Impact of quality improvement initiatives to improve CKD referral patterns: a systematic review protocol

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ABSTRACT

Introduction Chronic kidney disease (CKD) is a global-health problem. A significant proportion of referrals to nephrologists for CKD management are early and guideline-discordant, which may lead to an excess number of referrals and increased wait-times. Various initiatives have been tested to increase the proportion of guideline-concordant referrals and decrease wait times. This paper describes the protocol for a systematic review to study the impacts of quality improvement initiatives aimed at decreasing the number of non-guideline concordant referrals, increasing the number of guideline-concordant referrals and decreasing wait times for patients to access a nephrologist.

Methods and analysis We developed this protocol by using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses for Protocols (2015). We will search the following empirical electronic databases: MEDLINE, Embase, Cochrane Library, CINAHL, Web of Science, PsycINFO and grey literature for studies designed to improve guideline-concordant referrals or to reduce unnecessary referrals of patients with CKD from primary care to nephrology. Our search will include all studies published from database inception to April 2021 with no language restrictions. The studies will be limited to referrals for adult patients to nephrologists. Referrals of patients with CKD from non-nephrology specialists (eg, general internal medicine) will be excluded.

Ethics and dissemination Ethics approval will not be required, as we will analyse data from studies that have already been published and are publicly accessible. We will share our findings using traditional approaches, including scientific presentations, open access peer-reviewed platforms, and appropriate government and public health agencies.

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Strengths and limitations of this study

► Our proposed study will focus on improving referral patterns to specialist kidney care which has the potential to increase the proportion of guideline-concordant referrals and decrease wait times for patients with chronic kidney disease.

► Our study findings can inform focus groups in the future that will incorporate opinions of patients, policy-makers and scientific researchers to further explore methods in enhancing referral patterns from primary care to nephrologists.

► Our study may reveal which quality improvement initiatives best improve patient outcomes (eg, wait times).

► Given that the definition of appropriate referral is usually not uniform across studies, our analysis will be based on different local guidelines, which might affect the interpretation of our results.

INTRODUCTION

Chronic kidney disease (CKD) has become a serious global health concern. In 2017, CKD was reported as the cause of death for approximately 1.2 million people worldwide,[1] and estimates indicate that the number of patients with end-stage kidney disease requiring kidney replacement therapy (KRT) will continue to increase worldwide, reaching 5.4 million by 2030.[2]

Primary healthcare (PHC) practitioners play a significant role in managing earlier stages of CKD, when the focus is on addressing the risk factors for CKD progression, such as diabetes, hypertension and other comorbidities.[3 4] Estimates from Alberta, Canada indicate that up to 95% of people with CKD are managed in the PHC setting.[5] Another study reported that 71.9 per 1000 patients with advanced CKD (stages 3–5) in Canada are also managed in the PHC setting.[6] CKD management is costly to the healthcare system[7–10] and cost per person increases as CKD progresses.[11 12] Thus, effective CKD management at the PHC level has the potential to greatly reduce costs to the healthcare system, especially given the significantly high costs associated with KRT.[12–14]

Various guidelines and summary papers,[3 4 15 16] toolkits[17] and referral pathways[18] are available to help PHC practitioners manage CKD and decide which patients should or should not be referred to nephrologists. The Kidney Disease: Improving Global Outcomes (KDIGO) guidelines include specific recommendations for referral to nephrology, including but not limited to eGFR values, urine protein abnormalities and CKD progression.[16] Despite these internationally recognised recommendations, referral recommendations are not consistent, and vary between different healthcare systems.[15 16 19] For example, the Canadian Society of Nephrology recommends referring patients with CKD to nephrology when ACR exceeds 60 mg/mmol whereas KDIGO stipulates that referral should be initiated when ACR exceeds 30 mg/mmol.[15]

Timely referrals to nephrology have been shown to be linked to initiation of CKD-specific therapies and appropriate initiation of KRT.[20 21] Although it is well known that late referrals increase the risk of mortality, worsen post dialysis outcomes, and are associated with lengthy hospital stays and treatment costs,[22–24] not much is known about the implications of early—specifically, non-guideline concordant—referrals. Non-guideline concordant referrals may strain the healthcare system due to an increase in the number of overall referrals and prolonged wait times, and thereby delay access to specialty care[25] such as nephrology.

