Original Article

Referral Criteria to Specialist Palliative Care for People with Advanced Chronic Kidney Disease: A Systematic Review

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Abstract

Context. People with advanced chronic kidney disease (CKD) have significant morbidity, yet for many, access to palliative care occurs late, if at all.

Objectives. This study sought to examine criteria for referral to specialist palliative care for adults with advanced CKD with a view to improving use of these essential services.

Methods. Systematic review of studies detailing referral criteria to palliative care in advanced CKD conducted and reported according to the Preferred Reporting Items for Systematic Reviews and Meta Analyses (PRISMA) guideline and registered (PROSPERO: CRD42021230751).

Data sources. Electronic databases (Ovid, MEDLINE, Ovid Embase, and PubMed) were used to identify potential studies, which were subjected to double review, data extraction, thematic coding, and descriptive analyses.

Results. Searches yielded 650 unique titles ultimately resulting in 56 studies addressing referral criteria to specialist palliative care in advanced CKD. Of 10 categories of referral criteria, most commonly discussed were: Critical times of treatment decision making (n = 23, 41%); physical or emotional symptoms (n = 22, 39%); limited prognosis (n = 18, 32%); patient age and comorbidities (n = 18, 32%); category of CKD/ biochemical criteria (n = 13, 23%); functional decline (n = 13, 23); psychosocial needs (n = 9, 16%); future care planning (n = 9, 16%); anticipated decline in illness course (n = 8, 14%); and hospital use (n = 8, 14%).

Conclusion. Clinicians consider referral to specialist palliative care for a wide range of reasons, with many related to care needs. As palliative care continues to integrate with nephrology, our findings represent a key step towards developing consensus criteria to standardize referral for patients with chronic kidney diseases. J Pain Symptom Manage 2023;66:541−550. © *2023 The Authors. Published by Elsevier Inc. on behalf of American Academy of Hospice and Palliative Medicine. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).*

Key Words

Palliative care, kidney failure, chronic (chronic kidney failure, ESKD, end-stage kidney disease, end-stage renal disease, renal disease, end-stage, renal failure, chronic, renal failure, end-stage), systematic review, referral, consultation

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Key Message

This systematic review has identified a series of criteria for referral to specialist palliative care for people with advanced chronic kidney disease providing the foundation for developing practice consensus around access to palliative care for this group of patients.

Introduction

There is a significant and growing body of literature documenting the physical, social, psychological, and decision support needs of patients with advanced chronic kidney disease (CKD; glomerular filtration rate (GFR) category 4 and 5) and their families.[1–3] Attention to these needs is core to chronic disease management, and evidence supporting the benefits of early integration of palliative care into patient care across a number of chronic conditions including cancer, heart, and kidney failure, and respiratory disease is increasing.[4–7] These benefits include outcomes such as improved patient-reported symptom relief and experiences of care, improved family carer wellbeing and support, and reduction of acute health service use.[8]

Throughout the illness, the clinical management of people with kidney disease involves optimizing kidney function, cardiovascular risk factors, comorbidities, and albuminuria in addition to minimizing risks of nephrotoxicity.[9] For people with advanced CKD, nephrologist review will also consider treatment approaches which may include kidney replacement therapies (dialysis or kidney transplantation) or conservative kidney management (care that focuses on providing holistic, patient-centered and active kidney disease management but not does include kidney replacement therapies).[10]

Across each of these treatment pathways, the potential contribution of the principles and practices of palliative care through the provision of kidney supportive care[10] integrated within existing kidney services as well as the role of a specialist palliative care referral has been highlighted.[11–14] Kidney supportive care is an approach aimed at improving the health-related quality of life for patients with advanced CKD and involves symptom management, psychological, social, cultural, and spiritual support, interventions to delay progression of kidney disease and minimize complications and can be provided together with therapies intended to prolong life.[10] Kidney supportive care involves a detailed understanding of the management of kidney disease and is typically delivered by nephrologists within existing renal services, or in some instances by palliative care specialists who have had specific training in kidney supportive care.[15] Referral to specialist palliative care defined as those with specialist palliative care training who may be part of renal supportive care or may sit outside renal care, may also be enacted to address more complex needs.

