

A scoping review of adult chronic kidney disease clinical pathways for primary care

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ABSTRACT

Background: Chronic kidney disease (CKD) affects ~10% of the adult population. The majority of patients with CKD are managed by primary care physicians, and despite the availability of effective treatment options, the use of evidence-based interventions for CKD in this setting remains suboptimal. Clinical pathways have been identified as effective tools to guide primary care physicians in providing evidence-based care. We aimed to describe the availability, characteristics and credibility of clinical pathways for adult CKD using a scoping review methodology.

Methods: We searched Medline, Embase, CINAHL and targeted Internet sites from inception to 31 October 2014 to identify studies and resources that identified adult CKD clinical pathways for primary care settings. Study selection and data extraction were independently performed by two reviewers.

Results: From 487 citations, 41 items were eligible for review: 7 published articles and 34 grey literature resources published between 2001 and 2014. Of the 41 clinical pathways, 32, 24 and 22% were from the UK, USA and Canada, respectively. The majority (66%, $n = 31$) of clinical pathways were static in nature (did not have an online interactive feature). The majority (76%) of articles/resources reported using one or more clinical practice guidelines as a resource to guide the clinical pathway content. Few articles described a dissemination and evaluation plan for the clinical pathway, but most reported the targeted end-users.

Conclusions: Our scoping review synthesized available literature on CKD clinical pathways in the primary care setting. We found that existing clinical pathways are diverse in their design, content and implementation. These results can be used by researchers developing or testing new or existing clinical pathways and by practitioners and health system stakeholders who aim to implement CKD clinical pathways in clinical practice.

Keywords: chronic kidney disease (CKD), clinical pathways, guideline-concordant care, primary care, scoping review

INTRODUCTION

Chronic kidney disease (CKD) is defined by an estimated glomerular filtration rate (eGFR) <60 mL/min/1.73 m², and it affects ~10% of adults [1–3]. CKD is associated with increased morbidity, mortality and substantial health care costs [4, 5]. Timely recognition of CKD is important, as lifestyle and pharmacological interventions can prevent or slow progression of CKD to kidney failure [6–8]. The majority of patients with CKD are managed by primary care physicians [9]; however, despite effective treatment options, the use of evidence-based interventions for CKD in this setting remains suboptimal [10, 11]. This is related in part to the volume and complexity of clinical practice guidelines that primary care physicians are expected to implement and the limited time available per patient encounter [12, 13]. Since translating evidence into appropriate patient care can be challenging, tools to assist the incorporation of evidence into practice are needed to enhance guideline-concordant CKD care in primary care [14].

Although clinical practice guidelines are intended to address evidence-practice gaps, their passive dissemination has not led to improvements in patient care [15–17]. Clinical pathways have been identified as an effective tool to guide clinicians in providing evidence-based health care [18–20]. In contrast to clinical practice guidelines, clinical pathways are a tool to enhance uptake of clinical practice guidelines in routine care and are explicit about the sequence, timing and provision of interventions [21]. Clinical pathways aim to incorporate evidence-based clinical practice guideline recommendations and therefore have the potential to improve the quality of care [22, 23] by guiding clinical assessments and interventions at the

point of care [18–20]. Further, clinical pathways may lead to improved clinical outcomes and reduced health care costs [21, 24].

Clinical pathways may optimize care of patients with CKD in primary care by facilitating diagnosis, management and nephrology referral. To our knowledge, no study has systematically synthesized information on available clinical pathways for adults with CKD. Our scoping review aimed to examine the availability, characteristics and credibility of clinical pathways for adults with CKD managed in the primary care setting. Findings from this review may be used by researchers, clinicians and health system stakeholders to inform the development and implementation of CKD clinical pathways in clinical care.

METHODS

A scoping review is a form of knowledge synthesis that allows researchers to examine the extent and range of existing research findings, summarize them and identify potential gaps in the literature [25]. Our scoping review was guided by the framework outlined by Arksey and O'Malley [25] and refined by Levac *et al.* [26]. This framework includes (i) identifying the research question, (ii) identifying relevant studies, (iii) study selection, (iv) charting the data and (v) collating, summarizing and reporting the results. For this review, we aimed to determine the scope of clinical pathways for the primary care management of adults with CKD and specifically to report on their availability, characteristics and credibility.

