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CKJ REVIEW

# Use of eHealth and remote patient monitoring: a tool to support home dialysis patients, with an emphasis on peritoneal dialysis

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## ABSTRACT

Implementing eHealth requires technological advancement, universal broadband and internet access, and devices to conduct telemedicine and remote patient monitoring in end-stage kidney disease patients receiving home dialysis. Although eHealth was beginning to make inroads in this patient population, the COVID-19 pandemic spurred telemedicine usage when many regulations were waived during the Public Health Emergency to limit the spread of infection by endorsing social distancing. At the same time, two-way communication automatic peritoneal dialysis cyclers were introduced to advance remote patient monitoring. Despite the numerous advantages and potential benefits afforded by both procedures, challenges and untapped resources remain to be addressed. Continuing research to assess the use of eHealth and technological innovation can make eHealth a powerful tool in home dialysis. We review the past, present and future of eHealth and remote patient monitoring in supporting home dialysis.

**Keywords:** eHealth, end-stage kidney disease, peritoneal dialysis, remote patient monitoring, telemedicine

## INTRODUCTION

Technological innovations and its application have spurred eHealth and remote patient monitoring in home dialysis. The end-stage kidney disease (ESKD) interdisciplinary team members rely on eHealth and remote patient monitoring, especially during the COVID-19 pandemic, to stay connected to their home dialysis patients and to provide oversight of treatments. This review will highlight the past, present and future of eHealth and remote patient monitoring in home dialysis.

## DEFINITIONS

eHealth was first coined in 1999 as an umbrella term to describe "the combined use of electronic communication and information technology in the health sector… the use in the health sector of digital data—transmitted, stored and retrieved electronically—for clinical, educational and administrative purposes, both at the local and distance sites [1]."

eHealth technologies make use of the internet, for example, to allow eHealth users to access medical records, research health

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information and engage in person-to-person exchange of text, audio, video and other data. Modern mobile devices have the capability to download applications that allow users to instantly access health information [2].

Telehealth is defined as the delivery and facilitation of health and health-related services including medical care, provider and patient education, health information services, and self-care via telecommunication and digital communication technologies. Examples of technologies used in telehealth include live video conferencing, mobile health apps, "store and forward" electronic transmission and remote patient monitoring [3]. Telemedicine, on the other hand, is defined as "the remote diagnosis and treatment of patients by means of telecommunications technology."

Telemedicine encompasses the use of technologies and telecommunication systems to administer healthcare to patients who are geographically separated from providers [3].

Within telehealth, remote patient monitoring uses digital technologies to collect health data from patients in one location and electronically transmit that information securely to providers in a different location [4]. Examples of data can include vital signs, weight, blood pressure, blood sugar, etc.

With regards to definitions, going from the broadest to narrower ones, eHealth represents the broadest definition, then telehealth and finally telemedicine.

## TELEHEALTH APPLICATIONS

Telehealth, namely telemedicine, use in home dialysis and especially in peritoneal dialysis (PD) has increased worldwide in the last decade. Early advocators of telehealth to support PD include Cargill and Watson [5], Gallar *et al*. [6] and Nakamoto [7]. The next wave of advocators of telemedicine and remote patient monitoring occurred in the pre-COVID-19 period include Rosner and Ronco [8], Nayak *et al*. [9], Lew and Sikka [10] and Nayak *et al*. [11]. Telehealth utilization was constrained by regulation. While remote patient monitoring advanced rapidly, matching innovation and industry's inspiration and manufacture of appropriate equipment [12–19]. The COVID-19 pandemic spurred telehealth use and its deployment to support home dialysis occurred worldwide. A few examples include the USA [20, 21], Brazil [22, 23], China [24], Mexico [25] and Dominican Republic [26].

