BMJ Open

mHealth education for patients with chronic kidney disease: protocol for a scoping review

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To cite: Schultz ANØ, Kampmann JD, Kidholm K, *et al*. mHealth education for patients with chronic kidney disease: protocol for a scoping review. *BMJ Open* 2022;**12**:e061226. doi:10.1136/bmjopen-2022-061226

► Prepublication history for this paper is available online. To view these files, please visit the journal online (http://dx.doi.org/10.1136/bmjopen-2022-061226).

Received 19 January 2022
Accepted 04 July 2022

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ABSTRACT

Introduction More than 10% of the population worldwide is affected by chronic kidney disease (CKD). Despite many promising indications regarding the use of mHealth education for patients with CKD, there is still little evidence regarding the feasibility, effectiveness outcomes and outcome measures. Therefore, we will conduct a scoping review to examine the currently available evidence on mHealth education for patients with CKD and, thus, explore the existing evidence regarding feasibility, effectiveness outcomes and outcome measures, patient and/or provider perception and implementation challenges.

Methods and analysis A scoping review will be conducted in accordance with Joanna Briggs Institute Manual for Evidence Synthesis chapter on scoping reviews.

MEDLINE, Embase, CINAHL and PsycINFO will be searched. The search strategy will consist of blocks, which have been adopted and modified from former Cochrane reviews. Two independent reviewers will screen studies. Characteristics of the included studies, both quantitative and qualitative, will be reported using quantitative descriptive statistics. Quantitative results will be grouped by objectives (feasibility, effectiveness outcomes and outcome measures, patient perception and implementation challenges), types of intervention and characteristics of participants. Qualitative results will be organised into categories using an iterative process, as suggested by Pollock *et al*.

Ethics and dissemination As this scoping review does not involve primary data collection, ethical permission is unnecessary. Results of the scoping review will be published in an international peer-reviewed scientific journal.

Trial registration number Open Science Framework (https://osf.io/gxkeh/).

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ First comprehensive assessment of mHealth education for patients with chronic kidney disease.
⇒ Comprehensive search strategy, adopted from two recent Cochrane reviews.
⇒ Scoping reviews do not include quality assessment or risk of bias assessment.
⇒ Despite rigorous attempts to include all studies relevant to the aim, data sources such as grey literature may not have been exhausted, which may result in some studies not being included.

INTRODUCTION

More than 10% of the population worldwide is affected by chronic kidney disease (CKD).[1] The National Kidney Foundation-Kidney Disease Outcomes Quality Initiative has classified CKD into five stages, with stages 1 and 2 requiring the presence of kidney damage, such as proteinuria or structural damage.[2] CKD stages 3 and 4 are defined by glomerular filtration rate (GFR) beneath 60 mL/min/1.73 m^2 over a time period of at least 3 months.[2] CKD stages 3 and 4 (GFR 15–59 mL/min) represent a loss of 50% of the normal renal function and are considered a cut-off point for clinically significant CKD.[3 4] Stage 5 is also referred to as end-stage renal disease.[2]

At the end-stage of the disease, patients may choose between dialysis, kidney transplantation or maximum conservative management. However, CKD is a complex disease and patient awareness plays a crucial role in the treatment. A survey of dialysis patients found that patients' abilities to identify chronic comorbidities are associated with lower mortality.[5] In addition, patient education can provide patients with a better understanding of their disease and treatment options.[6] However, there are several barriers to providing information or education to patients with CKD. A systematic review examining the readability of patient education materials, including online materials, for patients with CKD, reported that the written language was pitched too high for the target audience.[7] A review by Narva *et al* reporting on barriers patients have to understanding CKD, highlighted limited access to information, among several other barriers.[6] The same review suggests using innovative approaches, such as digital

media and inclusion of family and caregivers to help overcome these barriers.