Despite significant needs, palliative care is underutilized even in settings where such care is available, and for many patients referral occurs late − within days of death.[16,17] The circumstances in which these specialist referrals are initiated in current practice- including the reasons for and timing of referrals- are not fully understood. As such the potential benefits of early engagement with palliative care, either through the addition of kidney supportive care or specialist palliative care involvement are not realized. Consistent with this, clinicians involved in kidney care commonly agree it would be useful to have defined triggers to underpin referral.[18]

The aim of this systematic review was to examine criteria for referral to specialist palliative care (defined as those with specialist palliative care training) for patients with advanced chronic kidney disease, to highlight current practices, and set a benchmark for improvement as we work globally to improve kidney care.

Methods

Design

We conducted a systematic review of studies meeting our aim to examine referral criteria for specialist palliative care for patients with advanced CKD (Stages 4 and 5 CKD classification). The review was registered with the International Prospective Register of Systematic Reviews (PROSPERO: CRD42021230751), with reporting guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA).[19] Involving only existing literature, ethics approval was not required. The review forms the first stage in a broader program of work by this team seeking to develop a standardized, consensus-based set of referral criteria, across a series of nonmalignant diagnoses, also including heart failure,[20] dementia[21] and respiratory disease.[22]

Search Strategy: Identification of Studies

The electronic databases including MEDLINE, Embase, and PubMed were searched simultaneously in Ovid, searching for publications in the English language (due to lack of access to translations), from the database inception to December 22, 2021. De-duplication was undertaken using the Ovid de-duplication tool.

A set of key terms and their related synonyms and/or abbreviations were defined (Fig. 1 Search and Coding Strategy) and applied to titles, abstracts, key words, and subject headings specific to each database. In brief, this included searches combining the following

SEARCH STRATEGY – CONCEPTS SEARCHED				
Palliative and end of life care **Kidney supportive care** **Kidney palliative care**	AND	**Advanced chronic kidney disease**	AND	**Referral or integration** (OR) **Trials** (OR) **Guidelines**
Limits: English Language; Database inception to 22nd December 2021				

INCLUSION CRITERIA Referral criteria for palliative care identified			
Criteria	***Examples***	**Criteria**	***Examples***
Physical/ emotional symptoms	*-Pain, itch*	Category of CKD/ Biochemical criteria	*-CKD G5/ glomerular filtration rate <15mL/min/m2*
Functional decline	*-Deteriorating performance status*	Hospital use	*-Hospitalization for acute complication*
Care planning	*-Assistance with advance care planning*	Limited prognosis	*-Surprise question suggests prognosis may be less than 12 months**
Psychosocial	*-Existential concerns* *-carer needs*	Anticipated decline in illness course	*- Complications from dialysis* *- Progressive deterioration on diaylsis*
Critical times of treatment decision making	*-point in illness when need to decide CKM versus dialysis*	Patient characteristics	*-Advanced age* *-Comorbidities*

**would you be surprised if this person died in the next 12 months?*

Fig. 1. Search & coding strategy *would you be surprised if this person died in the next 12 months?

concepts, "Palliative Care," AND "Advanced Chronic Kidney Disease" AND: Referral/Integration," OR "Clinical trials," OR "Guidelines/ Consensus Statements." A manual search of gray literature was also conducted to ensure key papers were included from experts in the field, cross-checking reference lists of key papers for articles potentially meeting inclusion. The complete MEDLINE Search strategy is detailed in Appendix.

Eligibility: Inclusion and Exclusion Criteria

Studies were eligible for inclusion in this systematic review if they 1) were focused on advanced CKD in adult populations, and 2) detailed a "trigger" or a referral criterion or set of criteria for referral to specialist palliative care. We included those articles that used the term "kidney supportive care" when this was describing a service which included specialist palliative care as part of an integrative team managing needs of people with advanced CKD. We excluded articles of mixed populations including people with different diagnoses if the advanced CKD participants comprised ≤30% of the included sample or data were not reported as a separate cohort. Seeking a broad overview of the range of referral criteria proposed in the literature, we included those arising as a primary result of the study, as a component of a clinical trial, as a recommendation or implication of the study findings, or derived from reviews or clinical perspective on referral triggers. We included all original studies, reviews, systematic reviews, guidelines, editorials, commentaries, and letters, and excluded duplicates, case reports, and conference abstracts.