Each country experienced its own path to eHealth for patients with ESKD in its current form. The US experience of telehealth to support home dialysis, including home hemodialysis, continuous ambulatory PD (CAPD) and automatic PD (APD), will be described. Until 2019, federal regulations in the USA had limited the use of telehealth by geographic location to include "rural health-professional-shortage area located either outside a metropolitan statistical area or in a rural census tract," or "county outside of a metropolitan statistical area." In addition, originating and distant sites were restricted to practitioners' offices, hospitals, skilled nursing facilities, federally qualified health centers and rural health clinics. Hospital-based or critical access hospital-based renal dialysis centers was specific to nephrology [27].

In an effort to expand home dialysis, HR 1892–Bipartisan Budget Act of 2018, Section 50 302 (9 February 2018) allowed Medicare beneficiaries receiving home dialysis access to telehealth [28]. Noteworthy items in this statute included: (i) originating sites include the patient's home and dialysis unit without geographic restrictions; (ii) the home dialysis patient must elect to receive monthly ESKD-related clinical assessments through telehealth; (iii) two monthly telehealth visits were permitted for every in-person visit per quarter. Specifically, face-to-face clinical assessments is needed in the initial 3 months of home dialysis, at least monthly, and at least once every 3 consecutive months. (iv) The practice became effective 1 January 2019. Despite the availability of telehealth to Medicare beneficiaries on home dialysis, PD patients were unaware of this regulation when surveyed in August 2018 [29].

During the COVID-19 pandemic, mandatory appeals for social distancing, especially for vulnerable individuals such as ESKD patients, and regulatory waivers from federal and state governments under the Public Health Emergency provided further opportunities for home dialysis patients to access telemedicine [30, 31]. The changes mostly applied to the clinicians and their practices. Key changes included: (i) the distant site included the clinician's home; (ii) state licensure was waived as long as the clinician held an active license; (iii) any convenient video platform could be used, forgoing many privacy and security requirements that created barriers for practices to implement telehealth quickly and cost effectively; and (iv) audio-only encounters were also accepted for reimbursement [31]. During the Public Health Emergency, ESKD patients receiving in-center hemodialysis were able to participate in telemedicine while receiving hemodialysis in the dialysis unit [30].

After the Public Health Emergency expires home dialysis patients will be able to continue telemedicine using pre-COVID-19 regulations [28].

### Operationalizing telehealth

Operationalizing telehealth for home dialysis patients requires changes on many fronts [32]. First, internet access must be established. This may pose a challenge in rural areas and for individuals of low socioeconomic status. Second, the necessary devices and platforms must be obtained to conduct telemedicine. This may include electronic medical records. Third, regulations governing telehealth must be followed, such as licensure and reimbursement. The users need to be educated on the process of eHealth. Fourth, telehealth can be deployed. Finally, the process must be evaluated for effectiveness and quality improvement (see Fig. 1).

#### Patient's perspective

Patients use their mobile phone to connect to the videoconferencing platform which eliminates the need for special equipment that may not be available to all patients, and avoids added cost to the user [32, 33]. Patients still need monthly laboratory tests which had traditionally been obtained in the dialysis unit. Dialysis units may require patients to continue to have these performed in the dialysis unit or refer them to a central laboratory proximal to their domicile. Parenteral medications that are administered subcutaneously can be performed by the patient or care partner in the home setting.

#### Physician's perspective

The distant site has been extended to the home, to supplement the office or hospital as the distant site. Thus, eliminating the commute to the dialysis unit or office. Clinicians should have the appropriate state licensure to practice medicine in the region that the patient resides. At the current time almost all practices and dialysis units use electronic medical records which can be accessed remotely and have a Health Insurance Portability and Accountability Act (HIPAA) compliant platform to conduct videoconferencing visits. Clinicians have adapted to a "virtual"