Definitions, information sources and search strategies

Given the lack of a unified definition of a 'clinical pathway' [27], we considered a clinical pathway to be a 'methodology for the mutual decision making and organization of care for a well-defined group of patients during a well-defined period' [28]. Search terms for clinical pathways in this scoping review included 'clinical pathway, algorithms, care pathway and critical pathway or a combination of the terms critical care pathway' [27]. We included the following terms for CKD: 'chronic kidney disease, renal insufficiency, chronic renal insufficiency, kidney disease and chronic kidney failure'. Searches were expanded using truncation symbols and Boolean operators to combine search terms where appropriate. Articles were limited to English language only. The electronic databases Medline, Embase, CINAHL and targeted Internet sites were searched from inception to 31 October 2014. The following websites and/or libraries were also searched to identify additional relevant resources: organizations associated with CKD care and research [including the Kidney Foundation of Canada, the National Kidney Foundation, the National Institute for Health and Care Excellence (NICE), Caring for Australians with Renal Impairment and the National Kidney Disease Education Program], government health agencies (including the Public Health Agency of Canada and the National Institutes of Health), Internet search engines (www.google.ca, www.google.co.uk, www.google.com.nrc, www.google.ca and www.google.com.au), graduate (Master's and PhD) theses and the Cochrane Database of Systematic Reviews. A librarian with expertise in systematic and scoping reviews assisted in developing the grey literature search strategies based on the Canadian Agency for Drugs and Technologies in Health Grey Matters checklist and relevant library resources [29–31]. To ensure that all relevant literature was captured, we hand searched references of eligible studies where references were available.

Article selection

A broad range of information sources from both scholarly (i.e. academic and peer-reviewed) and non-scholarly (i.e. professional organizations, individuals and government agencies) resources were considered for inclusion [32]. We defined 'published' articles as publications by an organization or journal whose primary purpose is to publish, whereas we classified 'grey literature' as information that is unpublished or published for non-commercial purposes (i.e. websites, reports and manuals) [33]. Two reviewers (S.G. and B.R.H.) independently screened titles, abstracts of articles and titles of resources to determine whether a 'clinical pathway for CKD care' was described. Articles indicating clinical pathway use in end-stage renal disease, transplant, dialysis, acute kidney injury, paediatric or conservative care settings were excluded. Two reviewers (S.G. and M.J.E.) then reviewed full-text articles and resources to determine their final eligibility based on evidence of (i) clinical pathway in descriptive (text format) and/or visual (step-by-step guide, visual algorithm or flow chart) format, (ii) integrated patient management plan that could be contained within an accessible research or clinical document or as a stand-alone tool [28, 34] and (iii) adult CKD in an outpatient setting (i.e. community-based or outpatient clinic). Disagreements between reviewers were discussed and a third reviewer (M.D.) was consulted if necessary to achieve consensus.

Data extraction and synthesis

A data extraction form was developed *a priori* to collect information on availability, characteristics and credibility of the included articles and resources. To describe the availability of the research, we recorded publication information (periodical type and country). We reported the following key clinical pathway characteristics: (i) format—static (one-way transfer of information) or online interactive tool (defined as 'the continuous two-way transfer of information between a user and a central point of a communication system to obtain data or commands and to give immediate results or update information') [33]; (ii) content—CKD screening/diagnosis, drug and lifestyle management, nephrology referral; (iii) implementation—dissemination plan and pathway end-users and (iv) evaluation—pathway evaluation and cost (related to the impact on downstream health care costs from use of the clinical pathway).