It has been shown that approximately 40% of referrals to nephrology for CKD management are not concordant with guidelines.[26 27] There may be various reasons for this. First, primary care physicians may not be comfortable with certain aspects of CKD management. For example, non-nephrology practices tend to adhere less often to monitoring parathyroid hormone, performing follow-up measurements of urine ACR and various other aspects of CKD care.[28 29] Second, specialty guidelines are continuously being expanded and updated, which places a burden on primary care physicians who must become familiar with each one.[28 30 31] Overall, this is an area where quality improvement (QI) initiatives may add substantial value by improving provider confidence, patient care and health efficiency

QI is an evolving area in healthcare with the potential to greatly influence practice patterns and reduce quality gaps in various areas of healthcare. A quality gap is the difference between healthcare outcomes and processes in the current state versus what can be achieved by applying professional expertise and implementing QI initiatives.[32] With regard to CKD referrals, outcome-level gaps include changes in wait times or the total number of referrals, and process-level gaps are reflected in how many primary care referrals are found to be guideline-concordant versus discordant.

QI initiatives are developed to reduce these gaps and inform interventions aimed at improving health outcomes by increasing the rate of effective practices in healthcare. Various taxonomies have been developed to classify QI initiatives into sub-groups based on target focus and delivery method.[32–36] In a previous systematic review, Faulkner *et al* examined interventions in PHC focused on influencing referral rates from primary to secondary care in the UK.[37] The authors found that most interventions targeting referral rates are professional (defined as interventions such education for PHC, information provision or guidelines) or organisational (defined as PHC and specialist provider schemes, general practitioner fundholding schemes and open access referral schemes) in nature, and that organisational interventions tend to reduce referrals to specialist care. Researchers also examined referrals from primary care to specialists in an updated Cochrane systematic review published in 2011, and found that educational activities and the use of structured referral sheets are the only interventions that impact referral rates.[38] These methods, however, have not demonstrated the same effectiveness with regard to referrals in the CKD population. A study from Ontario, Canada failed to show a significant change in the proportion of appropriate referrals from primary care after the implementation of a CKD toolkit and educational interventions for PHC providers.[17] Thus, further work is needed to identify which types of interventions have the potential to reduce overall and guideline-discordant referrals, improve wait times to specialist care and close quality gaps in referral patterns from PHC providers for the CKD population.

The key objective for this review is to determine the impacts of various QI initiatives on process-based measures of CKD referral patterns from PHC to nephrology, including wait times, number of referrals and/or proportion of guideline-concordant referrals. This is critically important, as PHC plays a prominent role in managing CKD[6] and our group has collected preliminary data indicating that a large proportion of referrals from PHC may be guideline-discordant, thereby potentially contributing to increased wait times.

METHODS
Study design
We will conduct a systematic review of studies reporting on the impact of QI initiatives aimed at ensuring appropriate referral of patients with CKD from PHC to clinical nephrology programmes. PHC providers are defined as family physicians, family doctors and general practitioners (including nurse practitioners) in the primary care setting; we will exclude general internists and paediatricians who may be considered PHC providers in certain geographic regions.[38] We will also exclude studies that include general internists and/or paediatricians among eligible referral sources. We chose to exclude such studies given that our focus is to assess the impact of implementing QI on referrals from primary care to nephrology. Including studies with referrals from general internal medicine (GIM) and paediatrics could create heterogeneity among the studies and confound our outcome

and conclusions given that GIM and paediatrics, in many places, are considered specialists rather than primary care. It is reassuring that this category of referrals from general medicine and paediatrics are small (<10% of all referrals to nephrology) based on empirical information available to use, and the referral model within the Canadian health system where primary care providers (family physicians and GPs) constitute the main gatekeepers to specialist care. The protocol for this study is based on Preferred Reporting Items for Systematic Reviews and Meta-Analysis for Protocols 2015 (PRISMA-P-2015).[39] We will follow the PRISMA 2020 methodological guidelines (PRISMA 2020) as we conduct and report the findings of our systematic review.[40] We have outlined the types of studies to be included based on the nature of participants, interventions applied, outcomes reported and study designs:

► Types of participants. We will include studies with participants over 18 years of age, regardless of sex, ethnicity and geographical location who had been diagnosed with CKD but had not initiated KRT when a study intervention was first implemented.