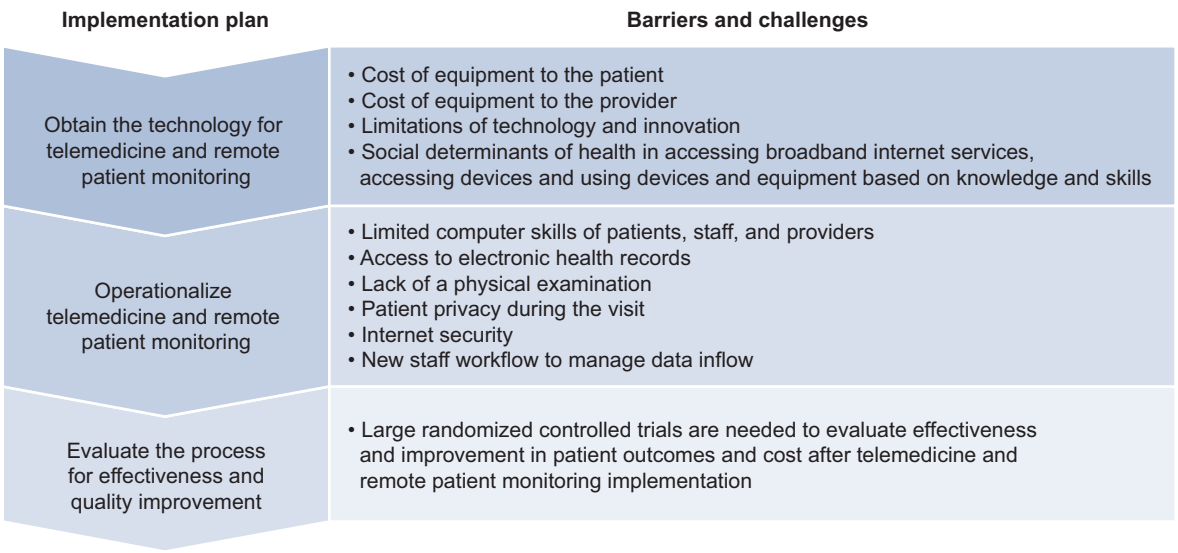


**Figure 1:** Implementation of eHealth and remote monitoring for home dialysis patients.

physical examination and the home dialysis patient has the necessary equipment to obtain and report vital signs [32].

#### Nurse's perspective

Nurses participate in eHealth from the clinic. They generally schedule the virtual visit and invite the patient and clinician to join the meeting. Nurses continue to play an active role during the visit in documenting vital signs, taking orders with respect to changes in prescription or medications, and executing the orders. The virtual visit gives the nurses an opportunity to see the patient in the home environment and interactions with family members and/or caregivers.

## REMOTE PATIENT MONITORING

Remote patient monitoring provides information about the home treatment that allows the care team to have therapy oversight. Patient monitoring has been in place ever since PD was offered as a home therapy. With CAPD, patients recorded on paper daily biometric readings (i.e. blood pressure, pulse, weight, temperature), treatment-related information (i.e. date, time, PD fluid inflow volume, PD dialysate drain volume, net ultrafiltration) and other parameters such as blood sugar in accordance with comorbid conditions. These records would be reviewed at monthly clinic visits. Although patients faithfully recorded the information, the nurses and doctors did not take action to modify the PD prescription until the clinic visit. Missed opportunities to treat hypertension, hypotension, manage volume overload or depletion, detect catheter malfunction or missed treatments prevailed. It was not unheard of for patients frequently to fail to record their treatment or bring in their PD flowsheets. The lack of treatment data impacted on patient care and the PD team's lack of oversight on patient care.

### Equipment and technology

Baxter (previously known as Travenol Laboratories) introduced the "Automated peritoneal dialysis cycler" as we know it today, in 1984 [34]. Norman Lasker designed the first PD cycler in 1964 [35]. Instead of manual techniques that dependent on gravity, modernization of equipment with semiautomatic to automatic machines and the availability of PD solution in plastic bags permitted patients to perform APD at home during night-time without the need for patient or care giver intervention. An example is Baxter's "HomeChoice™ APD System" (see Table 1).