We evaluated clinical pathway credibility by assessing the quality of the clinical practice guidelines referenced within the clinical pathway design, recommendations and/or development and by the editorial ownership (authorship) and control (year of publication or revision) [35]. Where clinical pathways referenced clinical practice guidelines, these guidelines were evaluated using

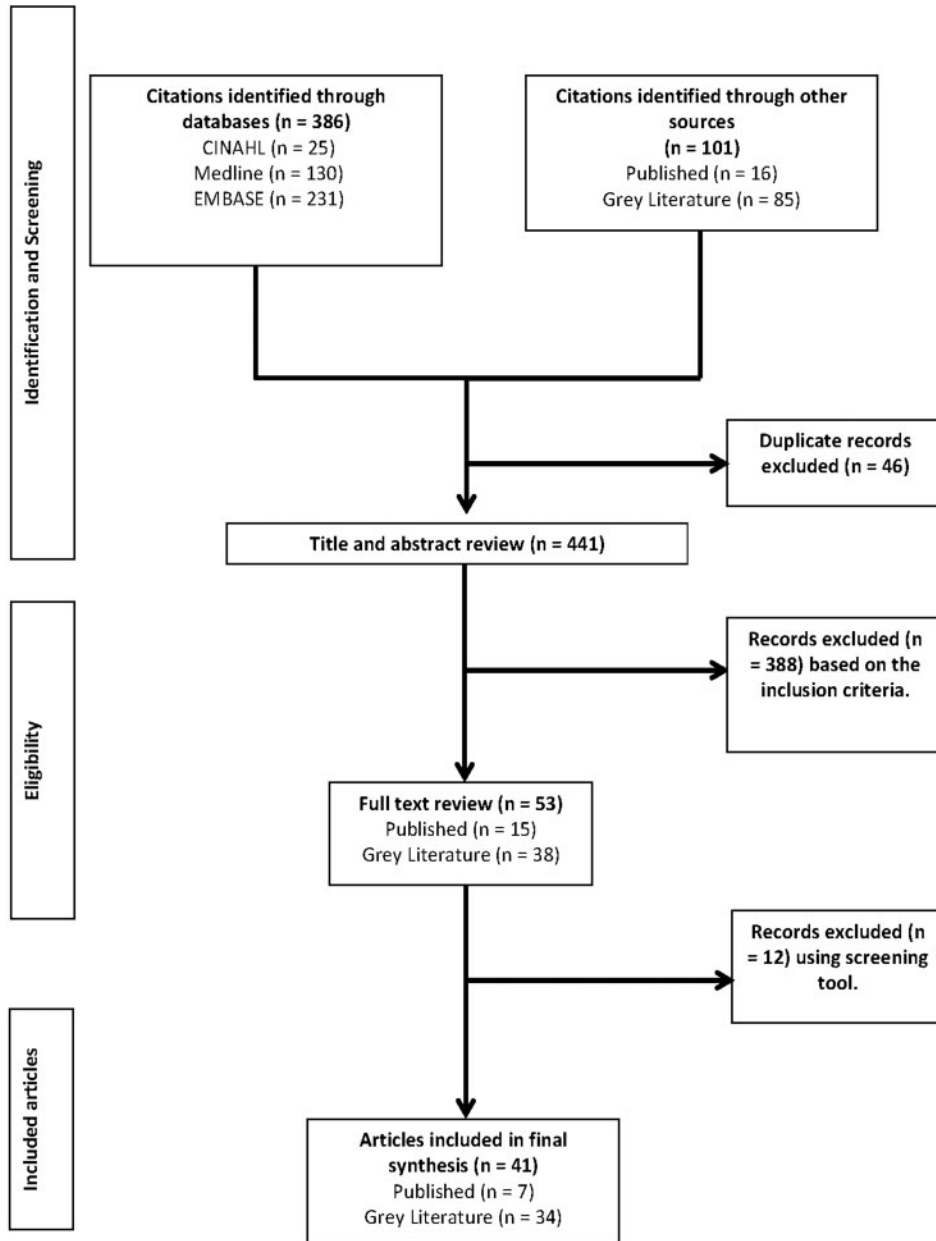


FIGURE 1: Flow diagram indicating selection of articles and resources.

the AGREE II instrument to assess their quality, reporting and applicability of the cited recommendations for adults with non-dialysis CKD [36]. Using this tool, each of the referenced clinical practice guidelines was appraised in six domains and assigned an overall score that encompasses whether the guideline would be recommended for use in practice.

