



Exploration of patients' preference for modalities of care among peritoneal dialysis patients in Singapore: a single-center experience

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Abstract

Introduction Peritoneal dialysis (PD) is home-based dialysis therapy and therefore a suitable modality for kidney failure patients, particularly, during the COVID-19 pandemic. The present study examined patients' preferences for different PD-related services.

Methods This was a cross-sectional survey study. Anonymized data from PD patients followed up at a single center in Singapore were collected using an online platform. The study focused on telehealth services, home visits, and monitoring of quality-of-life (QoL).

Results A total of 78 PD patients responded to the survey. The majority of participants were Chinese (76%), married (73%), and between 45 and 65 years old (45%). The in-person visit was preferred over teleconsultation for consultation with nephrologists (68% versus 32%), counseling for kidney disease and dialysis by renal coordinators (59%), whereas the telehealth service was favored over in-person visit for dietary counseling (60%) and medication counseling (64%). Most participants (81%) preferred medication delivery over self-collection, and the acceptable turnaround time was 1 week. Sixty percent would like to have a regular home visit, but 23% refused such visits. The preferred frequency of home visits was one-to-three visits within the first 6 months (74%) and then 6 monthly for subsequent visits (40%). The majority of participants (87%) agreed with QoL monitoring, and the preferred frequency of monitoring varied between 6 monthly (45%) and yearly (40%). Participants also indicated three key areas in research to improve QoL, such as the development of artificial kidneys, portable PD devices, and simplification of PD procedure. Participants also would like to see improvement in two main areas of PD services, such as delivery service for PD solutions and social (instrumental, informational, and emotional) support.

Conclusions Most PD patients preferred in-person visits with nephrologists or renal coordinators; however, they favored telehealth services with dietitians and pharmacists. PD patients also welcomed home visit service and QoL monitoring. Future studies should confirm these findings.

Keywords Telehealth services · Telemedicine · Teleconsultation · Peritoneal dialysis-related services · Home visit service · Quality-of-life

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Introduction

In the recent COVID-19 pandemic, peritoneal dialysis patients have been advised to stay at home to mitigate the risk of contracting infection. Telemedicine service has been promoted to replace some degree of in-person visits to clinics during the pandemic [1]. The Ministry of Health, Singapore has established guidelines for the proper conduct of telehealth services [2]. Healthcare professionals have been trained on how to provide telehealth services. However, the willingness of peritoneal dialysis (PD) patients to accept

telehealth for different services provided by the PD team has not been examined before.

Another aspect of care for PD patients is home visit service which provides support for patients and their caregivers to perform PD therapy safely in the community given that PD is a home-based dialysis therapy. There was a paucity of studies on home visit support for patients receiving PD [3] and most available studies were mainly focused on the discussion of clinical outcomes of patients [4–6]. A recently published study conducted in China reported that home visit services conducted virtually or in-person visits were well accepted by PD patients [3]. However, the study did not explore patients' preferences on the frequency of home visit services. Similarly, several studies compared the quality of life between PD and hemodialysis (HD) patients [7, 8], but a paucity of studies address the patient's willingness to be monitored on their quality of life and their preferred frequency of monitoring. In the era of person-centered care, PD patients' views on different aspects of their care should be explored. The present survey aimed to address this gap.

Methods

This was an anonymized survey conducted among PD patients at a single center in Singapore. The study was conducted between August and October 2021. The study was approved by Singhealth Centralized Institutional Review Board (CIRB) with the reference number 2020/3146. Individual consent was waived by CIRB given that it was an anonymized survey.

The study was conducted using the form.sg platform which is a secured online platform for public officers to conduct surveys in Singapore. Patients were provided with the link or QR code to access the online survey. The survey was conducted in English language only and patients can access the link through mobile phones or computers with Internet access. The survey questionnaires were generally multiple-choice questions (supplemental materials); however, free texts were available for questions exploring patients' opinions.

The study collected data including gender, race, and age which was grouped into four groups (21–45 years, >45–65 years, >65–75 years, >75 years), marital status, employment status, educational status, initial modality of kidney replacement therapy (KRT), duration on PD, and the person who carried out the PD exchange procedure (self-care, family member, and helper). The survey examined the acceptance of telehealth services by physicians, dieticians (assessing the nutritional status of patients), medical social workers (providing psychosocial support, and financial counseling for PD and financial support for needy patients), renal coordinators (providing education on chronic kidney disease and

pre-dialysis counseling, coordinating home visit service, and quality-of-life monitoring for PD patients), pharmacists (providing medication advice and counseling and arrange medication home delivery services for patients), and community PD nurses (providing PD services in the community such as home visit services for PD patients).