Data Extraction and Coding

The study selection process from the total pool of discrete articles (n = 650) involved an initial screen of titles and abstracts by two researchers (A. C. and J. P.) independently. Studies were included for full-text review where either reviewer determined that the study met eligibility (n = 155). Discussion to reach a consensus occurred in the case of any discrepancies in the two reviewer's decisions for inclusion (n = 38), with a third reviewer as arbitrator (K. D.) available, but not required.

Full-text review involved extraction of referral criteria mentioned by the included studies and thematic categorization of factors, consistent with published reviews of referral criteria in other disease settings including cancer and advanced heart failure, respiratory disease, and dementia.[20–22] The coding framework was discussed and refined with the research team to aid the clarity of results and interpretation of themes. The criteria were coded in full by one reviewer (J. P.), with double review of 20% of the final sample undertaken (AC) to validate categorization, ensure accuracy of coding, and minimize potential for reviewer bias.

Analyses

Data extracted from the final sample of articles (n = 56) were summarized using descriptive statistics, including counts, frequencies, and percentages.

Results

Overview of Included Studies

Our systematic search of the literature identified 650 articles for potential inclusion (Fig. 2). An independent double review of titles and abstracts by two investigators, including a discussion of 38 articles (6%) where there was an initial discrepancy between reviewers, resulted in 155 articles being subjected to a full-text review. Of these, a further 99 were excluded as not meeting the aims of the review, resulting in a final sample of 56 that identified referral criteria to specialist palliative care in advanced CKD (Table 1).

Most of the included studies were conducted in the United States (45%), the U.K. (14%), and Asia (11%). Studies were predominantly published after 2010 (84%) in nephrology (48%) or palliative care (29%) journals. The studies utilized a range of methodologies, most commonly prospective nonrandomized studies and surveys (41%), reviews (39%), and retrospective studies (13%), with few randomized controlled trials (5%).

Most articles (61%) did not identify the specific palliative care setting for which the referral criteria were intended. Twelve studies (21%) specifically mentioned inpatient palliative care and 10 studies (18%) mentioned outpatient care.

Specific cohorts of interest across the studies of people with advanced CKD included people receiving treatment on dialysis (29%), conservative kidney management (16%), and those with mixed CKD G4-5 (34%), while 21% did not further characterize.