Two reviewers (S.G. and M.J.E.) independently extracted data from all included articles and resources. Descriptive statistics were used to summarize data on clinical pathway availability, characteristics and credibility, and as reporting of these criteria was highly variable between included clinical pathways, qualitative descriptions were provided where appropriate. As the objective of this scoping review was to broadly examine existing published and grey literature on adult CKD clinical pathways, formal assessment of study quality was not undertaken.

RESULTS

Search strategy, study selection and data extraction

The results of the search strategy and study selection are outlined in Figure 1. After duplicates were removed, 441 articles were identified for title and abstract review (346 published and 95 grey literature). Of these, 53 articles were retrieved for full-text review, 12 of which were excluded for not meeting the eligibility criteria. The final synthesis included 41 different clinical pathways, 7 published articles and 34 grey literature resources. Interrater reliability of the study selection was moderate $\{\kappa = 0.59$ [95% confidence interval (CI) 0.42–0.79]}, with published articles having excellent agreement $[\kappa = 0.85$ (95% CI 0.21–1.00)] and grey literature fair agreement $[\kappa = 0.38$ (95% CI 0.16–0.65)].

Summary of CKD clinical pathway availability

The majority of the articles and resources were from grey literature sources (85%, $n = 34$), and no systematic or scoping reviews were found. Of the 41 clinical pathways, the majority (32%) were from the UK, with 24% from the USA and 22% from Canada (Table 1). The earliest available clinical pathway was from 2001 [37], although the year of publication was not reported for several ($n = 13$).

Summary of clinical pathways' characteristics

The majority (66%, $n = 31$) of clinical pathways were static and did not indicate that they had an online interactive feature (Table 1). In regards to content, 93% ($n = 38$) of the clinical pathways included content related to CKD screening/diagnosis and 76% ($n = 31$) described both drug and lifestyle

management. However, the specific recommendations were highly variable across clinical pathways. For example, the recommended patient populations for whom CKD screening should be considered and the screening tests themselves differed. Similarly, while most clinical pathways described mainstays of CKD treatment such as angiotensin-converting enzyme inhibitors to slow progression, specific treatment recommendations were not consistently reported and varied in their level of detail. The majority (85%, $n = 35$) of clinical pathways had information on when to initiate nephrology referral, and most provided criteria for referral, including eGFR and proteinuria cut-offs. Seventy-one per cent ($n = 29$) described intended clinical pathway end-users, and of these, the majority ($n = 20$) were designed for use in primary care settings [39, 45–49, 51, 52, 56, 57, 59–61, 64, 65, 68, 70, 71, 73, 77] and two [37, 62] were intended for use by patients with CKD.

Table 1. Characteristics and content of adult CKD clinical pathways

First Author, year, country, (Reference)	On-line Interactive Tool	CKD Screening/Diagnosis	Drug Management	Lifestyle Management	Nephrology Referral	Dissemination Plan	Pathway End-Users Described	Pathways Evaluated	Cost Analysis	Pathway reference Clinical Practice Guidelines	Website Updated	Total reported characteristics (N, %)
Published												
Baker, 2001, Canada [37]	○	●	●	●	○	●	●	●	○	○	○	6 55%
Dowling, 2008, United States of America [38]	○	●	○	○	○	○	○	○	○	○	○	1 9%
Harris, 2007, Canada [39]	○	●	●	●	●	○	●	○	○	●	○	6 55%
KDIGO, 2013, United States of America [40]	○	●	●	●	●	○	○	○	○	●	●	6 55%
McFarlane, 2013, Canada [41]	●	●	●	●	●	○	○	○	○	●	○	6 55%
Orantes, 2011, El Salvador[42]	○	●	○	○	○	○	●	○	○	○	○	2 18%
Owen, 2006, Australia[43]	●	●	●	○	●	○	●	○	○	●	●	8 72%
Grey Literature												
Arteriovenous Fistula First, NR, United States of America [44]	●	○	○	●	●	○	●	○	○	●	○	5 45%
Australia Renal Disease Health Network, 2007, Australia [45]	○	●	●	●	●	○	●	○	○	●	○	6 55%
Bradford Teaching Hospital, 2011, United Kingdom [46]	●	●	●	●	●	●	●	●	●	●	●	11 100%
British Columbia Renal Agency, 2008, Canada [47]	○	●	●	●	●	○	●	○	○	●	○	6 55%
Cumbria and Lancashire Kidney Care Network (NHS), 2009, United Kingdom [48]	○	●	●	●	●	○	●	○	○	●	●	7 64%
Cumbria and Lancashire Kidney Care Network, NR, United Kingdom [49]	●	●	●	●	●	○	●	○	○	●	○	7 64%

