dialysis.[14] Not all patients need to be seen by specialists, and removing these patients from wait lists will expedite the process for those who need in-person consultations with specialists. These issues illustrate a critical gap in the provision of optimal care to patients with CKD.

Alberta Health Services (AHS) is the largest health care provider in (the province of) Alberta, Canada. In 2016, AHS launched the electronic advice request pilot project to help PCPs (ie, family physicians and general practitioners) in Alberta obtain advice from nephrology specialists regarding nonurgent cases.[15] The advice request portal is hosted on the eReferral system of Alberta Netcare, the provincial electronic health record (EHR) system. Electronic referral and consultation practices have been widely adopted for CKD worldwide.[3,4]

Through a process of community engagement, this initiative was designed and executed by our team of researchers, clinicians, and AHS to address some unique problems in Alberta related to timely access to specialist care, including urban areas, and also particularly among residents of rural communities scattered across the province.

The main goals of the advice request pilot project were to improve delivery of health care services by streamlining communication between PCPs and specialists for optimal patient care, to reduce patient wait times to be evaluated by a specialist, and to decrease in-person specialist consultations for patients who could be effectively managed by their PCPs in their own communities. We report our initial experience with this initiative, the extent of use by PCPs across AHS zones, specialist (nephrologist) response times, and the characteristic referral reasons of patients managed via advice request.

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Methods

Setting

Geography of Alberta. Alberta's large size is an important factor associated with disparities in distribution of health care resources, health workforce, and access to care. The population of Canada is divided into metro (population >500 000), urban (population >25 000 and <500 000), and rural (<10 000-25 000) areas by Statistics Canada.[16] Rural residents suffer from a significant lack of health services provision, including reduced access to specialized nephrology care, and have worse clinical outcomes than their counterparts in urban centers.[11,12] Rural communities comprise 17% of the total population of Alberta.[12] Remote communities are defined as those areas that do not have year-round road access or rely on third-party transportation (eg, plane, train) to a larger center[17]; these communities also have significant health issues, access to health care, and lack health service provision.[12]

Health system structure in Canada and Alberta. In Canada, health care is generally publicly funded (hospital and physician care, with no patient copayment) and is delivered by provinces and territories through a publicly funded health care insurance plan. Medications are funded by a mix of private and public coverage, and patient copayments are common.[18]

Alberta Health Services is the sole provincial health care authority of Alberta, responsible for providing care to ~4 million residents of Alberta.[6] Alberta Health Services has divided Alberta into 5 zones: Edmonton, Calgary, North, Central, and South. Edmonton and Calgary are considered "metro areas," whereas Central and North are "rural." South Zone consists of both urban and rural areas. Specialist kidney care in Alberta is provided through the Alberta Kidney Care North and South, part of AHS. Currently, there are 80 nephrologists in Alberta, most (~50) are based in academic centers, and the rest practice in community settings.

The distribution of nephrology services in Alberta is explained in Table A1.[19] Patients are not required to pay for ambulatory care delivered by a PCP or specialist in Alberta, as this is covered by the basic provincial coverage that provides fee codes for referring and consulting physicians.[20]

Alberta Netcare eReferral advice request system. Alberta Netcare is the largest provincial electronic repository in Alberta that contains patients' health information and personal data. Netcare is a secure centralized portal for clinical information from clinics, hospitals, and laboratories in one system. This allows physicians to obtain rapid access to a significant amount of clinical data for patients to facilitate care delivery. Alberta Netcare is available to all physicians in Alberta, including PCPs.[15]

The Alberta electronic referral system is a part of a larger initiative by AHS to provide a secure, reliable, and efficient platform for interactions between PCPs and specialists to deliver timely and high-quality ambulatory care for patients with chronic diseases. This tool is hosted on the provincial Netcare system. The advice request portal was launched across AHS's 5 geographic zones in July (2014) and has been operational for nephrology services since 2016. The advice request portal is available to all PCPs across Alberta to use. The advice request system was developed with the input and suggestions of primary care practitioners. Educational sessions about using the system were held across Alberta, to engage primary care practitioners. In addition, brochures were distributed to PCPs and information disseminated through newsletters for physicians as well.

An advice request could be made through Netcare by any PCP in Alberta; requests could also be submitted by clinic staff (eg, referral coordinators, administrators) on behalf of the PCP. The PCPs send clinical information about the patient's condition and their question to the specialist through the eReferral advice request system. Specialists can also access all the patients' health records and clinical investigation results on Netcare. Specialists can request the PCPs for additional details or missing information, if required.