The primary outcome was the acceptability of telehealth services in different aspects of care by a multidisciplinary PD team. The secondary outcomes were the acceptance of community PD services, such as home visit services, PD-related investigations, management of PD-related complications, and medication delivery service, quality-of-life monitoring, and patients' view on the area of PD services that required improvement. Data were presented as frequency (percentage) and descriptive analyses and were performed for the outcomes of the study. Fisher's exact test was used to compare younger patients and elderly patients (>65 years) on the preference for community PD services. Data were analyzed using Stata version 14.0 (Stata Corp LP, College Station, TX, USA), and *p* values <0.05 were considered statistically significant.

Results

Demographic data

A total of 350 PD patients were approached, and 78 patients responded to the online anonymized survey. The majority of participants were Chinese (76%), married (73%), and middle-aged (46–65 years) (45%). Thirty-seven percent of patients were engaged in full-time jobs, 10% were on a part-time job, 25% were unemployed, and 28% were retired. PD is the first modality of KRT for most patients (85%) and 81% of them were on Automated PD (APD). PD exchange was assisted either by family or helpers in 39% of patients. Demographic data were presented in Table 1.

Telehealth and remote monitoring services

Most patients preferred an in-person visit to telehealth for services such as consultation with nephrologists (68% versus 32%), education for kidney disease, and dialysis counseling by renal coordinators (59%) (Fig. 1). In contrast, most patients favored telehealth service over in-person visits for services, such as dietary counseling by dieticians (60%) and medication counseling by pharmacists (65%). However, 50% of participants preferred in-person visits for financial and psychosocial counseling by medical social workers. With regards to remote monitoring, most patients (69%) would like to use a mobile application platform to record their PD-related data, and the majority (84%) would like to have their

Table 1 Demographic and baseline characteristics of study participants

Variables	Values (<i>n</i> = 78)
<i>Age (years)</i>	
21–45	12 (15)
> 45–65	35 (45)
> 65–75	21 (27)
> 75	10 (13)
Gender (male)	35 (45)
<i>Race</i>	
Chinese	59 (76)
Malay	16 (20)
Indian	3 (4)
<i>Marital status</i>	
Married	57 (73)
Single	10 (13)
Divorced or separated	5 (6)
Widowed	6 (8)
<i>Employment status</i>	
Full time	29 (37)
Part-time	8 (10)
Not employed	19 (25)
Retired	22 (28)
<i>Educational status</i>	
Did not complete primary school	14 (18)
Secondary or high school	37 (47)
Professional certificate, vocational school	16 (21)
Undergraduate/bachelor's degree	9 (12)
Postgraduate degree	2 (2)
Current modality of PD (APD)	63 (81)
<i>Duration on PD</i>	
0–1 year	16 (20.5)
> 1–3 years	32 (41)
> 3–6 years	23 (29.5)
> 6 years	7 (9)
Initial modality of KRT (PD)	66 (85)
<i>PD exchange procedure performed by</i>	
Self-care	48 (61)
Family member	20 (26)
Helper/maid	10 (13)

APD automated peritoneal dialysis, KRT kidney replacement therapy

PD treatment monitored and adjusted remotely by the PD team.

Community PD home visit service

Of the 78 participants, only 60% of them have received home visit services before. Most participants (60%) would like to have a regular home visit by community PD nurses, but 23% of them refused regular home visits, and 17% responded

“not sure”. With regards to the frequency of home visits within the first 6 months of PD initiation, 74% of participants chose to have 1–3 visits, 11% of participants chose to have 4–6 visits, and only 1% chose to have 7–9 visits, whereas 14% of participants chose not to have any home visit. After 6 months of PD initiation, 40% of them preferred semi-annually visits, 26% of them chose quarterly visits, and 20% of them chose annual visits that would be sufficient for them, but 14% of them preferred not to have any home visits. There was a significant association between age and preference for home visit services with elderly (> 65 years old) favored PD training at home (81 vs 45%; $p < 0.01$) by community PD nurses, home visit service at PD initiation (87 vs 62%; $p 0.02$), and regular home visit services based on an assessment by community PD nurses (87 vs 43%; $p < 0.001$) compared to younger PD patients (Supplemental Table 1).

Seventy-two percent of participants would like to have a community PD nurse to guide them in PD therapy. Fifty-nine percent of patients reported that a home visit was helpful, whereas 6% responded that it was not helpful, and 35% of them were unsure whether the visit would be helpful. Approximately 50% of them would accept the PD training in the community PD center. The majority of them (73%) would recommend a home visit to other PD patients.

