

# Community pharmacist targeted screening for chronic kidney disease

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## Introduction

More than 1 in 10 adults in Canada is living with chronic kidney disease (CKD),<sup>1</sup> defined as a reduction in kidney function (estimated glomerular filtration rate [eGFR] <60 mL/min/1.73 m<sup>2</sup>) or markers of kidney damage (albuminuria ≥3 mg/mmol or abnormalities in urine sediment or renal imaging) for more than 3 months.<sup>2</sup> Individuals with CKD require more intensive follow-up due to their reduced renal function, increased cardiovascular risk and multiple associated comorbidities.<sup>3</sup> Early detection can help optimize the treatment, prevent or slow the progression of the disease and ultimately improve the quality of life of patients with CKD.<sup>4-6</sup> Early stages of CKD are often asymptomatic, making preventive efforts difficult. Indeed, Mitra and Bradley<sup>7</sup> identified that a large proportion of patients in the community are underdiagnosed and undertreated for CKD. As such, the use of comprehensive evidence-based guidelines to aid in targeted screening, early detection and management of such patients has been recommended.<sup>1</sup> The CKD Clinical Pathway was developed to provide guidance on these issues in this high-risk population.<sup>8</sup>

The CKD Clinical Pathway is an online tool modeled after the successful National Institute for Health and Care Excellence (NICE) clinical pathways. It was developed by a team of stakeholders that included nephrologists, pharmacists, primary care physicians, nurses, other health care professionals, information technology specialists, web developers and designers to aid in the diagnosis, management and referral of adults with CKD in the community. The content in the CKD Clinical Pathway is evidence based and combines a group

of national and international guidelines.<sup>2,9-14</sup> This ensures that the recommendations are relevant and harmonized across Canada. More information on the CKD Clinical Pathway is available at [www.ckdpathway.ca](http://www.ckdpathway.ca).

Pharmacists are frontline health care professionals who see patients with, and at risk of, CKD frequently and therefore could systematically identify these individuals and assist in their management. Moreover, pharmacists' scope of practice has expanded in Alberta, allowing them to order and view laboratory tests. As such, we undertook this study to evaluate pharmacists' application of the CKD Clinical Pathway in the screening and identification of patients with CKD, particularly those with previously unrecognized CKD.

## Methods

This evaluation of the implementation of the CKD Clinical Pathway by pharmacists was conducted as part of the Rx EACH study, a randomized controlled study of pharmacist-led cardiovascular risk reduction intervention versus usual care.<sup>15</sup> It was conducted in 55 community pharmacies across the province of Alberta.

Pharmacists systematically identified potential participants in the Rx EACH study by focusing on target prescriptions for oral hypoglycemic, antihypertensive, lipid-lowering, antiplatelet and anticoagulant medications.<sup>15</sup> As part of routine care, pharmacists checked the most recent laboratory test results for those patients. If the potential participant had diabetes, established vascular disease, Framingham risk score >20% and/or history of CKD and at least one uncontrolled risk factor (i.e., blood pressure,

## KNOWLEDGE INTO PRACTICE



- Community pharmacists' application of the Chronic Kidney Disease (CKD) Clinical Pathway in patients at high risk for cardiovascular events demonstrated a high prevalence of CKD.
- Applying the CKD Clinical Pathway recommendations represents a promising approach for targeted CKD screening that has important implications for chronic disease prevention and management.
- Expanding the scope of practice of community pharmacists to include laboratory testing can have a positive impact on patients' outcomes.

low-density lipoprotein cholesterol, HbA1C or current smoking), he or she would be eligible to take part in the study.<sup>15</sup> Eligible patients were asked to sign a written informed consent form.<sup>15</sup> The study was approved by the research ethics boards of the University of Alberta and the University of Calgary and registered at clinicaltrials.gov (identifier NCT01979471).

Pharmacists used the CKD Clinical Pathway Targeted Screening Guidelines to screen all participants in the Rx EACH study for CKD based on serum creatinine (and eGFR) and random urine albumin-to-creatinine ratio (ACR). If these tests had been performed over the past 12 months, then those results were used; otherwise, they were ordered by the pharmacist. The eGFR and ACR test results were entered into the CKD Clinical Pathway tool to confirm the presence of CKD. Participants were also asked if they had a previous diagnosis of CKD.

Participants were considered to have CKD if they had at least one of the following:

- Patient self-reported CKD (confirmed by laboratory results obtained through the provincial electronic health record)
- Pharmacist knowledge/awareness that the patient has CKD (with the aid of laboratory results available in the provincial electronic health record)
- Two consecutive eGFRs both  $<60$  mL/min/ $1.73$  m<sup>2</sup> over a 3-month period
- Two consecutive ACRs both  $\geq 3$  mg/mmol over a 3-month period
- One ACR  $\geq 30$  mg/mmol

Patients with CKD were further categorized as those with known CKD or those with unrecognized CKD.