Table 1. Continued

Department of Health, 2008, NR [50]	●	●	●	●	●	●	●	●	●	●	●	5 45%
Department of Veterans Affairs and Defense, 2007, United States of America [51]	●	●	●	●	●	●	●	●	●	●	●	7 64%
Dudley Group (NHS), 2009, United Kingdom [52]	●	●	●	●	●	●	●	●	●	●	●	8 72%
East Kent Hospitals, NR, United Kingdom [53]	●	●	●	●	●	●	●	●	●	●	●	5 45%
Government of Canada, 2012, Canada [54]	●	●	●	●	●	●	●	●	●	●	●	4 36%
IHS Division of Diabetes Treatment and Prevention, 2010, United States of America [55]	●	●	●	●	●	●	●	●	●	●	●	5 45%
Intermountain Healthcare and Select Health, 2014, United States of America [56]	●	●	●	●	●	●	●	●	●	●	●	7 64%
Kaiser Permanente Nephrology Guideline Group, 2011, United States of America [57]	●	●	●	●	●	●	●	●	●	●	●	4 36%
Manitoba Renal Program, NR, Canada [58]	●	●	●	●	●	●	●	●	●	●	●	4 36%
Ministry of Health Malaysia, Malaysian Society of Nephrology, Academy of Medicine of Malaysia, 2011, Malaysia [59]	●	●	●	●	●	●	●	●	●	●	●	7 64%
NCC-CC and NICE, 2008, United Kingdom [60]	●	●	●	●	●	●	●	●	●	●	●	8 72%
NHS and the University of Manchester, NR, United Kingdom [61]	●	●	●	●	●	●	●	●	●	●	●	7 64%
NHS, NR, United Kingdom [62]	●	●	●	●	●	●	●	●	●	●	●	6 55%
NICE (Algorithm B), NR, United Kingdom [63]	●	●	●	●	●	●	●	●	●	●	●	2 18%
NICE (Algorithm C), NR, United Kingdom [64]	●	●	●	●	●	●	●	●	●	●	●	5 45%
NICE, 2012, United Kingdom [65]	●	●	●	●	●	●	●	●	●	●	●	8 72%
Nova Scotia Renal Program, 2009, Canada [66]	●	●	●	●	●	●	●	●	●	●	●	5 45%
Peterborough Regional Health Centre, 2009, Canada [67]	●	●	●	●	●	●	●	●	●	●	●	3 27%
Primaris Healthcare Business Solutions, 2009, United States of America [68]	●	●	●	●	●	●	●	●	●	●	●	5 45%
Scottish Intercollegiate Guidelines Network, 2008, United Kingdom [69]	●	●	●	●	●	●	●	●	●	●	●	5 45%
The Champlain Primary Care Cardiovascular Disease Prevention and Management Guideline, NR, Canada [70]	●	●	●	●	●	●	●	●	●	●	●	6 55%
The Kidney Alliance, 2012, Australia [71]	●	●	●	●	●	●	●	●	●	●	●	7 64%
Unknown 1, NR, NR [72]	●	●	●	●	●	●	●	●	●	●	●	4 36%
Unknown 2, NR, United Kingdom [73]	●	●	●	●	●	●	●	●	●	●	●	6 55%
Upper Midwest Fistula First Coalition, NR, United States of America [74]	●	●	●	●	●	●	●	●	●	●	●	5 45%
Veterans Affairs/ Department of Defense, 2009, United States of America [75]	●	●	●	●	●	●	●	●	●	●	●	5 45%
www.go-training.net , NR, NR [76]	●	●	●	●	●	●	●	●	●	●	●	5 45%
Zhao, 2011, NR [77]	●	●	●	●	●	●	●	●	●	●	●	3 27%
Total Reported, N %	10 24.4	38 92.7	33 80.4	32 78.0	35 85.4	3 7.3	29 70.7	4 9.8	2 4.8	31 75.6	11 26.8	