Remote patient monitoring began with the introduction of the memory card in 1999 to record and store 2 months of treatment data [36]. This device, which also held the treatment prescription program, was incorporated into a commercial PD cycler, "HomeChoice Pro™ APD System" (see Table 1). The memory card provides a means to accurately record the treatment data. However, patient entered data such as blood pressure and weight continue to be subjected to human error or falsification. The PD team relies on the patient to bring in the memory card and the patient frequently forgets to do so. Any deviations or unusual treatment patterns were not detected until treatment data were reviewed, which was usually at the monthly visit but could be up to 2 months. Any treatment prescription changes must be made on the memory card, which again relies on the patient bringing in the memory card.

Additional innovations in remote monitoring resulted in Baxter's introduction of the "Amia APD System" and "Sharesource Connectivity Platform" in 2018 (see Table 1). Amia is a lightweight automated PD system that has an incorporated software and modem such that the PD staff using the appropriate software (Sharesource) can program treatment prescription and retrieve treatment data remotely. The bidirectional communication permits full remote patient management. Patients are still required to enter their blood pressure and weight manually into the cycler. The Sharesource connectivity platform allows the PD staff to retrieve patient treatment records daily or near real-time. The PD staff no longer relies on patients to bring in the memory card to the clinic to reprogram treatment prescription or retrieve treatment data. Baxter later repackaged the automatic cycler and software, renaming it the "HomeChoice Claria APD System" (see Table 1). These cloud-based tools gives remote visibility to a patient's treatment, allowing the PD staff real-time oversight of patient treatment and results [37]. The automated patient treatment data collection ensures accurate patient treatment

**Table 1: Peritoneal dialysis cycler remote monitoring features—Baxter Healthcare.**

| |  |  |  |  |
|---|---|---|---|---|
| Device Name | HomeChoice™ APD System (Baxter) | HomeChoice Pro™ APD System | Amia APD System | Homechoice Claria APD System |
| Weight | 12.3 kg/27 lbs | 12.3 kg/27 lbs | 9 kg/18 lbs | 29.8 lbs |
| Dimensions | Height: 7 inches<br>Width: 19.3 inches<br>Depth: 15.7 inches | Height: 7 inches<br>Width: 19.3 inches<br>Depth: 15.7 inches | Height: 10.4 inches<br>Width: 14.8 inches<br>Depth: 8.1 inches | Height: 19.4 cm<br>Width: 46.7 cm<br>Depth: 38.7 cm |
| Functionality | No remote monitoring | ProCard needed for programming and recording of treatment | A modem attached to the cycler allows the nurse (or doctor) to adjust the patient's APD prescription or programs without requiring them to make additional trips to the clinic | A modem attached to the cycler allows the nurse (or doctor) to adjust the patient's APD prescription or programs without requiring the patient to make additional trips to the clinic |
| Vital signs | Written | Patient needs to manually enter BP and weight | Patient needs to manually enter BP and weight | Patient needs to manually enter BP and weight |
| Software platform | – | – | Sharesource Connectivity Platform | Sharesource Connectivity Platform |
| Treatment record | | | + | + |
| APD prescription/program ordered | | + | + | + |
| Date | Written | + | + | + |
| Start time | Written | + | + | + |
| Total therapy time | Written | + | + | + |
| Total therapy volume | Written | + | + | + |
| Average fill volume | | + | + | + |
| Number of cycles | Written | + | + | + |
| Average dwell time | | + | + | + |
| Customer service | | | | |
| Remote firmware upgrades | | | + | + |
| Remote technical service | | | + | + |
| Comprehensive treatment reporting | | | + | + |
| Automated patient treatment data collection | | | + | + |

Permission to reproduce cycler photographs has been granted by Baxter.
BP = blood pressure.