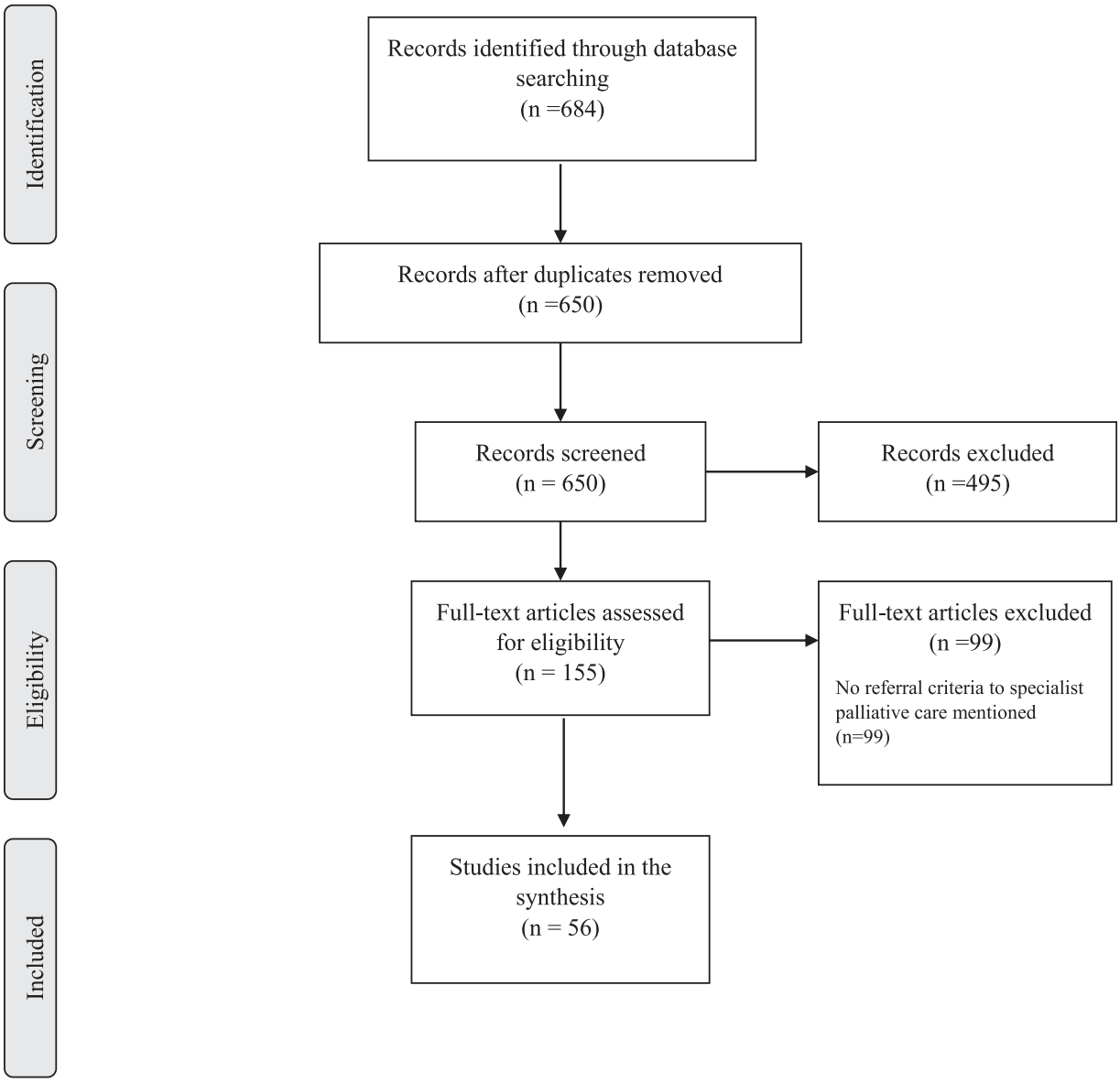

Fig. 2. PRISMA diagram.

Table 1
Publication Characteristics (N=56)

Article Characteristics	N (%)
Study population	
Dialysis	16 (29)
Transplant	0 (0)
Conservative kidney management	9 (16)
Mixed (e.g., stage 4 and 5)	19 (34)
Not specified	12 (21)
Article type	
Practice Guidelines, Expert consensus	0 (0)
Prospective nonrandomized studies and surveys	23 (41)
Prospective randomized trials	3 (5)
Qualitative studies	1 (2)
Retrospective studies	7 (13)
Review	22 (39)
Trial design	0 (0)
Publication year	
2003–2010	9 (16)
2011–2020	47 (84)
Journal type	
Kidney journals	27 (48)
Palliative care journals	16 (29)
General medical journals	6 (11)
Other	7 (13)
Country	
Europe	4 (7)
Australia	3 (5)
UK	8 (14)
United States	25 (45)
Canada	1 (2)
Asia	6 (11)
Not specified	8 (14)
PC Service	
Specialist Palliative Care	29 (52)
Hospice	2 (4)
Not specified	25 (45)
PC Setting	
Outpatient	10 (18)
Inpatient	12 (21)
Not specified	34 (61)

Referral to a specific "Kidney Supportive Care" or "Kidney Palliative Care" service which involved specialist palliative care embedded within renal services, was mentioned by 8 studies (14%).[10,23–29] Other models of palliative care support for patients with advanced CKD described involved increased capacity in the renal workforce to deliver a palliative approach to care,[68,32] and home-based care delivered by primary care teams with support from hospital renal and palliative care services.[43]