Information regarding clinical pathway implementation, specifically a dissemination plan, was reported for only 7% ($n = 3$) of articles. Clinical pathway evaluation and cost were reported in 10% ($n = 4$) [37, 43, 46, 59] and 5% ($n = 2$) [46, 60] of articles, respectively (Table 1). This included reporting of qualitative and quantitative outcomes pre/post-pathway implementation, pathway usefulness and comprehension and health care costs associated with use of the clinical pathway. Only one article [46] reported 100% of the data extraction variables based on criteria of availability, characteristics and credibility.

Summary of clinical pathways' credibility

The majority (76%, $n = 31$) of articles reported using one or more clinical practice guidelines as a resource to develop content. Overall, 20 clinical practice guideline documents were used along with 6 consensus statement documents, frameworks or standards (Supplementary data, Tables S1 and S2). Based on guideline assessments using the AGREE II instrument, 75% ($n = 15$) of the clinical practice guidelines were recommended for use in practice, and those not recommended generally contained recommendations more specific to dialysis than to earlier stages of CKD (Supplementary data, Table S1). Authorship was not reported for two articles, and publication year was reported for only 32% ($n = 13$) of the clinical pathways. Twenty-seven per cent ($n = 11$) of the articles reported when the clinical pathway was revised or planned for revision.

DISCUSSION

Using an established methodology for scoping reviews [25], we identified 41 scholarly and non-scholarly articles pertaining to adult CKD clinical pathways. The Internet has increased access to health-related information, thus it was important to search both published and grey literature to ensure we identified all relevant clinical pathways from organizations, groups and individuals. In fact, the majority (34 of 41) of the clinical pathways were from grey literature sources. We were able to locate available CKD clinical pathways dating back to 2001, and from six countries. The majority of clinical pathways were static (i.e. not interactive) in nature and reported using one or more clinical practice guidelines as a resource for developing pathway content. While few clinical pathways described their dissemination and evaluation plan, many reported intended pathway end-users.

As primary care physicians manage the vast majority of patients with CKD [9], it is not surprising that the majority of clinical pathways we identified were designated for use in the primary care setting. In patients with earlier stages of CKD, management focuses on identifying those at increased risk of progressing, offering targeted interventions to slow disease progression and appropriately referring for specialist nephrology care in advanced or complicated cases [40]. Given that patients with CKD often have several comorbidities, care for these individuals can be complex and encompass chronic disease treatment recommendations from multiple sources. Indeed, it has been reported that for primary care physicians to apply all preventive recommendations by the US Preventive Service Task

Force (USPSTF), 7.4 h/working day would be required [12]. Given the time constraints in primary care practice, the development of clinical tools that engage primary care physicians in efficient and evidence-based CKD care is paramount. Clinical pathways are such tools that provide the opportunity for improved collaboration and communication between primary care physicians and nephrologists in providing optimal CKD care. In a systematic review, integrated care pathways were found to be effective tools in ensuring patients receive timely and appropriate interventions and/or assessments and in promoting practitioner adherence to clinical practice guideline recommendations [18]. Thus, the development and evaluation of quality clinical pathways for CKD management may be a strategy to enhance quality care for patients with CKD in the primary care setting.

Clinical pathways are more explicit than clinical practice guidelines about the timing and provision of interventions and assessments and aim to be directly incorporated into routine patient care [27]. It has been shown that online applications can increase pathway compliance [78]. Our findings show that only 25% of the available clinical pathways incorporated an interactive feature—the majority were static with a single flow diagram concept, and no tool allowed for integration of patient information into the clinical pathway. With the proliferation of electronic medical records, demand for available and accessible online interactive clinical pathways will potentially increase.

While the majority (>75%) of clinical pathways included content related to screening, diagnosis, management and referral, the level of detail was highly variable and the content typically relevant to a local setting, limiting their generalizability. Many clinical pathways omitted information such as the date the clinical pathways were developed, plans for updating and sources used. These features are important to determine currency and relevance to best available evidence.