Hence, one solution could be mHealth education for patients and possibly, family members or caregivers. The WHO defines mHealth (ie, mobile health) as: 'the provision of health services and information via mobile technologies, such as mobile phones, tablet computers, and Personal Digital Assistants (PDAs)'.[8] mHealth interventions may include synchronous (ie, text messages, phone calls, video or live chat) and asynchronous (ie, pre-recorded videos, interactive apps without direct contact with the educator) forms of education.[9]

In 2013, the US Department of Veterans Affairs launched an eKidney clinic, a web page containing educational information in written and illustrative formats together with short videos.[10 11] Since the launch, website traffic has tripled, indicating a growing interest in online education among patients with CKD and carers.[10 11]

A study comparing the effects of video (using an online synchronous group format allowing for real-time interaction) versus face-to-face patient education for renal replacement therapy found that both forms of education increased patients' abilities to choose their preferred type of renal replacement therapy.[12] Furthermore, a qualitative study of mHealth-delivered dietary coaching interventions (including phone calls and text messages) was well accepted among patients with CKD.[1] Both of these interventions demonstrate synchronous forms of education. Even though there are more than 174 mobile applications available for patients with CKD to help them with various aspects of their disease, a recent study found that only a few are rated highly by patients and nephrologists.[13]

Despite the many promising trends regarding the use of mHealth education for patients with CKD, there is still little evidence regarding feasibility, effectiveness outcomes and outcome measures, patient and/or provider perception or implementation challenges.

Aim

This scoping review aims to explore the existing evidence on mHealth education for patients with CKD, regarding feasibility, effectiveness outcomes and outcome measures, patient and/or provider perception or implementation challenges.

METHODS AND ANALYSIS

A scoping review will be conducted in accordance with the Joanna Briggs Institute Manual for Evidence Synthesis chapter on scoping reviews.[14] Scoping reviews are a type of knowledge synthesis used to map key concepts and the main sources and types of evidence. Furthermore, scoping reviews can be used to discern where there are current gaps in the evidence.[15]

The protocol is guided by the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) Protocols.[16] The final results of the study will be reported following the PRISMA extension for Scoping Reviews.[16]

Inclusion and exclusion criteria

In this scoping review, we will include studies addressing mHealth education for patients with CKD. Studies must address at least one of the following: feasibility, effectiveness outcomes and outcome measures, patient or provider perception or implementation challenges. Feasibility will be regarded as any form of study reporting on the feasibility of conducting mHealth education. Effectiveness outcomes and outcome measures will be defined as any study measuring any effect of an mHealth education intervention, including, but not limited to, clinical effects (eg, percentage of patients who end up in dialysis) or to increase the knowledge of the participants. Patient and provider perception can include both qualitative statements or take a more quantitative form, for example, satisfaction or experience questionnaires. Due to the broad spectrum of outcomes, we will include both quantitative and qualitative research, which may be both interventional and non-interventional.

Implementation challenges will be defined as any mention of implementation challenges and grouped in accordance with the Consolidated Framework for Implementation Research, which is composed of five domains: intervention characteristics, outer setting, inner setting, characteristics of the individuals involved and the process of implementation.[17]

mHealth education interventions can include both synchronous (ie, text messages, phone calls, video or live chat) and asynchronous (ie, pre-recorded videos, and interactive apps without direct contact with the educator) forms of education. However, only primary research studies published as full-text papers in peer-reviewed journals will be included in the review.

We will exclude other types of telemedical interventions (eg, remote monitoring or treatment) for patients with CKD. We will also exclude papers assessing mHealth education for healthcare professionals. Articles published in languages other than English, Danish, Norwegian or German will be excluded (table 1). Furthermore, due to the rapid evolvement in technology and technological readiness over time, only papers published from 1 January 2018 to the current day will be included due to the rapid evolvement in technology.

Search

MEDLINE, Embase, CINAHL and PsycINFO will be searched. The search strategy will consist of two blocks: one for 'CKD' and one for 'mHealth', combined with the Boolean operator *AND*. The blocks have been adopted and modified from two Cochrane reviews: one capturing articles about CKD[18] and the other capturing articles about mHealth education.[19] The search strategy for MEDLINE can be found in box 1. The full search strategy

Table 1 Selection criteria

	Inclusion	Exclusion
Study types	► Full-text peer-reviewed studies ► Quantitative, including, but not limited to: – RCTs – Cohort studies – Case–control studies ► Qualitative, including, but not limited to: – Focus groups – Interviews ► Other – Mixed methods	Protocols, conference papers, editorials, etc Articles in languages other than Danish, English, German or Norwegian Studies published before 2018
Participants	► Patients with CKD ► Healthcare educators, including, but not limited to: – Dieticians – Doctors – Nurses	
Interventions	mHealth education for patients with CKD, either: ► Synchronous, real time or ► Asynchronous, store and forward	mHealth education for healthcare professionals Other forms of mHealth for patients with CKD: ► Remote monitoring ► Remote treatment consultations

CKD, chronic kidney disease; RCT, randomised controlled trial.

for all databases will be presented with the dissemination of the results. Furthermore, reference lists of all included studies will be searched for relevant studies not identified by the database search.