Referral Criteria

We identified 10 major categories of referral criteria (Table 2), representing a diverse range of palliative care needs. The most discussed criterion in order of frequency were: Critical times of treatment decision making (n = 23, 41%);[10,11,24–26,28–45] physical or emotional symptoms (n = 22, 39%);[11,13,14,27–31,33,42,44,46–56] limited prognosis (n = 18, 32%);[25,31,33,35,40,42,48,50,53,54,57–64] patient age and comorbidities (n = 18, 32%);[11,23,28–30,33,36,40,42,44,48,54,55,61,63,65–67] category of CKD/ biochemical criteria (n = 13, 23%);[10,29,31,40,43,47,55,59,68–72] functional decline (n = 13, 23%);[14,25,30,33,40,42,44,48,55,56,59,63,73] psychosocial needs (n = 9, 16%);[13,14,27,29,31,44,48,51,52] future care planning (n = 9, 16%);[13,14,27,31,42,44,47,52,56] Anticipated decline in illness course (n = 8, 14%);[11,25,36,59,61,64,66,72] and hospital use (n = 8, 14%).[29,33,35,50,65,69,72,74]

Just 11 studies (20%) cited factors which they tested or indicated were currently implemented in practice.

Discussion

This review reports the criteria discussed in the literature which underpin referral to specialist palliative care for patients with advanced CKD. We found ten categories of referral criteria and a focus on those related to critical times in treatment decision making. These decisions are often related to dialysis including the decision for conservative kidney management vs. dialysis, and considerations around continuing or ceasing dialysis. The identification of multiple and diverse criteria for palliative care referral in this review suggests a wide range of palliative care needs. Alongside the development of kidney supportive care globally, there is a future opportunity to develop, in advanced CKD, a clear consensus on when and who should be referred to specialist palliative care.

Data from this study suggest that it is most frequently treatment-based factors that prompt referral to palliative care, and in particular, times of critical decision making surrounding dialysis. This includes both the commencement, emergence of problems during, and consideration of discontinuing dialysis. The consideration of dialysis and its different phases obviously represent key time points for decision-making that are core elements of the care of people with advanced CKD. It also represents opportunities for introducing aspects of kidney supportive care into kidney care. In the conceptualization of a model of kidney supportive care, Davison recommended specific attention be directed towards identifying those at high risk of mortality, high symptom burden including pain, and with particular needs for support around decision making of treatment and end of life care.[48] However, she notes that for many, the severity of pain and other symptoms may not be recognized by kidney care teams[75] and remain untreated.[48]

Set within the context of the evolving paradigm of kidney supportive care,[10] our review reflects the changing global landscape in the management of CKD. Recognizing the advantages of the integration of palliative care practices and principles for all kidney patients, international experts have led the expansion and adoption of this "generalist" approach to addressing palliative care needs through the development of kidney supportive care.[10] The global development of kidney

Table 2
Palliative Care Referral Criteria for Advanced Chronic Kidney Disease (N=56) and the Key Individual Criteria

Criteria Mentioned by Studies	Frequency N (%) [a]	Setting N			References
		IP [b]	OP [b]	NS [b]	
Critical times of treatment decision making	23 (41)	2	6	15	10,11,24–26,28–45
Decided for dialysis	5				29,33,35–37
Decided for CKM/ not for dialysis	15				10,11,24–26,28,32,33,38–44
Considerations around continuing or withdrawal of dialysis	6				25,28,29,33,44,45
Point in illness when need to decide dialysis vs. CKM	8				25,28–34
Physical and Emotional Symptoms	22 (39)	4	6	12	11,13,14,27–31,33,42,44,46–56
Fatigue	1				46
Pain	3				13,49,54
Cognitive disturbance	3				46,47,50
Pruritis	1				47
Psychological symptoms	7				14,29,31,42,46,51,52
High symptom burden (not specified)	16				11,14,27–31,33,42,44,46,48,51,53,55,56
Limited Prognosis	18 (32)	2	3	13	25,31,33,35,40,42,48,50,53,54,57–64
"Surprise question" using 12 month prognosis	7				48,50,53,54,58,60,62
"Surprise question" using 6 month prognosis	2				33,50
Prognostic tools	1				42
Poor prognosis – not specified	8				25,31,35,40,57,59,61,63,64
Patient Age and Comorbidities	18 (32)	1	5	12	11,23,28–30,33,36,40,42,44, 48,54,55,61,63,65–67
Cancer	1				54
Other poor prognosis illness	10				11,30,33,40,42,44,48,54,61,65
Age	11				23,28,29,33,36,40,48,55,63,66,67
Category of CKD/ biochemical criteria	13 (23)	2	5	6	10,29,31,40,43,47,55,59,68–72
CKD G5/ eGFR<15 mL/min/1.73m^2	9				10,29,31,40,43,47,55,68,71
CKD G4 / eGFR 15–29 mL/min/1.73m^2	6				29,40,43,55,69,70
CKD G3	1				55
Albumin<2.5 m/dL	1				55
Functional Decline	13 (23)	2	1	10	14,25,30,33,40,42,44,48,55,56,59,63,73
AKPS <40, AKPS other	4				33,42,48,55
Reduced functional status,	7				25,40,42,55,56,59,73
Increased dependency for ADLs,	5				14,42,44,55,63
Frailty	2				30,48
Psychosocial needs	9 (16)	3	2	4	13,14,27,29,31,44,48,51,52
Family Support	1				51
Psychological support	3				27,31,51
Emotional support ns.	3				29,51,52
Conflict	3				14,44,48
Spiritual distress	2				13,51
Anticipated decline in illness course	8 (14)	3	1	4	11,25,36,59,61,64,66,72
Complications from dialysis	2				25,61
Progressive deterioration on dialysis	5				11,25,59,61,72
Dialysis + a poor prognostic factor / advanced age	4				36,59,64,66
Hospital Use	8 (14)	3	2	3	29,33,35,50,65,69,72,74
Admission	6				33,35,50,65,69,74
Multiple admission	1				29
ICU	1				72
Future care planning	9 (16)	3	2	4	13,14,27,31,42,44,47,52,56
Advance care planning	4				13,44,52,56
End of life planning around care of dying/goals of care	4				14,27,31,44
Patient/ Caregiver request for palliative care	2				42,47