The clinical pathways reviewed had sparse information on implementation, evaluation and cost. Few articles described their dissemination plan, although most did indicate their intended end-users. Strategies for effective dissemination and implementation are critical to ensure uptake of the clinical pathway. Evaluating the effect of a clinical pathway is a relatively new area in health care research, and essential to guarantee guideline-concordant care for patients with CKD.

The clinical pathway from the Bradford Teaching Hospital [46] included information on all variables we considered important for this review. It describes the local implementation, quality evaluation and cost outcomes of an e-consultation initiative and provides an interactive algorithm to guide the management of adults with CKD. Four other articles and resources reported on 72% of the features and were deemed credible based on the clinical practice guidelines used to develop the content [43, 52, 60, 65]. Two of these resources [60, 65] were developed by the NICE guidance. The NICE 2012 document [65] outlines an interactive algorithm for CKD management and links directly to guideline recommendations for screening, management and specialist referral. These documents could serve as a useful resource for one seeking to develop a CKD clinical pathway.

Clinicians, organizations and policy makers may want to consider the following when choosing to use or develop a CKD

clinical pathway. First, ‘buyer beware’, as there is no gold standard to guide development, implementation and evaluation of clinical pathways in the primary care setting. It is important to examine clinical pathway characteristics (i.e. format, content) and credibility (i.e. guideline referencing, authorship) to ensure they meet end-user needs. Second, availability and accessibility are not interchangeable—we reviewed only the articles and resources available to us, but other clinical pathways may exist that are only accessible to end-users internally within organizations. Third, in the future, standardized reporting of clinical pathway development, implementation and evaluation in the literature must be emphasized in the research and clinical communities.

Due to challenges inherent to scoping reviews, limitations of this review must be acknowledged in the overall interpretation of our findings. First, the articles were diverse in their content and focus, making it challenging to select articles, extract data and synthesize results. Interrater reliability for published article selection was excellent, but fair for grey literature, reflecting the difficulty reviewing the various article formats and content. While criteria have been developed to objectively evaluate clinical pathways [27], these criteria were established for clinical pathways based in a hospital setting and therefore were less relevant for the clinical pathways included in our scoping review. Second, we limited articles to those published in English, which may limit overall generalizability. Third, by definition, scoping reviews aim to broadly describe the state of the literature on a given topic without formal assessment of the quality of the identified articles. Therefore, it is difficult to identify the strengths and weaknesses of included articles based on the validity of the research findings and assessment of methodology. However, it was reassuring to see that 76% of the literature did identify clinical practice guidelines as a source for their content, and we used the AGREE II instrument to score the quality of the clinical practice guidelines considered. Fourth, for practical reasons, we were unable to contact authors or have access to internal organizational documents or websites to obtain further detail on pathway development, implementation and evaluation, although we do believe that the majority of articles and resources have been captured in this review.

Clinical pathways are an effective tool to increase uptake of guidelines and may help optimize the recognition and management of patients with CKD. Our scoping review has synthesized the available literature for CKD clinical pathways and may be of use to researchers, practitioners and health system stakeholders who are interested in implementing, adapting or developing new CKD clinical pathways.

SUPPLEMENTARY DATA

Supplementary data are available online at <http://ndt.oxfordjournals.org>.

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AUTHORS' CONTRIBUTIONS

Research idea and study design: B.R.H., M.D. and S.G.; data acquisition: M.D., S.G. and M.J.E.; data analysis/interpretation: M.D., S.G. and M.J.E. Each author contributed important intellectual content during manuscript drafting or revision and accepts accountability for the overall work by ensuring that questions pertaining to the accuracy or integrity of any portion of the work are appropriately investigated and resolved. B.R.H. takes responsibility that this study has been reported honestly, accurately and transparently; that no important aspects of the study have been omitted and that any discrepancies from the study as planned have been explained.

CONFLICT OF INTEREST STATEMENT

None declared. The results presented in this paper have not been published previously in whole or part, except in abstract format.

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