Known CKD was defined as follows:

- Having a previous diagnosis of CKD as reported by the patient (and confirmed by laboratory results from the provincial electronic health record)
- Pharmacist knowledge/awareness of a previous CKD diagnosis (and confirmed by checking the provincial electronic health record)
- Having impaired kidney function tests (eGFR  $<60$  mL/min/ $1.73$  m<sup>2</sup> and/or ACR  $\geq 30$  mg/mmol or 2 consecutive ACR tests that are  $\geq 3$  mg/mmol)<sup>15</sup>

Unrecognized CKD was defined as follows:

- No previous diagnosis of CKD as reported by the patient (and confirmed by laboratory results from the provincial electronic health record)
- No pharmacist knowledge/awareness of a previous CKD diagnosis
- Having 2 consecutive eGFRs both  $<60$  mL/min/ $1.73$  m<sup>2</sup> over a 3-month period and/or 2 consecutive ACRs both  $\geq 3$  mg/mmol over a 3-month period or 1 ACR  $\geq 30$  mg/mmol during the study period

The primary outcome of our study was the proportion of patients with unrecognized CKD.

## Results

We enrolled 720 participants in the Rx EACH study, of whom 57% were male. The median age of these participants was 63 years (interquartile range, 54-70), and more than a quarter of them were current smokers (27%). Diabetes was the most common comorbidity (79%) among those participants, followed by CKD (39%) and established vascular disease (30%).

Among patients with CKD, 60% had previously known CKD (Figure 1). More than three-quarters of these known CKD cases (82%) had previous laboratory confirmation of the presence of CKD, while the remainder (18%) were categorized based on self-report and/or pharmacist knowledge of their diagnosis.

A total of 113 patients (40% of those with CKD) had unrecognized CKD; that is, they had no evidence of a previous diagnosis of CKD. Of these, 83% had an elevated ACR ( $\geq 3$  mg/mmol over a 3-month period) and normal eGFR results ( $>60$

mL/min/1.73 m<sup>2</sup> over a 3-month period), while 9% of those cases had low eGFR (<60 mL/min/1.73 m<sup>2</sup> over a 3-month period) and normal ACR (<3 mg/mmol over a 3-month period). The remainder (8%) had abnormal results for both tests (Figure 2).

## Discussion

Community pharmacists' application of the CKD Clinical Pathway demonstrated a high prevalence of previously unrecognized CKD—113 patients in our pool of 720 patients at high risk for cardiovascular events. This may have important clinical implications for patient care, including the need to adjust medication regimen and measures to prevent progression of CKD and reduce risk for cardiovascular events. To our knowledge, this is the first validation of the benefit of expanding the scope of practice of community pharmacists to include laboratory testing.

Using a targeted screening approach as recommended by the CKD Clinical Pathway, we found a higher prevalence of CKD than what was reported in the literature among Canadian adults.<sup>1</sup> Arora and colleagues<sup>1</sup> reported a 13% overall prevalence of CKD among Canadian adults. This difference can be explained by the fact that we included individuals at high risk for cardiovascular events and whose median age was 63 years (in contrast to a median age of 40 in the general Canadian population).<sup>16</sup>

Importantly, we found 113 patients (40% of the patients with CKD) who were previously unrecognized as having kidney dysfunction. This finding is consistent with the findings of Szczech and colleagues,<sup>17</sup> who assessed the routine practices of primary care practitioners and the sensitivity of detecting CKD in a high-risk adult population.

## MISE EN PRATIQUE DES CONNAISSANCES

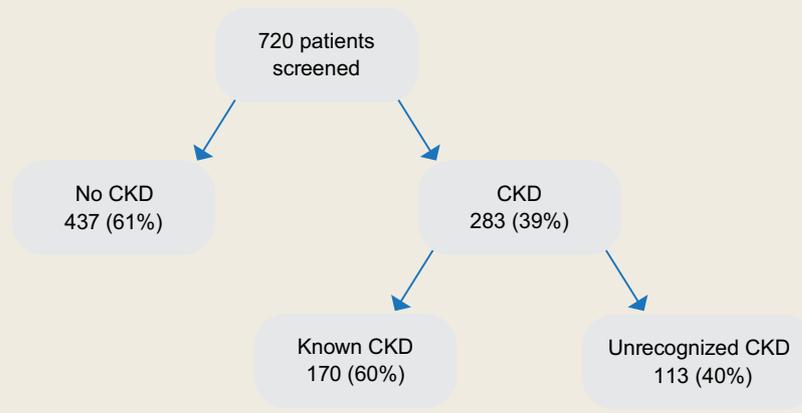


- Les pharmaciens communautaires appliquant le CKD Clinical Pathway (chemin clinique pour la néphropathie chronique) chez les patients présentant des risques élevés d'événement cardiovasculaire ont permis de signaler la forte prévalence de la néphropathie chronique.
- L'application des recommandations du CKD Clinical Pathway représente une approche prometteuse de dépistage ciblé de la néphropathie chronique, qui a des conséquences importantes sur la prévention et la prise en charge de la maladie chronique.
- En élargissant le champ d'exercice des pharmaciens communautaires aux analyses en laboratoire, les résultats médicaux des patients pourraient s'améliorer.

