Impact of Telehealth Interventions on Processes and Quality of Care for Patients With ESRD

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Caring for patients with end-stage renal disease (ESRD) requiring dialysis is intensive and expensive. Telehealth may improve the access and efficiency of ESRD care. For this perspective, we systematically reviewed studies that examined the effectiveness of telehealth versus or in addition to usual care for ESRD management. 10 studies were identified, including 7 randomized trials and 3 cohort studies. Study populations, modes of delivery (including telephone, telemetry, or videoconferencing), and the outcomes evaluated varied substantially between studies. Two studies examined telehealth interventions versus standard ESRD care and demonstrated mixed results on processes of care, no differences in laboratory surrogate markers of ESRD care, and reduced or similar rates of hospitalization. Eight studies evaluated the addition of telehealth to usual care and demonstrated no significant improvements in processes of care or surrogate laboratory measures, variable impacts on hospitalization rates, and mixed impacts on some domains of quality of life, including improvement in mental health. Although potential benefits of telehealth in ESRD care have been reported, optimal designs for delivery and elements of care that may be improved through telehealth remain uncertain.

Complete author and article information provided before references.

Am J Kidney Dis. XX(XX): 1-9. Published online Month X, 2017.

doi: 10.1053/j.ajkd.2018.02.353

Introduction

More than 700,000 Americans[1] and 37,000 Canadians[2] have end-stage renal disease (ESRD). Most patients with ESRD are treated with renal replacement therapy, including hemodialysis (HD) or peritoneal dialysis performed in medical facilities or at home. Due to their frequency of care, patients with ESRD are often in contact with health care providers across several points of care to monitor and manage their health, which can be challenging and resource intensive, particularly when patients live in remote or underserved areas.

Telehealth, or telemedicine, is a rapidly growing area of medicine in which health care services are delivered in part or exclusively through technology. There are a variety of formats for delivering telehealth, which include clinician-to-clinician, clinician-to-patient, and patient-to–mobile health technology communication.[3] Telehealth has the potential to improve access to ESRD care for patients in their own homes or from remote facilities.[4] However, despite the growing recognition of the potential opportunities, benefits, and challenges pertaining to implementation and regulation,[5] evidence-based guidance on how to use telehealth effectively in ESRD care is lacking. Although several narrative reviews have discussed the potential applications of telehealth for managing chronic kidney disease,[6-8] the impact of telehealth on the care and outcomes of patients with ESRD has not been systematically reviewed.

As the basis of this Perspective, we performed a systematic literature review to identify design and reporting features that will advance the field. Our goal was to synthesize the current evidence on the effectiveness of telehealth in ESRD management, focusing specifically on the process and quality of care. We leveraged randomized clinical trials and observational studies that examined the impact of telehealth versus or in addition to usual care on clinical outcomes, patient-reported measures, or process of care or surrogate measures in adults receiving dialysis.

Literature Review

We conducted a systematic literature search, following a prespecified protocol registered with PROSPERO (registration number: CRD42016052975). Randomized clinical trial (crossover or parallel) or cohort studies (exposed/control or single-group pre/post design) that included adults with ESRD receiving dialysis and evaluated a technology-based bidirectional interaction between patients and providers were eligible for inclusion. We specifically included studies that investigated the impact of telehealth on either a clinical outcome (eg, hospitalization), patient-reported outcome (including self-reported physical or mental status) or experience measure, or surrogate measurement (eg, blood pressure) or ESRD process measure (defined as a deliberate action to follow a process intended to provide quality care). We did not include studies that assessed only feasibility or costs of telehealth implementation.

Two independent reviewers (M.L. and R.L.) searched online databases and references of identified articles published up to August 1, 2017. Databases searched included Medline, PubMed, CENTRAL, Embase, CINAHL, and Health Technology Assessment. We identified 10,667 citations from the 5 databases, resulting in 6,377 unique citations (Fig 1). Eight additional articles were identified from references of identified articles. Following abstract