Study records

Data management and selection process

The literature search will be transferred to EndNote, duplicates will be removed manually and the results will be uploaded to Covidence for screening. All uploaded studies will be screened by title and abstract by at least two reviewers, and then, by full text. For the title and abstract screening, all reviewers will screen a random sample of 50 papers by title and abstract to ensure reliability. To ensure consistency and reliability in full-text screening, 10% of all full-text articles will be screened by all reviewers and the results discussed. Each step of the screening process will begin only after at least 75% agreement has been reached in both exercises. In case of disagreement, discussion and, if needed, a third independent reviewer will be used to make the final decision.

Data extraction and synthesis

Data on intervention type (synchronous/asynchronous), study objective, study design, number and type of participants and duration of the study, as well as the country of origin and publication year, will be extracted independently. In case of disagreement, the two reviewers will discuss the issue. If needed, a third independent reviewer

Box 1 Search strategy MEDLINE ALL Ovid

1. exp Renal Replacement Therapy/
2. exp Dialysis/
3. (hemodialysis or haemodialysis).tw.
4. (hemofiltration or haemofiltration).tw.
5. (hemodiafiltration or haemodiafiltration).tw.
6. dialysis.tw.
7. (CAPD or CCPD or APD).tw.
8. exp Kidney Diseases/
9. (kidney disease* or renal disease*).tw.
10. (nephropath* or nephrit* or glomerulo* or glomerular disease*).tw.
11. (end-stage renal or end-stage kidney or endstage renal or end-stage kidney).tw.
12. (ESRF or ESKF or ESRD or ESKD).tw.
13. (chronic kidney or chronic renal).tw.
14. (CKF or CKD or CRF or CRD).tw.
15. (predialysis or pre-dialysis).tw.
16. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15
17. Text Messaging/
18. ((mms or sms) and (text* or messag*)).tw.
19. (multimedia messag* service* or short messag* service*).tw.
20. (text messag* or texting).tw.
21. exp Cellular Phone/
22. ((car or cell* or smart or mobile) adj3 phone*).tw.
23. (carphone* or cellphone* or smartphone* or mobilephone*).tw.
24. (iphone* or ipod* or podcast* or ipad* or android* or blackberr* or palm pilot*).tw.
25. exp Computers, Handheld/
26. (pda* or personal digital assistant*).tw.
27. (tablet adj6 (computer or pc)).tw.
28. ((wireless or handheld) adj3 (device* or technolog*)).tw.
29. Telemedicine/
30. telemedicine.tw.
31. telehealth.tw.
32. telemonitor*.tw.
33. ehealth.tw.
34. e-health.tw.
35. (mobile adj3 health*).tw.
36. mhealth.tw.
37. m-health.tw.
38. Computer-Assisted Instruction/
39. ((computer or online or internet or web) adj3 (learn* or educat* or instruct*)).tw.
40. (elearning or e-learning).tw.
41. Electronic Mail/
42. (electronic mail or email* or e-mail*).tw.
43. exp Internet/
44. (web or website* or internet).tw.
45. (social adj3 (media or network*)).tw.
46. chat.tw. not (choline or acetylcholine).mp.
47. 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46
48. exp Health Education/
49. ((health or patient) adj3 (educat* or teach* or learn* or literate or literacy)).tw.
50. exp Health Promotion/
51. ((health or wellness) adj3 (promot* or program* or campaign*)).tw.
52. exp Self Care/

Continued

Box 1 Continued

53. (self adj3 (care or manage*)).tw.
54. 48 or 49 or 50 or 51 or 52 or 53
55. exp Technology/
56. exp Telecommunications/
57. (technolog* or wireless or text messag*).tw.
58. ((car or cell* or smart or mobile) adj3 phone*).tw.
59. 55 or 56 or 57 or 58
60. 54 and 59
61. 47 or 60
62. 16 and 61

will decide. Data will be extracted to a predefined form. The form will be pilot tested on five randomly selected articles among the included articles in our review.