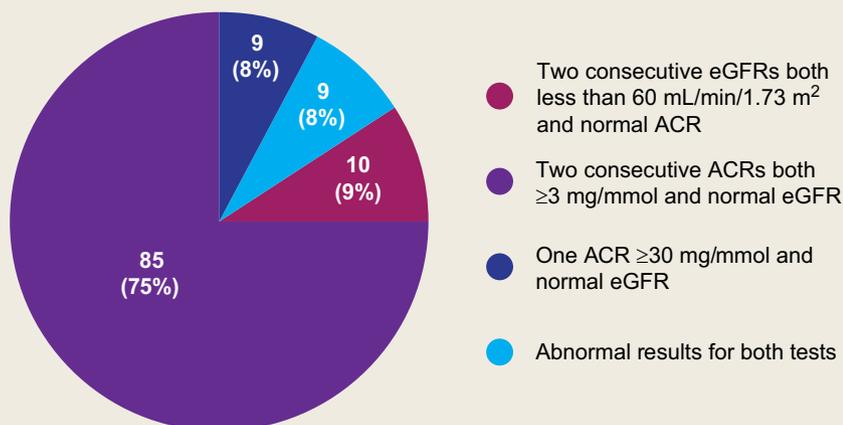
They reported that an even higher proportion of patients with CKD (78%) (stages 3-5) did not have a physician diagnosis of CKD before the study. In our study, more than three-quarters of the unrecognized cases had normal eGFR and elevated ACR results, which highlights the importance of conducting both tests during CKD screening to ensure disease detection.

Our study was conducted in the context of a clinical trial in patients at high risk for cardiovascular events, and one might not expect such a high "yield" in lower risk populations. Nevertheless, pharmacists followed the targeted screening guidelines set out in the CKD Clinical Pathway and the international clinical practice guidelines.<sup>2</sup> Indeed, our results validate the CKD Clinical Pathway as a useful tool to identify patients eligible for targeted testing and to use laboratory test results to diagnose CKD. ACR is known to be falsely elevated during some acute illnesses such as urinary tract infection or febrile illnesses.<sup>11</sup>

**FIGURE 1** Prevalence of chronic kidney disease (CKD) (known and unrecognized) among patients in the Rx EACH study



**FIGURE 2** Breakdown of diagnostic criteria used to identify patients with unrecognized chronic kidney disease (CKD) ( $n = 113$ )



ACR, albumin-to-creatinine ratio; eGFR, estimated glomerular filtration rate.

Our study protocol did not take this into account, which could have introduced some false-positive results. However, it seems likely that community-dwelling outpatients would simply delay laboratory testing if they had an acute illness. Moreover, all participants had follow-up testing at 3 months to confirm their kidney function. The use of self-report and pharmacist knowledge/awareness as some of the criteria to define CKD could introduce recall bias, which could falsely elevate the number of unrecognized CKD cases. However, the pharmacists reviewed all previous lab tests (using the provincial electronic health record) to assess the patients' kidney function before categorizing them into known or unrecognized CKD. Moreover, the high proportion of unrecognized cases in the community is consistent with what has been reported in the literature.<sup>17</sup>

We believe this is the first empiric evidence of the benefit of expanding pharmacists' scope

of practice to include targeted laboratory testing. The results of our study suggest a potential public health benefit of identifying patients with mild to moderate CKD in the early stages, when preventive efforts against progression to end-stage CKD are possible. This is in addition to allowing pharmacists to adjust medication regimens according to renal function and also recommend cardiovascular prevention to this high-risk population.

## Conclusion

Community pharmacists' application of the CKD Clinical Pathway in patients at high risk for CVD events demonstrated a high proportion of patients with unrecognized CKD. This represents a promising approach for targeted screening which has important implications for chronic disease prevention and management. This also highlights the benefit and the potential impact of judicious ordering of laboratory tests by pharmacists. ■

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**Author Contributions:** Al Hamarneh had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. Study concept and design: Tsuyuki, Hemmelgarn, Jones and Al Hamarneh. Acquisition of data: Tsuyuki and Al Hamarneh. Analysis

and interpretation of data: Tsuyuki, Hemmelgarn, Jones and Al Hamarneh. Drafting of the manuscript: Tsuyuki, Hemmelgarn and Al Hamarneh. Critical revision of the manuscript for important intellectual content: Tsuyuki, Hemmelgarn, Jones, Curtis, Balint and Al Hamarneh. Statistical analysis: Tsuyuki and Al Hamarneh. Administrative, technical, and material support: Tsuyuki, Hemmelgarn, Jones, Curtis, Balint and Al Hamarneh. Study supervision: Tsuyuki, Hemmelgarn, Jones and Al Hamarneh.

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