► Types of interventions. We will include any initiative or programme designed to ensure guideline-concordant referrals or to reduce unnecessary referrals of patients with CKD from a primary care provider to a nephrology specialist. Various methods have been employed previously, including but not limited to: CKD management/referral pathways, toolkits, electronic referral systems, structured referral forms and practice facilitation (ie, consultant-led educational programmes for primary care practitioners). We will categorise these studies based on the focus of the intervention, as described in previous studies[32 41]: (1) provider education; (2) provider reminder systems; (3) audit and feedback; (4) organisational change; (5) financial incentives, regulation and policy; and (6) other (table 1).

► Types of studies. We will include randomised trials, controlled clinical trials, controlled before-after studies, interrupted time series studies, QI reports and descriptive studies.

Search strategy

We have developed a search strategy in consultation with a research librarian (LNH) (online supplemental appendix 1). We will search the following electronic databases— MEDLINE, Embase, Cochrane Library, CINAHL, Web of Science and PsycINFO—using a combination of controlled vocabulary search terms ; the MEDLINE search strategy is shown in online supplemental table S1. We also will manually search the references of publications meeting our criteria to identify any other work relevant to our review. Furthermore, we will search grey literature (conference abstracts and proceedings, government and organisational reports, working papers, policy papers) in consultation with a librarian.

Study outcomes

Our outcomes of interest are changes to process-based QI measures: wait times, changes in the total number of referrals and changes in the proportion of guideline-concordant referrals. We anticipate that included studies will have used various guidelines specific to geographic locations and local practice patterns. For studies that do not specify certain guideline referral criteria, we will document that referral criteria were not used.

Data collection and analysis

The PRISMA flow diagram summarises the recommended study selection process (figure 1). To screen and select studies to be included, we will use a two-stage collaborative review process. In the first stage, two reviewers (AG and NS) will independently review titles and abstracts of retrieved studies based on the inclusion and exclusion criteria listed in table 2. In the second stage, full texts of the selected studies will be obtained by these reviewers and analysed independently to determine eligibility for inclusion in our final review. For both the first and second stages of screening, studies will be included if there is consensus between the two reviewers. If there is a disagreement, a third reviewer (IO) will resolve such conflicts and make decision on eligibility. For any excluded study, we will record at least one reason for exclusion.