Characteristics of the included studies, both quantitative and qualitative, will be reported using quantitative descriptive statistics (ie, frequencies, summary statistics). In addition, due to the probable variety of study methodology in the included articles, quantitative results will be grouped by objectives (feasibility, effectiveness outcomes and outcome measures, patient perception and implementation challenges), types of intervention and characteristics of participants. Qualitative results will be summarised under each of these objectives, when applicable, and organised into categories using an iterative process, as suggested by Pollock *et al*.[20]

Patient and public involvement

The protocol has been developed without any involvement from patients or the public. However, the findings and results of the review will be disseminated and discussed with patients with CKD who received CKD education prior to writing the final manuscript. The patients' work will be voluntary and they will be offered coauthorship according to the International Committee of Medical Journal Editors criteria.

ETHICS AND DISSEMINATION

As this scoping review does not involve any primary data collection, ethical assessment is not necessary. The results of the scoping review will be published in an international peer-reviewed scientific journal. If possible, the results may also be presented at an international conference prior to publication.

DISCUSSION

In this scoping review, we aim to explore the existing evidence on mHealth education for patients with CKD regarding feasibility, effectiveness outcomes and outcome measures, patient and/or provider perception and implementation challenges. Thus, our review will include different types of research, providing a comprehensive overview of the available literature. Furthermore, knowledge gaps in the current literature will be identified, as well as research challenges and possibilities for further research.

Scoping reviews follow many of the same steps as systematic reviews. However, given the nature of a scoping review, the quality of the research will not be judged.[14] Therefore, the scoping review results are not as generalisable as those of the systematic review, and implications for practice are limited. Nevertheless, our review will point towards whether or not it is worthwhile conducting a full systematic review on mHealth education for patients with CKD in any of the areas included in our study. The preliminary search indicated that studies of both qualitative and quantitative designs are available regarding mHealth education for patients with CKD. However, the preliminary search did not identify any studies focusing on implementation. When evaluating new technology and the effectiveness of a given technology, the results are strongly affected by the success of the implementation.[21]Hence, we anticipate that the area of implementation evaluation may be poorly represented.

Another issue when evaluating mHealth education, and telehealth in general, is the rapid evolvement in technology and technological readiness over time. In 2005, the number of internet users worldwide was 1.1 billion, growing to 3.97 billion by 2019.[22]

Therefore, only articles published from 2018 to the current day will be included. Moreover, the internet penetration rate (share of individuals using the internet) varies greatly depending on the region. For example, in 2019, the internet penetration rate was more than 80% in Europe, while only 28.6% in Africa.[23] Furthermore, there may be considerable variation within each region. This can make the transferability of a study very challenging. Another limitation of this review is the selection of included languages, which for practical reasons is kept to English, Danish, German and Norwegian, languages that are familiar to the review team. Despite our best attempt to include as many languages as possible, this might introduce an inclusion bias.

The strengths of this scoping review include the comprehensive search strategy adopted from former Cochrane reviews.[19 24] Furthermore, publishing the protocol enhances the transparency of the research. Amendments or deviations will be registered in the Open Science Framework registration and/or mentioned in the final paper when publishing the results.

To the best of our knowledge, the evidence for mHealth education of patients with CKD has not been previously examined, rendering our scoping review the first of its kind. Findings will provide an overview of the evidence, and inform future research.

Contributors ANØS, EHB and JDK had the original idea for this study. ANØS wrote the first draft of the manuscript and will be the guarantor for the review. EHB, JDK, KK and CM contributed to the development of the idea and study protocol development, and reviewed the manuscript for intellectual content. All authors approved the final submitted version of the manuscript.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests ANØS reports personal fees from OpenTeleHealth, outside the submitted work.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Provenance and peer review Not commissioned; externally peer reviewed.

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