[a]N (%) = Number of discrete studies mentioning a referral criteria related to that category, with the percentage relevant to the total number of studies included ($n = 56$).
[b]Setting: IP = inpatient, OP = outpatient, NS = setting not specified.

supportive care services and the considerable number and nature of different criteria put forward as prompting specialist palliative care referral (as distinct from kidney supportive care) in this review point to several important considerations as this field continues to progress.

First, there is a clear role for kidney care teams in providing kidney supportive care, as a core component of all CKD management and one that is not dependent upon a persons' treatment pathway. Reflecting this changing environment, some of the factors underpinning referral to specialist palliative care highlighted by this review such as decision for CKM vs. dialysis will be readily and most appropriately addressed within the provision of kidney supportive care. In this case, moving forward, opportunities for upskilling of core competencies for kidney care teams in aspects of kidney supportive care are essential to ensure the appropriate and timely access and integration of palliative care for people with advanced CKD. The priority assigned to

various patient symptom needs as criteria for palliative care referral highlights how much these affect patients with advanced CKD, and emphasis the need for shared symptom management approaches[18] and mutual training on symptom control.

Inherent in this task is a need for reconciling the variation of terms into the description of commonly agreed and consistently used approaches. In this review, the conceptualization of "palliative care" and, in some instances, how this form of care was put into practice differed across services. In some settings patients receiving conservative kidney management would have access to kidney supportive care, which may include a team of kidney and palliative care clinicians collaborating to provide care[18] or it may be provided by kidney care teams who intentionally adopt a palliative care approach into care.[10] International leaders in nephrology have sought to respond to this variation through careful definition and description of a model of conservative kidney management.[10,76,77] The clarification and adoption of the terms "kidney supportive care" and "conservative kidney management" will do much to progress the field and reduce misunderstandings.

Alongside this focus, there remains the important task of expert- and patient-led delineation of the factors or circumstances which may trigger a referral to specialist palliative care. This specialist level of support may be particularly warranted to support those patients and their kidney care providers who have a higher complexity of need. This may relate to, for example, difficult clinical decision-making around treatment pathways, support with complex family dynamics, or the presence of multiple compounding factors requiring specialist support. Building on this review, an agreed recommendation or minimum standards of who and when specialist palliative care should be considered would considerably advance the field. In such an endeavor, attention to both individual circumstances and their combination which might prompt referral is a priority.