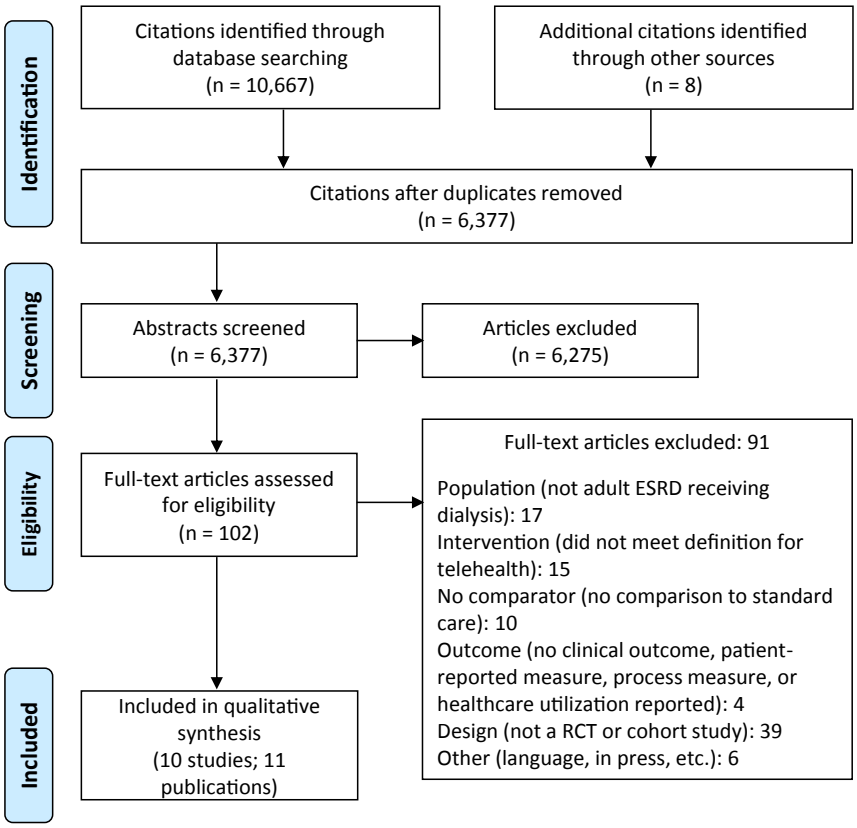

Figure 1. Overview of article screening and selection. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow chart describes process of searching, screening, and identifying eligible articles for the review. Abbreviations: ESRD, end-stage renal disease; RCT, randomized controlled trial.

screening, 102 full-text articles were selected for full-text review, and 11 publications (10 studies) were included in the systematic review.

Study-level data were collected and managed using REDCap electronic data capture tools hosted at the Cumming School of Medicine.[9] The Template for Intervention Description and Replication (TIDieR) checklist,[10] a 12-item tool developed by an international group of experts and stakeholders to describe interventions, was used to extract a description of the intervention. A descriptive synthesis was performed to categorize the nature of interventions and outcomes of the published telehealth interventions identified for ESRD management.

Summary of Findings

Characteristics of Included Studies

Eleven papers reporting on 10 unique studies of telehealth in ESRD management were included (Table 1).[11-21] Studies were conducted across 8 countries, published between 2007 and 2017, and had sample sizes that ranged from 11 to 135 patients.

Characteristics of Telehealth Interventions

Mode of communication

Methods of communication varied across the telehealth interventions (Fig 2; Table S1). Four interventions used a telephone call only[12,16,17,21] and 4 adopted a combination of software applications to electronically transfer clinical data[11,13,15,18,19] or patient-reported outcomes[11,13,18] to health care providers, who would review the information and act based on the information received. One study also provided health information to patients through a portal, based on a needs assessment questionnaire.[19] Two interventions used videoconferencing allowing for visual interface, one between providers at the hospital and patients in their homes[14] and the second between a nephrologist and a satellite clinic, where nurses and patients were located.[20]

Health Care Provider

The primary health care providers participating in telehealth communication with patients varied across studies (Table 1; Fig 2). Three telephone interventions were performed by nurses[12,16,17] and 1 videoconferencing intervention was conducted by nephrologists.[20] Interventions involving a multidisciplinary health care team used either telephone (text messaging),[21] videoconferencing,[14] or telemetry[13,15,19] (Table 1; Fig 2).

Purpose of Telehealth Intervention

Six studies used telehealth for patients receiving HD, and 4 studies, for patients receiving peritoneal dialysis (Table 1). Studies that examined patients receiving HD evaluated the following interventions: 1 connected nephrologists with remote clinics,[20] 2 supported patients undergoing home dialysis,[11,18,19] 2 supported self-management for