Medications-related service

The majority of patients (81%) preferred to have medicines to be delivered to their addresses rather than to collect them personally from a pharmacy, and the acceptable turnaround time for medicine delivery was within a week of order for 53% of patients and within 3 days of order for 44% of patients. Most of them (81%) indicated that they would like to have information on PD-related medicine. If there is a change in medicine, they would like to have counseling about changes by pharmacists through video or telephone consult rather than face-to-face counseling.

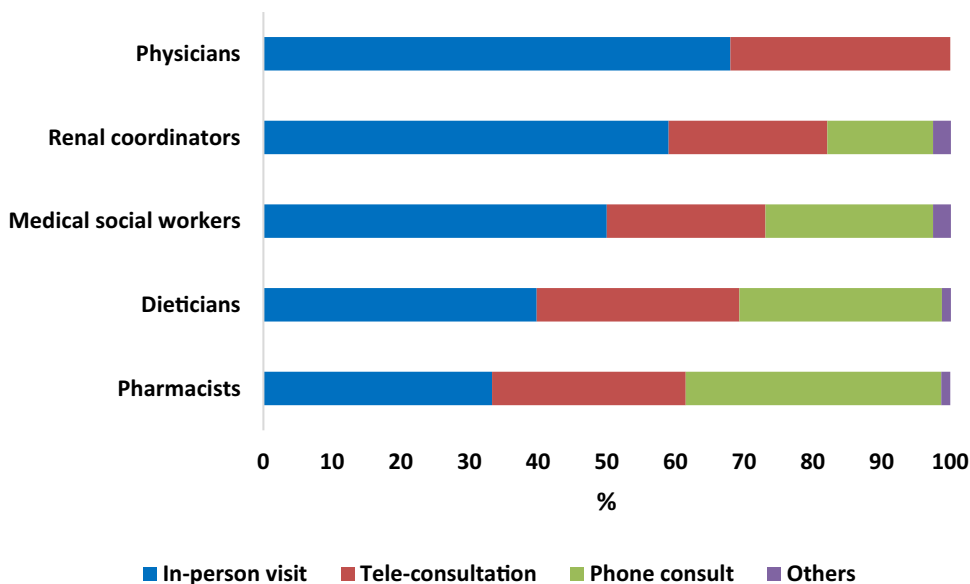
Service for blood tests and PD-related complications

Approximately half of the participants indicated that they would like to have their blood tests or PD-related tests to be done at a nearby polyclinic or community PD center. However, if they develop PD-related complications, such as PD-related infection, they preferred to come to their hospital PD unit for consultation rather than the nearby community PD center.

Quality-of-life monitoring

Most patients (87%) would like to have their quality of life (QoL) to be monitored by attending physicians. With regards

Fig. 1 Patients' preference for type of consultation services provided by multidisciplinary PD team



to the frequency of monitoring for QoL, 45% of participants preferred 6 monthly monitoring, 40% preferred yearly monitoring, and only 15% preferred 3 monthly monitoring.

Research to improve the quality of life of PD patients

When explored which area of research they would like to see to improve the quality of life of PD patients, participants responded in a free text which can be summarized into three key areas including (a) development of artificial kidneys for transplantation, (b) the development of portable PD device, and c) improving the process of PD therapy. Respondents stressed that “*To research the possibility of a high-tech artificial kidney for transplant*”. With regards to PD devices, participants responded that “*more mobile forms of dialysis*”, “*dialysis system, machine compact in size, improve mobility, to move around. Hope can go out of the house*”, and “*portable dialysis machine will be good, can enable traveling*”. One participant also suggested “*Research on shorter dialysis time and frequency*”, and another participant responded, “*Improvements to the PD process, less hassle in connections and setup*”.

PD services that required improvement

When feedback for PD-related services was sought, respondents indicated the need to improve social support (instrumental, informational, and emotional support). Respondents stressed that “*Give more adequate information and advice on how to handle machine errors*”, “*Video on troubleshooting*” (instrumental support), “*More help should be available at the beginning of dialysis treatment, especially in the first year when there are a lot of uncertainties and*

apprehension”, “*Information sharing and community outreach programs; community groups and activities for PD patients to improve their social life*”, and “*More sharing among the PD patients for ease of fears especially among the old folks*” (informational and emotional support). In addition to social support, some respondents would like to see improvement in the solution delivery service, “*Too many solutions to store and carry. Half my storeroom filled with solutions, every day has to throw plastic bags and big boxes. Can the vendor do free two deliveries per month instead?*”.

Discussion

The study examined the PD patients' views on different aspects of the PD program, such as telehealth services by various members of the PD team, PD home visits and support by community PD nurses, and services for remote monitoring and monitoring of QoL of PD patients. Most patients favored in-person visits to telehealth services for consultation with physicians and renal coordinators/educators, whereas telehealth services were preferred for other services, such as dietary counseling and medication counseling.