Table 2: Peritoneal dialysis cycler remote monitoring features—Fresenius Medical Care.


| | |
|---|---|
| Device name | Liberty® Select with Kinexus® |
| Device weight | 32 ± 4 lbs |
| Device dimensions | 18.8 × 16.3 × 8.5 inches |
| Functionality | The Kinexus Therapy Management Platform connects clinicians to their patients. With the use of the Kinexus Gateway, patient treatment data and therapy programs are transmitted wirelessly from the Liberty Select PD Cycler to the clinician portal and vice versa |
| Vital signs | Patient uses Liberty cycler touchscreen to enter blood pressure and weight |
| Software platform | Kinexus Therapy Management Platform |
| Upgradable operating system | + |
| Date | + |
| Start time | + |
| End time | |
| Total therapy time | + |
| Total therapy volume | + |
| Total UF | |
| Number of cycles | + |
| Transmits details for each cycle: fill volume, drain volume, UF volume, fill time, dwell time, drain time, number of fill alarms, and number of drain alarms | + |
| Drain and fill profile graphs | |
| Transmits fluid type used during treatment | + |
| Transmits patient weight | + |
| Transmits patient blood pressure | + |
| Transmits treatment alarm data | + |
| Configurable exception reporting | + |

Permission to reproduce cycler photograph has been granted by Fresenius Medical Care.
UF = ultrafiltration.

data collection, eliminates manual entry of treatment data, and reduces administrative burden on patients and clinic staff. The treatment record also serves as treatment verification for the payer as there is solid proof of treatment for reimbursement purposes. The modern devices allows Baxter to provide remote technical service by troubleshooting devices in a timely manner and fewer device swaps. In addition, modern devices allows Baxter to perform software updates without a device swap, eliminating hassle for both the patient and clinic staff.

Areas of unmet need include systems still requiring patient entry, as the patient may fail to perform the task or enter data incorrectly. These areas include blood pressure, weight and solution concentration. Digital capture of blood pressure readings and weight are available using appropriate devices. Moreover, real-time transmissions of these values from the patients' home to PD units are also available. Aspiration for the next generation of automated PD cycler would include these technologies. Digital capture of blood pressure and weight would require less work on the part of the patient to enter these data daily and would provide accurate readings for the first time, eliminating human error and falsification. Patients on CAPD can participate in remote patient monitoring of their blood pressure and weight if provided appropriate equipment that can transmit the data to a modem with Bluetooth technology. This information can then be transmitted in real time to their healthcare provider.

Fresenius Medical Care, another manufacturer of PD cycler, has made similar innovations available for their cycler "Liberty® Select" using Kinexus™ "Gateway" software (see Table 2). Fresenius has innovated its cycler and software to its latest model, "Versi™ PD," which received US Food and Drug Administration approval in April 2022. This cycler claims to be the smallest, lightest and quietest PD cycler. VersiPD uses Kinexus™ therapy management platform, a connected health system. At the time of this writing, Fresenius was still working to launch the product and therefore could not provide details.

## Impact on healthcare provider's practice and behavior

Remote patient monitoring allows the PD team members daily access to the patient's treatment record [13]. The information include adherence to prescription, alarms during treatment, drainage times and ultrafiltration amount. The PD team can then provide feedback and correct any deviations or nonadherence to treatment in a timely manner. Theoretically, this should result in a decrease in the number of clinic visits, emergency department (ED) visits and hospitalization for PD-related issues.

The two-way communication platforms give remote visibility to patient's treatment. Remote patient monitoring has created an impact on clinician's practice and behavior [38]. The nurses and clinicians must allocate time to their schedule to review patient biometric data and treatment information. This shift of reviewing treatment information away from clinic visits allow for shorter clinic visits or more time to spend on other aspects of patient care.

### Clinical outcomes

Remote patient monitoring aims to improve patient oversight. The impact of remote patient monitoring has gone beyond the PD treatment itself. The staff can observe patient treatment details and can make prescription changes remotely. In this fashion, investigators have shown that remote patient monitoring has advanced and supported home dialysis [16, 39].

Benefits of remote patient monitoring in PD include the following:

- Improves clinical outcomes [40–45]
- Improves treatment adherence [18]
- Improves adherence to treatment results in better blood pressure control with fewer antihypertensive medications [46]
- Improves patient quality of life due to more PD-free time, ability to remain in contact with healthcare providers [18, 41, 44, 47, 48]
- Remote patient monitoring has been reported to be cost-effective by reducing ED visits, hospitalization rate and hospital length of stay [17, 18, 40, 41, 43, 44, 49]
- Decrease technique failure [42, 43]

These unforeseen benefits of remote patient monitoring will boost PD usage and improve patient quality of life and outcomes. Remote monitoring allows nephrologists to recruit and maintain patients who live far away from the dialysis unit to choose PD as a treatment modality.