To create an advice request, a physician (or clinic staff member) logs on to Netcare, searches for the patient's record, and then creates the referral. The reason for the request is documented, either by selecting from a drop-down list of common kidney problems or by entering the reason in an open field. The advice request system also includes an option to send a request to a specific specialist and/or location. Once submitted, the status of the advice request can be monitored by the submitting provider.

A specialist responds to the advice request by providing advice (through the advice request portal) on management to the PCP or indicates the need for an in-person specialist consult.

Both the submitting physician and responding specialist can be compensated by the provincial health ministry for time spent on advice requests. Primary care providers are required to submit the referrals to specialists within their respective zones. Exceptions are unavailability of specialists and urgent medical conditions that need to be addressed immediately.

Wait times for nephrology services for traditional fax-based referrals are collected by triage nurses. In the Northern Alberta Renal Program (that comprised Edmonton, Central, and Northern AHS Zones), wait times for nephrology referrals outside the electronic advice system are 1 week for urgent, 1 month for semi-urgent, and 3 to 4 months for nonurgent cases. Similarly, in the Southern Alberta Renal Program (that comprised Calgary and South AHS Zones), wait times are 2 to 3 weeks for urgent, 4 to 6 weeks for semi-urgent, <3 months for routine, and <6 months for elective cases.[19]

Ethics approval. Prior to conducting the study, approval was obtained by the University of Alberta Research Ethics Board (# Pro00046614).

Data Collation and Analysis

We performed a retrospective study of advice requests submitted to nephrology specialists in Alberta following its pilot launch. We analyzed advice requests from all 5 AHS zones submitted between October 13, 2016, and December 31, 2017.

We extracted data elements from Netcare and stored them in a database hosted by the Division of Nephrology at the University of Alberta. Variables included site from which the advice request was submitted, date of referral submission, reason for referral, referral provider (PCP), referral submitter (PCP or clinic staff member), date of response, nephrologist's response content, and time elapsed (number of days) between the request submission and the nephrologist's response.

We categorized the advice requests by submission location according to the 5 AHS zones (Edmonton, Calgary, North, Central, and South) and analyzed the distribution by calculating the absolute number (n) of requests submitted from each zone and expressing each as a percentage (%) of the total number of advice requests made in the province. We also categorized request submitters as PCPs, clinic staff members, or unknown (designation not reported) and analyzed the distribution by calculating the absolute number (n) of unique submitters from each category and expressing each as a percentage (%) of the total number of unique submitters in the province. We also analyzed the distribution of PCPs and clinic staff members by location type (ie, metro, urban, and rural) to assess system utility in different areas.

In addition, we reviewed clinical conditions described in advice requests and nephrologists' responses. Primary care providers were given reasons for advice request as follows based on standardized guidelines for CKD:[21] CKD, isolated albuminuria, isolated microscopic hematuria, acute kidney injury, kidney stones, and general nephrology (other causes) (Table 4). We divided nephrologists' responses to advice requests into 2 categories: advice/continue managing and referral required. We analyzed these data by calculating the absolute number (n) of times each clinical condition appeared in requests and responses, and expressing each as a percentage (%) of the total number of clinical conditions appearing in the data set. We also measured response times by calculating the number of days (mean ± SEM) between advice request submissions and nephrologists' responses in each zone and overall. We report these descriptive statistics along with median, minimum, and maximum values.

To analyze the data, we used the XLSTAT (Addinsoft, New York, NY, USA) and GraphPad Prism (GraphPad Software Inc, La Jolla, CA, USA) software packages. We used descriptive statistics and bivariate tests of associations as appropriate.

Results

Distribution and Indications for eReferral Advice Requests

The total number of advice requests to nephrology services in Alberta during the 15-month study period was 118. The highest number of requests came from the Edmonton Zone (n = 41; 35%), followed by the Calgary Zone (n = 39; 33%), North Zone (n = 24; 20%), Central Zone (n = 12; 10%), and South Zone (n = 2; 2%) (Figure 1A). The most common reason for submitting an advice request was general nephrology (ie, problems other than those specifically listed) (n = 57; 48%), followed by CKD (n = 32; 27%), isolated albuminuria (n = 11; 9%), isolated microscopic hematuria (n = 8; 7%), acute kidney injury (n = 7; 6%), and kidney stones (n = 3; 3%) (Figure 1B).