There are limitations to this systematic review which require mention. Our search was inclusive but nevertheless yielded only 56 articles and included only those studies where specialist palliative care referral was the focus. Kidney supportive care alone that did not describe inclusion of a palliative care clinician did not meet our eligibility criteria. That said, the 8 included studies identified which mentioned referral to kidney supportive care also mentioned palliative care.[10,23–29] With just a small number of the studies in our review having included the criteria for referral as part of an empirical prospective design (5% were randomized studies), we are unable to comment on the utility of the criteria put forward since these have largely not yet been subject to evaluation. Such a formal evaluation will be critical to take the field forward.

In conclusion, our systematic review has identified a diverse range of criteria which may prompt a referral to specialist palliative care for people with advanced CKD. Conducted in the evolving global context of kidney supportive care, this review demonstrated that referral was most commonly related to critical times associated with treatment decision making, in particular dialysis. These times may represent a standardized point in the management of CKD where kidney care teams seek to also incorporate a holistic palliative approach to care ensuring an appropriate focus on quality of life regardless of the treatment pathway. To progress in this field, a clear understanding of the role and benefits of kidney supportive care in integrated kidney care is required, with attention to a reconciling of differences in terminology of palliative care, conservative kidney management and kidney supportive care. Such current differences are likely to add to the variation in practice and clinical uncertainty around these important decisions. It is likely that leadership will continue to emerge from both palliative care and nephrology and their collaborative efforts remain core to the successful progression of the field. A shared clear understanding will lead to a common sense of responsibility for addressing palliative care needs, with the roles of kidney and palliative care teams readily delineated. In turn, this will enable the development of consensus around those criteria which may trigger a referral to specialist palliative care, and their subsequent empirical evaluation.

Data Availability

The authors confirm that the data supporting the findings of this study are available within the article and its supplementary materials.

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Appendix 1. Search Strategy Medline

1. exp Palliative Care/
2. Palliative Medicine/
3. (Palliative or palliation).ti,ab,kw.
4. exp Terminal care/
5. exp Hospice Care/
6. Hospices/
7. exp Advance Care Planning/
8. ((terminal or hospice or supportive or "end-of-life" or dying) adj3 care).ti,ab.
9. (care adj3 end adj3 life).ti.
10. (conservative adj3 (care or management)).ti,ab.
11. "renal supportive care".ti,ab. "kidney supportive care".ti,ab.
12. hospice*.ti,kf.
13. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12
14. exp "Referral and Consultation"/
15. (referr* or consult*).ti,ab,kf.
16. Patient Transfer/
17. exp "Delivery of Health Care, Integrated"/
18. (integrate* or integrating or integration or collaborat*).ti,ab,kf.
19. ((providing or provision or needs or assessment or specialist* or specialty or facilitator* or barrier* or initiat*) adj5 palliative).ti,ab,kf.
20. exp Decision Making/ and ((renal or kidney) adj3 (failure or disease)).ti,ab,kf.
21. 14 or 15 or 16 or 17 or 18 or 19 or 20
22. **13 and 21**
23. exp renal failure/
24. ((renal or kidney) adj3 (failure or disease or advanced or "end stage")).ti,ab,kf.
25. ("Chronic kidney disease" or "CKD" or "ESKD").ti,ab.
26. dialysis.ti,ab,kf.
27. 23 or 24 or 25 or 26
28. **22 and 27**
29. (randomized or randomised or randomly).ti,ab.
30. exp clinical trial/
31. groups.ab.
32. multicenter study.pt.
33. (trial or multicenter or multi center or multi-centre or multi centre).ti.
34. (comparative study not review).pt.
35. exp Validation Studies/
36. exp Evaluation Studies/
37. 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36
38. **13 and 27 and 37**
39. exp Guideline/
40. exp Practice Guidelines as Topic/
41. consensus development conference.pt.
42. consensus development conference nih.pt.
43. (position adj3 (statement*1 or paper)).ti.
44. (guideline* or consensus).ti.
45. (practice adj parameter*).ti.
46. 39 or 40 or 41 or 42 or 43 or 44 or 45
47. **13 and 27 and 46**
48. (Palliative or palliation or "renal failure").ti,kf.
49. exp *Palliative Care/
50. Palliative.ab. /freq=2
51. 48 or 49 or 50
52. 28 or 38 or 47
53. **51 and 52**
54. (13 and 27) not 53
55. ((renal or kidney) adj3 (advanced or end-stage)).ti.
56. 54 and 55
57. 53 or 56
58. limit 57 to english language