### Patient attitudes

Remote monitoring of automated PD improves personalization of dialytic prescription and patient's independence [50]. Patients report positive attitudes towards remote patient monitoring. When patients perform PD at home for the first time or for the first few months, they may experience low confidence level, insecurity and fear of making an error. Patients appreciate that the staff track their PD treatment to identify deviations or abnormalities. Treatment adherence and ultrafiltration amounts in patients increased with the use of remote monitoring using APD, as the patient knows the PD staff are monitoring their treatment and that they may receive a call if treatments are not performed [46].

## ADVANTAGES OF EHEALTH

There is no question that telemedicine saves time and money for both patients and clinicians in commuting to and from the dialysis unit. One can extend this to a reduction in carbon footprint and "green" advantages [51]. Telehealth could potentially increase patient independency and autonomy [51]. Chronic kidney disease education can be conducted with eHealth.

Combining remote patient monitoring with telemedicine provide a powerful tool for home dialysis patients. There is potential for improvement in clinical and economic outcomes, with reduction in ED visits, hospitalization rate, length of hospital stay and cost of care.

For the pediatric population, Clark *et al*. reported that the child was more comfortable in their home environment compared with the office and the visit was family-centered visit as it included parents, caregivers and siblings [21]. In addition, the parents avoid having to take time away from their daytime activities, traveling to the dialysis unit and taking the child out of school for the visit. Telehealth in the pediatric population also addresses clinician shortages and provides remote guidance for chronic care pathways from pediatric subspecialists to rural-based referring physicians, representing a sustainable and cost-effective strategy to improve pediatric care [52].

During the COVID-19 pandemic, remote patient management of PD provided continuity of care, and decreased or prevented COVID-19 infection was reported [24, 26, 53, 54].

PD training traditionally occurred in the dialysis unit between the nurse and patient with or without a caregiver. The method involves show, do, and teach back or demonstrate competency. The distance between the patients' home and the dialysis unit will constrain training time and patients' capacity to learn. Successful remote training for peritoneal has been demonstrated by Viglino *et al*. [55]. Techniques may include video training and videoconferencing.

## CHALLENGES OF EHEALTH

Despite the advantages of eHealth supporting home dialysis, many challenges exist along the entire spectrum which limit universal up take.

Not every dialysis unit offers home dialysis. This may be due to the patient selecting in-center treatments, physicians not familiar or comfortable with the treatment, and limited nursing staff. As patient location may be distant from the dialysis units offering home dialysis programs, the advantages of telemedicine come into play to recruit and maintain patients on a home modality.

Information and communication technologies depend on broadband access and internet service, and devices such as computers, smartphones and tablets. Patient factors affect this, such as living in rural areas, belonging to a low socioeconomic status, or being socially disadvantaged such that they do not have access to these basic services and equipment to conduct eHealth. Societal awareness of the effects of social determinants of health and health disparities impact those living at the margin of society.

Patients may perceive and therefore express concerns about privacy when conducting eHealth. The originating site has been designated as the home which offers privacy if the patient is in a secluded room. The clinician at the distant site should seek an area where others cannot see or hear the patient to protect patient privacy. Patients may perceive and have also expressed security concerns, especially when using electronic health records and platforms to conduct the audio-video conference. The use of virtual private networks and HIPAA-compliant platforms protects sensitive patient health information. The use of a personal smartphone or computer adds another layer of protection compared with using a public computer.