Referring Providers and Submitters

Among the total requests, 89 (75.4%) were submitted by referring PCPs and 29 (24.6%) were submitted by clinic staff members (ie, referral coordinators, administrators) (Table 1). Among the referring physicians, 45 (66.2%) were from metropolitan areas (Edmonton and Calgary Zones), 3 (4.4%) were from an urban area (ie, Lethbridge; South Zone), and 20 (29.4%) were from rural areas (Central and North Zones). Of all the 68 referring PCPs, 23 (33.8%) were repeat users who had used the advice request system more than once; of these PCPs, 13 (57%) were from metropolitan areas (Edmonton and Calgary Zones), 1 (4%) from Lethbridge (urban area), and 9 (39%) from rural areas (Central and North Zones). Similarly, 11 (84.6%) clinic staff members were from metro areas (Calgary and Edmonton Zones), whereas just 2 (15.4%) were from rural areas (Table 2). Of the advice requests, 79 (66.9%) were submitted from the metro areas (Calgary and Edmonton Zones), 4 (3.4%) from urban areas (South Zone), and 35 (29.7%) from rural areas (Central and North Zones) (Table 3). No advice requests were submitted from remote regions.

Outcomes of eReferral Advice Requests

Among the total number of advice requests submitted, 31 (26.3%) cases required referrals for in-person nephrologist consultations. For the remaining 87 (73.7%) cases, PCPs were advised to continue managing patients with appropriate guidance provided by the nephrologists. Details relating to nephrologists' decisions regarding specific clinical problems are presented in Table 4.

Specialist Response Times

Nephrologist response time to advice requests was 5.7 ± 0.6 days (mean ± SEM) across the province; for nephrologist