The acceptability of teleconsultation service with clinicians by PD patients was assessed in the study, and nearly 70% of participants preferred in-person visits compared to teleconsultation services alternating with in-person visits despite no additional cost for teleconsultation services. The hesitancy in accepting telemedicine has been reported in the previous studies [9]. Lack of physical examination in telemedicine was perceived as ineffective by patients, which made it less attractive than an in-person visit [9]. The present study also identified that most patients preferred physical

visits to telehealth services for CKD or pre-dialysis education sessions with renal coordinators, whereas they favored phone consult or video consult services for dietary and medication counseling with dieticians and pharmacists.

With teleconsultation service to mitigate the need for frequent hospital visits during the COVID-19 pandemic, the medication home delivery service became popular and was provided free as part of the service package for telehealth service. However, the patients' acceptable turnaround time for medication home delivery has not been examined before. In this study, most participants rated the delivery period of 1 week after placing an order of medicines as acceptable. This information will help inform the pharmacy department to plan the logistic of delivery appropriately.

PD is a home-based dialysis therapy and community PD support, such as home visits, has been reported to improve PD outcomes [5, 6]. There was a paucity of studies published on the acceptance of PD home visits [3], or PD training at home or community PD center, and most of them discussed the clinical outcomes of home visits rather than exploring the acceptability and the desired frequency of home visits by PD patients. The present study reported that a considerable number of patients would like to have a home visit, particularly, elderly PD patients, and also would recommend a home visit to other PD patients. The survey also identified that most patients preferred 1–3 home visits within the first 6 months of PD initiation, and then 6 monthly to yearly after that. This information will help healthcare policymakers to plan and project funding for PD home visits.

Quality-of-life (QoL) survey was not routinely performed for patients in most PD centers. It was unknown whether PD patients were willing to respond to the QoL survey and be monitored by their treating physicians. In this study, most patients reported willingness to participate in the QoL survey and be monitored regularly by their clinicians. However, the acceptable frequency of the survey was 6 months or yearly. This information will help the PD team to plan the appropriate interval for QoL monitoring to avoid survey fatigue.

Although PD therapy can achieve solute and fluid clearance to sustain life, there are still rooms for improvement in PD therapy to improve the QoL of patients. In the present study, participants suggested research on improvement in PD devices, to make them portable, and smaller in size, and also to develop the PD therapy which can allow reduction of duration and frequency of therapy to improve QoL. Studies have been conducted to develop small or portable PD devices [10, 11]. Respondents also stressed the need for social support in the area of instrumental, informational, and emotional support for PD patients, particularly in the first year of PD initiation. A previous qualitative study of social support in PD patients also indicated the need for social support for PD patients and family members [12].

This is one of few studies conducted to examine PD patients' opinions on telehealth service, PD home visits, QoL monitoring, and areas of research to improve QoL. The study has several limitations. This was a single-center study and cross-sectional survey study design. The survey was conducted online using the English language only; therefore, patients who are unable to read or understand English, or unfamiliar with technology to use online survey platforms or those who did not have Internet access were automatically excluded from the study. Therefore, the findings from this study may not be generalizable. In addition, we did not survey the acceptance of telehealth services provided by PD nurses. Nonetheless, the study provides useful information on the different aspects of the care of PD patients.

In summary, this study reported important but rarely examined components of PD services including PD home visits, telehealth service, and quality-of-life monitoring. The findings from the study can serve as a guide for a PD program planning to launch home visits, telehealth services, and QoL monitoring. Future larger studies are needed to confirm the findings from the study.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s11255-023-03605-1>.

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Code availability Not applicable.

Declarations

Conflicts of interest Htay Htay has received consultancy fees, speaker's honoraria and travel sponsorships from Baxter Healthcare and consultancy fees and travel sponsorships from AWAK Technologies, speaker's honoraria from Fresenius Medical Care, grants from Johnson & Johnson Company, grants from Singhealth NIG, outside the submitted work and Marjorie WY Foo has received grants from National Medical Research Council for the study; consultancy fees and speaker's honoraria and travel sponsorships from Baxter Healthcare, consultancy fees and travel sponsorships from AWAK Technologies. The other authors have nothing to disclose.

Ethics approval Centralized Institutional Review Board (CIRB) was consulted for approval. The study was approved by CIRB given that the study involved collection of anonymized data from study participants (CIRB reference number 2020/3146).

Consent to participate The consent was waived as only anonymized data were collected.

Consent for publication The consent was waived as only anonymized data were used.

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