| Table 1	Taxonomy of interventions used in the systematic review
Intervention type	**Definition**
Provider education	Interventions aimed at training care providers, including educational workshops/meetings, outreach programmes and distribution of educational materials.
Provider reminder systems	Providing specific information about clinical encounters with the aim of prompting clinicians to recall information or promote a certain aspect of care.
Audit and feedback	Methods that provide a review of clinical performance for healthcare providers and institutions to help improve quality of a certain aspect of care.
Other	Interventions not covered in the previously listed items, for example, organisational change initiatives, financial incentives, patient reminder systems, patient education, promotion of self-management and facilitated relay of clinical data to providers.
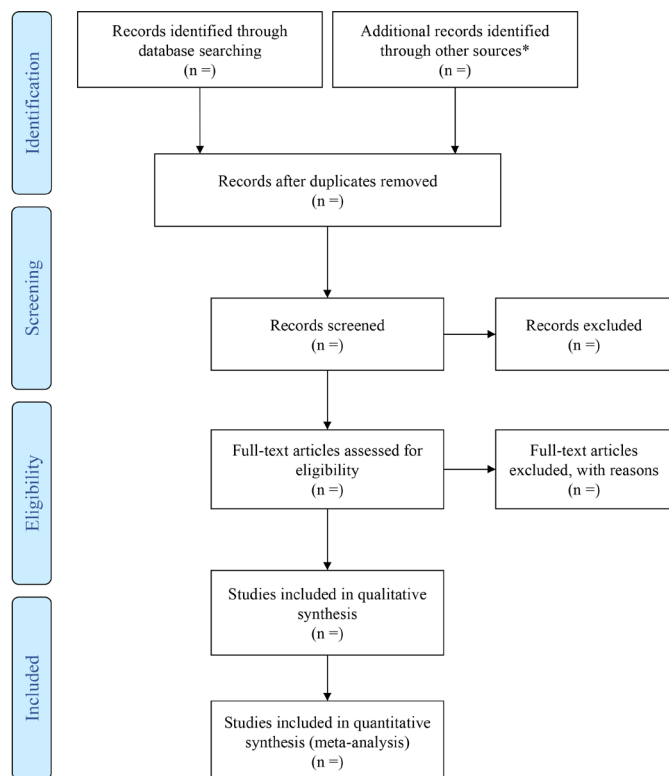
Figure 1 Study selection process. *Other sources (online publications, technical reports, policy briefs, etc).

Data extraction and management

Two reviewers will independently retrieve data and enter the summarised details into a data extraction form in Microsoft Excel. Data will include type of study, study design, publication year, first author, location of study and local healthcare system (eg, private vs public), CKD stages included in study, assessment of kidney function (eGFR, serum creatinine and urine albumin levels), referral guidelines/criteria used, a description of the QI intervention utilised, duration of intervention and follow-up, wait times and changes in total number of referrals and the proportion of guideline-concordant referrals.

Assessment of risk of bias in included studies

We will adapt and use the Cochrane Effective Practice and Organisation of Care risk of bias criteria[42] to assess methodological quality and evaluate risk of bias in our retrieved studies. The risk of bias per study will be displayed in a risk of bias summary table, and any discrepancies will be resolved by a third reviewer.

Data synthesis and analysis

We will report changes in wait times, total referrals and the proportion of guideline-concordant referrals associated with the QI interventions used in each study. Changes in the number of referrals, the proportion of guideline-concordant referrals and other outcomes associated with QI interventions will be presented as absolute values and reported in the same way across all studies. All wait times will be reported as number of days.

If concerns arise regarding missing or unclear data in the studies analysed, we will contact the authors to request information related to study methods, referral criteria used, and changes in guideline-concordant referrals. Missing outcome data will be summarised in the data extraction form and noted in the risk of bias section. Characteristics of included studies will be summarised in tables. Intervention effects will be calculated as relative risks with 95% CIs for dichotomous data, and mean differences with 95% CIs for continuous variables. If we identify a sufficient number of studies, and clinical and methodological heterogeneity are reasonable, we will perform a meta-analysis to summarise pooled results using a random effects model.[43] Statistical heterogeneity will be quantified using I^2 statistics[44] in each analysis. If heterogeneity between studies is high ($I^2 > 50\%$), then data will be reported descriptively and we will provide a narrative synthesis of included studies using the Synthesis Without

Table 2 Inclusion and exclusion criteria for this study	
Inclusion criteria	**Exclusion criteria**
► Studies involving patients with CKD who are not being managed with KRT. ► Studies reporting changes in process-based QI measures (wait times, number of referrals, or changes in guideline-concordant referrals) for patients with CKD. ► Studies reporting at least one outcome measure (referral numbers, rate or proportion of guideline concordant referrals or wait times). ► No restrictions on publication date. ► No restrictions on language. ► No restrictions on the referral guidelines (eg, KDIGO vs local/national guidelines) used.	► Studies where referrals are not from PHC to nephrology (eg, referrals from or to general internal medicine for CKD). ► Review articles, editorials, letters to the editor, commentaries, case studies, case reports, images. ► Studies where we cannot obtain relevant data (eg, method of intervention or outcomes reported) even after contacting authors. ► Studies where the outcomes of interest (referral numbers, wait times, guideline-concordant referral rate) are not clearly reported.