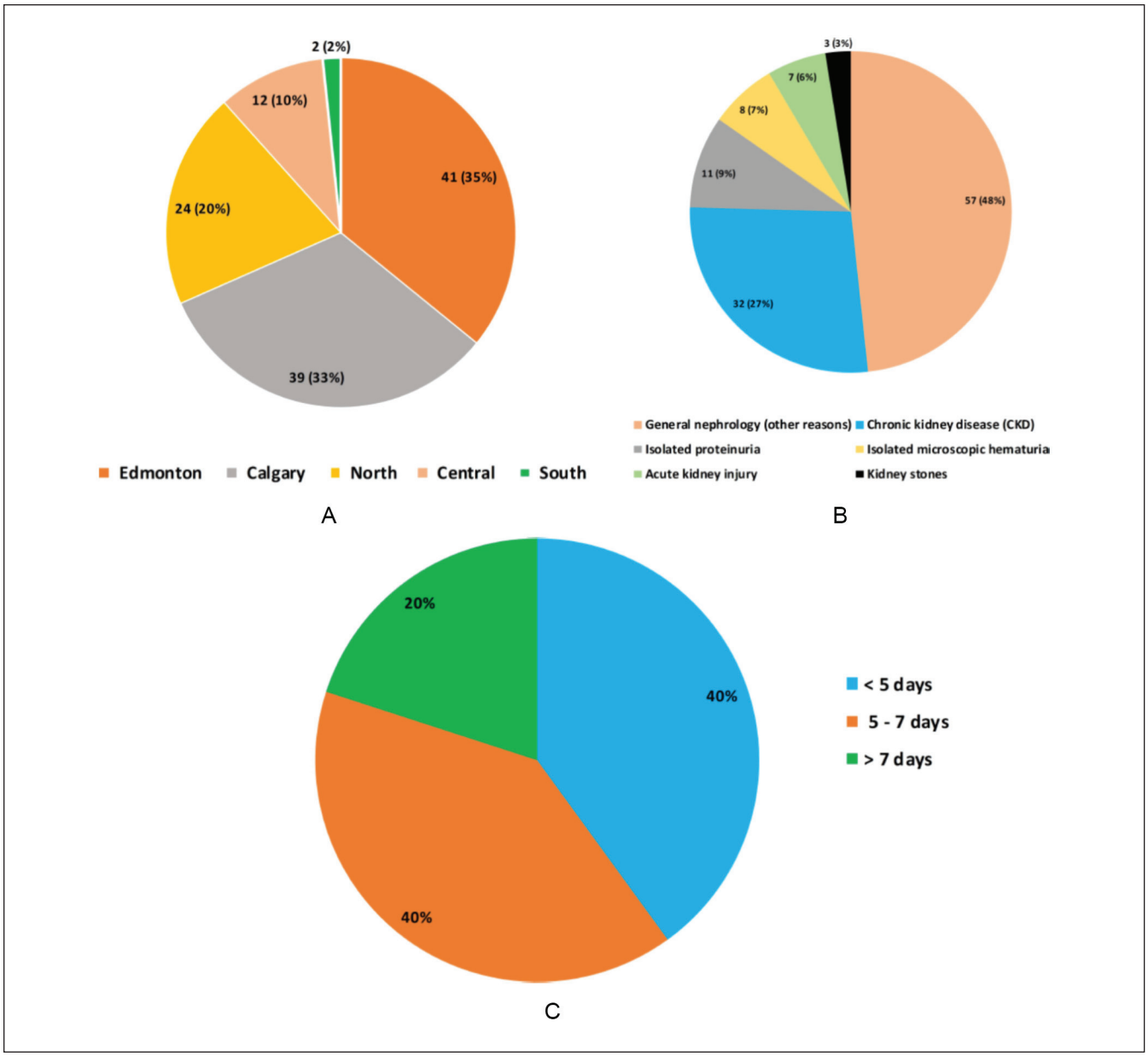

Figure 1. Advice requests to nephrology services in Alberta by Alberta Health Services zone: (A) distribution, (B) reasons, and (C) specialist response time.

Table 1. Number of Advice Requests Submitted.

Advice requests	Primary care providers (family physicians and general practitioners)	Clinic staff members (referral coordinators, administrators)
N	89	29
%	75.4	24.6

response to advice request submitted from PCPs from each zone, response times were 7.5 ± 2.4 days for the Central Zone, 6.4 ± 1.3 days for the Edmonton Zone, 5.9 ± 1.4 days for the North Zone, 4.7 ± 0.5 days for the Calgary Zone, and 4.7 ± 3.4 days for the South Zone. The median, minimum, and maximum response time values are reported in Table 5. Overall, nephrologists responded to 40% of advice requests in less than 5 days, 40% in 5 to 7 days, and 20% in more than 7 days (Figure 1C).

Number of Nephrology Referrals in Alberta (2003-2016)

The total number of referrals directed to nephrology services in Alberta, and annual and 5-year change in the number of referrals were documented. The number of

Table 2. Submitters of Advice Request.

Submitter type	Total, No. (%)	Metro: Edmonton and Calgary Zones, No. (%)	Urban: South Zone, No. (%)	Rural: Central and North Zones, No. (%)	Value of P
Primary care providers (family physicians and general practitioners)	68 (84)	45 (66.2)	3 (4.4)	20 (29.4)	0.15
Multiple submissions	23 (33.8)	13 (57)	1 (4)	9 (39)	0.29
Clinic staff (referral coordinators, administrators	13[16]	11 (84.6)	0 (0.0)	2 (15.4)	0.06
Total: No. (%)	81 (100.0)	56 (69.1)	3 (3.7)	22(27.2)	

Table 3. Regional Distribution of Advice Requests.

Advice requests	Metro: Edmonton and Calgary Zones	Urban: South Zone	Rural: Central and North Zones
N	79	4	35
%	66.9	3.4	29.7

referrals directed to nephrology (number of adults with first outpatient nephrology visit) in Alberta from 2003 to 2016 was 4380.93 ± 214.94 per year (mean ± SEM) (Figure A1). Overall, the number of referrals shows an increasing trend.

Discussion

In this article, we report our initial experience with the pilot launch of the advice request initiative for nephrology services in Alberta. A total of 118 advice requests were directed from PCPs to nephrologists during the initial 15-month period of this program. The highest number of advice requests was submitted from the Edmonton and Calgary Zones. Fewer advice requests were submitted from the other zones (Central, North, and South), which are primarily rural areas with comparatively limited availability of health care resources and specialists. Rate of advice request per 100 000 population was 3.2 for Edmonton Zone, 2.5 for Calgary Zone, 5 for North Zone, 0.67 for South Zone, and 2.6 for Central Zone. Of note, the population of Calgary or Edmonton Zone is at least more than twice of other zones. The Edmonton and Calgary Zones also had the highest number of referring providers and submitters. The number of PCPs and patients is highest in the Calgary Zone, followed by Edmonton, Central, North, and South Zones. The rate of referral per number of PCPs by region was 2.7 in Calgary, 4.2 in Edmonton, 3.4 in Central, 8.3 in North, and 0.9 in South. The rate of referral per number of patients was 0.003 in Calgary, 0.004 in Edmonton, 0.003 in Central, 0.008 in North, and 0.0008 in South. Thus, although the North Zone has less PCPs and patients, the PCPs are using the advice request system more frequently compared with the Edmonton and Calgary Zones that have more dense patient and PCP populations. No referrals were submitted from remote areas, which are subsets of rural areas (located more than 200 km from metro and urban areas), and have limited access to care. This reflects a need to improve the implementation of the eReferral advice request system in all zones, including Calgary and Edmonton, and especially in rural regions of Alberta where residents have significant health care access issues that are often linked to adverse clinical outcomes compared with their counterparts living in urban centers.[11,12]