The lack of a physical examination has deterred some physicians from advocating for eHealth. In certain specialties, palpation and auscultation play key roles in eliciting physical findings. In nephrology, palpation and auscultation are not mandatory. For example, especially in dialysis patients, combining several parameters such as blood pressure reading, the

**Table 3: Advantages, potential benefits and challenges associated with eHealth for ESKD patients receiving home dialysis.**

| Advantages | Potential benefits | Challenges |
|---|---|---|
| Telemedicine | | |
| Social distancing during pandemic decreases infection risk | Addresses nephrologist shortage in rural and urban areas | Availability of internet and devices for all patients |
| Recruit and maintain patients on home therapy who live far from the dialysis unit | Enhance patient education regarding ESKD treatment modalities and home dialysis techniques | Internet privacy |
| Decreases commute time for patients and providers | | Internet security |
| Decreases cost and carbon footprint of transportation | | Lack of a hands-on physical examination |
| | | Patient privacy during the virtual visit |
| | | Obtaining blood monthly for laboratory tests |
| Remote patient monitoring | | |
| Better oversight of treatment | Improves clinical outcomes | Patient biometric data requires manual entry |
| Accurate data collection | Improves treatment adherence | Staff management of data |
| Real- to near real-time data transmission | Improves patient quality of life | |
| | Reduces ED visits | |
| | Reduces hospitalization rate | |
| | Reduces hospital length of stay | |
| | Decreases cost of care | |
| | Decreases technique failure | |

presence of pedal edema, weight and work of breathing may be used to assess a patient's volume status. The visual inspection of the PD catheter exit site or hemodialysis arteriovenous access with a smartphone camera provides clear and sharp images. An unstable patient who needs a physical examination may need to be seen in-person.

Although pediatric ESKD patients are few in number compared with adults, this vulnerable population has special needs that eHealth cannot provide. A pediatric clinic visit requires the attendance of one or both parent and occasionally a caregiver such as a nanny or grandparent. Such a visit requires parents to take time away from their daily activities such as work or caring for younger siblings in order to attend the clinic visit. The telemedicine encounter could save the parent time away from work and commuting time. However, the physician cannot perform an adequate examination virtually [21]. Additionally, the physician cannot speak privately to teenagers on a virtual visit because the parents are present in the room [21].

Arrangements for monthly laboratory tests can be performed at the dialysis unit or central laboratory. Advantages and disadvantages exist for both methods. For example, central laboratories are not equipped to calculate Kt/V or normalized protein catabolic rate.

Overall, there remains room for improvement in telemedicine. Basic communication services and devices need to be available. Technological advances may provide equipment or apps for the smartphone to enhance the virtual physical examination with the ability to auscultate sounds.

Not every study showed a positive outcome for telemedicine. In Brazil, there was an increase hospitalization for hypervolemia, and infection not related to PD doubled after transition to telemedicine [22], as did PD-related infection [23].

## FUTURE

Future innovation in technology will bring additional tools to enhance eHealth. Artificial intelligence can make use of the voluminous biometric, physiologic and treatment data collected by remote and virtual technologies to learn patient patterns that can predict and ultimately alter individual patient outcomes.

The use of telemedicine during COVID-19 occurred under unusual circumstances. Patients showed better adherence to treatment due to fewer competitive activities or better blood pressure control because they ate home-cooked meals rather than restaurant meals which tend to have more sodium, or because of adherence to treatment. Additional studies need to be performed using larger cohorts to understand the benefits and challenges of eHealth. Systematic reviews [56–58] demonstrate mixed results because of the small number of subjects involved, different intervention endpoints (transfer to hemodialysis, peritonitis, patient satisfaction, ED visits, hospitalization rate, hospital length of stay, mortality, cost) and different eHealth interventions. Metrics to measure quality include the three domains of structure, process and outcomes when applied to assess telehealth's impact on and quality for home dialysis [59].

## CONCLUSION

The potentials derived from harnessing innovation to expand remote patient monitoring and virtual technologies such as telemedicine can support and increase home dialysis. Both benefits and challenges exist in using eHealth to support home dialysis treatment modalities. Large-scale clinical studies are needed to understand the impact of eHealth on home dialysis (Table 3).

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## CONFLICT OF INTEREST STATEMENT

S.Q.L. and C.R. have no conflicts of interest to declare.

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