CKD, chronic kidney disease; KDIGO, Kidney Disease: Improving Global Outcomes; KRT, kidney replacement therapy; PHC, primary healthcare; QI, quality improvement.
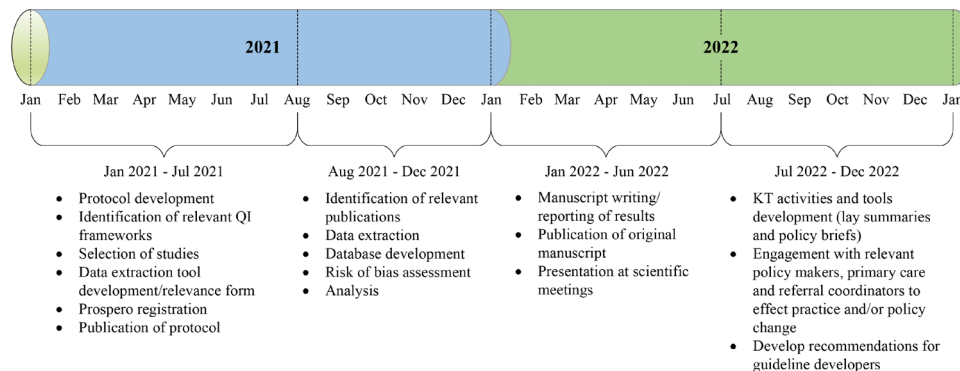
Figure 2 Project timeline. QI, quality improvement.

Meta-analysis reporting guideline as a framework.[45] We will assess publication bias using a regression-based test[46] and by visually inspecting funnel plots.

We will conduct a stratified meta-analysis by study characteristics. These include: the use of KDIGO guidelines versus others, CKD stage at referral and country income group (low and middle income vs high income). We will perform categorical comparisons of the different types of QI interventions (ie, provider education; provider reminder systems; audit and feedback; organisational change; financial incentives, regulation and policy; and other).[32] We will compare the number of QI interventions in each category and the overall impacts of each on wait times, referral numbers and the proportion of guideline-concordant referrals. This information will be summarised in table format, similar to previous studies that have examined the impacts of QI interventions on referral rates.[37 38]

Patient and public involvement

This protocol for a systematic review will not utilise patient or public involvement. Because no patient data will be collected at this step, this study does not require ethics approval. However, we hope to form focus groups in the future where we will promote patient engagement by soliciting and incorporating the opinions of patients with CKD regarding the relevance and implications of the study protocol and results. We hope to form similar focus groups with PHC providers. We also will involve policymakers at Alberta Health Services who will be interested in analysing QI measures to enhance local health policies and practices. Furthermore, we will collaborate with scientific researchers at our institutions and others who are interested in this topic and have performed relevant work in this field. These groups will be engaged after the protocol is published and the results of the systematic review have been synthesised.

Timeline

We will collect data and develop our database from August to December 2021, analyse our data and compile our results from January to June 2022, and engage in knowledge translation activities from July to December 2022 (figure 2).

Ethics and dissemination

Ethics approval will not be needed for our project since we will analyse data from already published studies. Our findings will be shared using traditional approaches, including open access peer-reviewed publication(s), presentations at meetings and a report.

DISCUSSION

QI initiatives have significant potential to close quality gaps, improve health systems and enhance patient outcomes. To the best of our knowledge, no systematic reviews have been performed to examine different QI interventions that have been trialled to ensure appropriate referrals of patients with CKD from PHC to nephrology. Our analysis will yield a summary of which types of QI interventions improve referral patterns. These results can guide the strategic implementation of future QI initiatives to improve referral patterns and may ultimately enhance knowledge and CKD management practices in primary care settings, improve referral and triage systems, and increase the proportion of guideline-concordant referrals of patients with CKD. These implications are significant, especially for public healthcare systems which may be burdened by both the costs of chronic disease management and long wait times for patients to access specialist care.

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