Notably, only about 26% of cases required subsequent face-to-face office visits with nephrologists; most cases were managed by PCPs with support from nephrologists via the portal. Decision for whether a patient should have face-to-face visit depends on nephrologists. One nephrologist may think that an in-person visit is required. We are of the opinion that the decision of whether an in-person visit is necessary may be affected by nephrologist confidence in referring physician, nephrologist willingness to see a patient, availability of new patient referral spaces, and so on; all these factors can potentially limit effective utility of the eReferral system. The mean nephrologist response time was approximately 6 days; response times exceeded a week in only 20% of cases. This is a substantial improvement over the weeks to months that typically elapse between traditional paper referral submissions and nonurgent in-person consultations in clinics.

As most advice requests did not result in in-person specialist consultation, wider adoption of this system could reduce wait times for in-person nephrology services. It may also improve health system efficiency, reduce costs, and save patient travel time. eConsult implementation in remote areas led to timely access to specialist care.[8] In addition, eConsult utility in multiple specialties in Canada resulted in substantial cost savings to the health system, such as reduced costs (time off work and travel) for patients[22] and less cost for cases handled through eConsult compared with those dealt via traditional referrals.[23] We anticipate similar cost savings in Alberta with the eReferral system.

Although a varying pattern was observed year to year, overall, nephrology referrals have been increasing in Alberta between 2003 and 2016. Many nephrology

Table 4. Nephrology Specialists' Responses to Advice Requests in Alberta, by Reason for Advice Request.

Reason for advice request	Total requests, No. (%)	Continue managing via primary care, No. (%)	Nephrologist referral required, No. (%)
Kidney stones	3 (2.5)	3 (100.0)	0 (0.0)
Acute kidney injury	7 (5.9)	5 (71.4)	2 (28.6)
Isolated microscopic hematuria	8 (6.8)	3 (37.5)	5 (62.5)
Isolated albuminuria/proteinuria	11 (9.3)	10 (90.9)	1 (9.1)
Chronic kidney disease	32 (27.1)	23 (71.9)	9 (28.1)
General nephrology (other[a] reasons)	57 (48.3)	43 (75.4)	14 (24.6)
Total	118 (100.0)	87 (73.7)	31 (26.3)

[a]Other reasons = unspecified, numerical glomerular filtration rate or albuminuria/proteinuria values, cystic/genetic kidney diseases, and so on.

Table 5. Time Elapsed Between Advice Request Submission and Specialist Response.

Zone	Number of referrals	Days to specialist response			
		Mean ± SEM	Minimum	Median	Maximum
All zones	118	5.7 ± 0.6	0.01	4.4	38.8
Central	12	7.5 ± 2.4	0.70	3.2	23.6
Edmonton	41	6.4 ± 1.3	0.01	4.3	38.8
North	24	5.9 ± 1.4	0.90	4.6	35.2
Calgary	39	4.7 ± 0.5	0.04	4.8	14.2
South	2	4.7 ± 3.4	1.20	4.7	8.1

in-person consultations can be avoided if more PCPs start using the advice request system. To improve the efficiency of the advice request system and provide optimal care for patients with CKD, province-wide initiatives to facilitate PCPs' use of the system must be implemented. This study is from the first 15 months after system implementation; it remains possible that eAdvice requests increased since that time. Widespread uptake of the advice request system in Alberta should help physicians provide optimal health care, especially to residents of rural and remote communities.[17] Our results indicate that referrals submitted by both urban and rural clinic staff were minimal, and thus both these areas should be targeted for training the clinic staff on using the eAdvice request system.

Finally, this initiative, executed by our team of researchers and clinicians in concert with AHS, was designed to address some unique health care access problems in Alberta. Because of the large land mass, there are rural areas in almost every province in Canada, including Alberta. It is extremely difficult for residents living in the remote and rural communities to access necessary care in a timely fashion, and increased use of the advice request system in future can help improve access to specialist care. Of note, there are certain limitations and barriers that can potentially affect effective implementation. First, many clinics in rural areas lack high-speed Internet, and completing the advice request system might take longer than sending paper-based referrals. Second, training of clinic staff is required to ensure a smooth transition from paper-based to electronic referrals, for effective flow of referrals within the system. Also, the assessment of the impact of eAdvice beyond improving processes of care requires long-term follow-up of clinical outcomes, which is beyond the scope of this article.

Conclusion

Appropriately designed and executed with community engagement, this study demonstrates the utility and impact of an electronic referral system for ambulatory kidney care. The next step is to develop effective adoption strategies comprising a composite framework for care delivery tools (eg, a CKD care pathway, eReferral toolkits) to build capacity in participating communities for optimal kidney health and to reduce the access gap to timely specialist care, particularly in remote and rural communities. Also, to facilitate adoption of the eAdvice system by PCPs in rural and remote regions, we will conduct practice facilitation visits entailing academic detailing about the eAdvice system and guideline-concordant care for CKD across clinics in Alberta. The practice facilitation visits will be followed up by detailed telephonic sessions with the clinics every 3 months for a year to address any concerns the PCPs have about using the system.

Appendix

Table A1. Distribution of Nephrology Services in Alberta by Renal Programs.

Renal program	Alberta Health Services zones covered	Clinical sites (hubs)[a]	Number of nephrologists	Rural/satellite sites[b]
Northern Alberta Renal Program (NARP)	Edmonton	University of Alberta Hospital	25	
		Grey Nuns Hospital	4	
		Royal Alex Hospital	4	
	North	Fort McMurray—Northern Lights Regional Health Centre	1	Grande Prairie Queen Elizabeth II Hospital, Whitecourt Healthcare Centre, St. Paul Healthcare Centre, Peace River Community Health Centre, Westlock Healthcare Centre, Whitecourt Healthcare Centre, Wetaskiwin Hospital, Hinton Healthcare Centre
	Central	Red Deer Medical Dental Building	2	
Southern Alberta Renal Program (SARP)	Calgary	Sheldon M. Chumir Health Centre	42	
		Sunridge Mall		
		Calgary Urban Project Society		
		Medicine Hat	1	Siksika Health and Wellness Centre, Blood Tribe Health Centre —Levern Clinic
	South	Lethbridge	1	

[a]Clinical site with a nephrologist on site.
[b]Outreach visits by nephrologists.

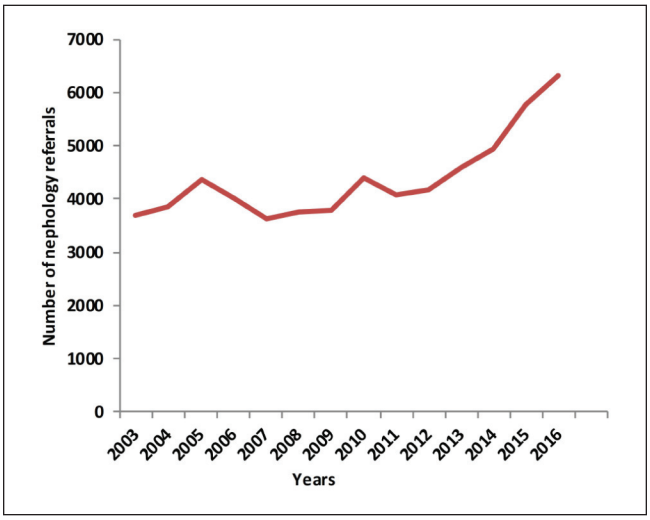

Figure A1. Number of referrals directed to nephrology services in Alberta.
Note. Referrals submitted to nephrology services (number of adults with first outpatient nephrology visit) in Alberta from 2003 to 2016.

Ethics Approval and Consent to Participate

Prior to commencement of the study, ethics approval was obtained from the University of Alberta Research Ethics Board.

Consent for Publication

All authors have given their consent for publication of this article.

Availability of Data and Materials

The data for the study will remain with Dr. Aminu Bello and is available on request.

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Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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