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CKJ REVIEW

Peritoneal catheter insertion: combating barriers through policy change

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ABSTRACT

Barriers to accessing home dialysis became a matter of life and death for many patients with kidney failure during the coronavirus disease 2019 (COVID-19) pandemic. Peritoneal dialysis (PD) is the more commonly used home therapy option. This article provides a comprehensive analysis of PD catheter insertion procedures as performed around the world today, barriers impacting timely access to the procedure, the impact of COVID-19 and a roadmap of potential policy solutions. To substantiate the analysis, the article includes a survey of institutions across the world, with questions designed to get a sense of the regulatory frameworks, barriers to conducting the procedure and impacts of the pandemic on capability and outcomes. Based on our research, we found that improving patient selection processes, determining and implementing correct insertion techniques, creating multidisciplinary teams, providing appropriate training and sharing decision making among stakeholders will improve access to PD catheter insertion and facilitate greater uptake of home dialysis. Additionally, on a policy level, we recommend efforts to improve the awareness and feasibility of PD among patients and the healthcare workforce, enhance and promulgate training for clinicians—both surgical and medical—to insert PD catheters and fund personnel, pathways and physical facilities for PD catheter insertion.

Keywords: catheter, COVID-19, ESRD, home dialysis, peritoneal dialysis

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INTRODUCTION

Peritoneal dialysis (PD) is the home therapy option of choice for most patients with kidney failure worldwide. Best-practice PD today provides mortality and quality-of-life outcomes similar to those achieved with in-center hemodialysis (HD) [1, 2]. PD is cost saving in most global settings and recommended by professional societies, including the International Society of Nephrology (ISN) [3]. Further, while patients receiving in-center HD were 5–20 times more likely to be infected with severe acute respiratory syndrome coronavirus 2 compared with the age-matched general population, the risk for PD patients was the same as the general population [4–7].

A lack of focus on PD catheter insertion has been identified as an important barrier preventing PD utilization [8]. Inadequate skill training in the range of catheter insertion techniques leaves the newly trained clinician poorly equipped to optimally utilize this modality, pushing patients to the default in-center HD option. While there are excellent and dedicated surgeons passionate about PD catheter insertion, it is given low priority in some programs and, due to clinical prioritization, operating rooms are preferentially used for other procedures. Further, in some locations, PD catheter insertion was classified as a nonurgent procedure during the coronavirus disease 2019 (COVID-19) pandemic, which deprived many patients starting dialysis from benefitting from PD.

There are plenty of data from around the world to show that compared with those inserted by surgeons or interventional radiologists, catheter insertion by trained nephrologists without the need for operation theater access or general anesthesia is associated with similar or higher rates of successful PD utilization, both for elective and urgent-start PD [8]. A shared care model has been recommended, in which the decision on the initial insertion approach is made after a risk estimation—with nephrologists performing insertion in uncomplicated cases and surgeons takeing care of high-risk cases that might require (advanced) laparoscopy, including additional procedures such as adhesiolysis, omentopexy or hernia repair.

Despite the acknowledgement of the critical role played by the timely creation of access to the peritoneal cavity in the success of this treatment modality, this topic needs greater attention. Therefore the aim of this article is to discuss the importance of PD catheter insertion, barriers to successful and timely insertion, and potential solutions.

HISTORY OF PD CATHETER INSERTION

Wegner performed the first PD experiments in rabbits in 1877 [9]. The first intermittent PD trial in a human patient was carried out by Ganter in 1923 [10]. He introduced 1.5 L of saline solution intraperitoneally in a woman with ureter obstruction and observed a slight improvement. In 1927, Heusser and Werder [11] conducted dialysis on three uremic patients by the continuous method, but there was no improvement, perhaps because too little fluid was used. Two techniques were used: intermittent dialysis with one tube, where both the infusion and drainage occurred through the same tube, and continuous dialysis, with two tubes placed in the peritoneal cavity, one used for the inflow of the PD solution and the other for outflow.

When Dr. Fred Boen defended his PhD dissertation in Amsterdam in 1959, PD was still ‘crawling’, but already saving and prolonging the lives of patients with acute kidney injury (AKI) and kidney failure. His thesis contains a narrative of the PD technique, including case histories of 22 patients treated with 32 treatments [12, 13]. An excerpt of his thesis gives us a clear perspective of PD access insertion:

> Technique: The surgeon (Dr. van der Reyden) made an incision on the left and right side of the abdomen at the level of the spina iliaca anterior superior and brought two rubber drains into the abdomen through these openings, one tube being used for the inflow and the other for the outflow. When difficulties were encountered in the outflow, the direction of the flow was reversed. During the course of the dialysis, an enormous leakage occurred from both incisions. This was not abolished after stitching the wound again.

Present-day considerations

With the creation of the first successful indwelling peritoneal catheter by Henry Tenckhoff in 1968, PD became more regularly utilized. Over time, the vital importance of a functioning PD catheter for the patient came to be realized.

Who inserts PD catheters, the exact location of service, and the methods are influenced by a number of factors. In some countries, regulatory constraints limit who can perform PD catheter insertion or the location where can it be done, which limits the opportunities for PD catheter insertion for patients. This underscores the need to educate not only doctors, nurses, and patients, but also people in the regulatory and political spheres in every country.

Practitioners need to learn from centers, regions, or countries that have successfully developed and implemented PD catheter insertion programs in renal services. Such programs exist in many countries, including South Africa, Saudi Arabia, Mexico, Thailand, China, Guatemala, Dominican Republic, and Brazil. However, only a few of these programs have published their findings (Appendix D).

GLOBAL PICTURE OF PD CATHETER INSERTION TECHNIQUES

This section summarizes catheter insertion techniques, followed by a discussion of conditions that influence variations in observed PD access practice patterns around the world.

The insertion techniques available can be divided into percutaneous, open surgical and (advanced) laparoscopic. Not all countries have access to all techniques. Often there is substantial variability of the relative availability between centers within the same country. Variations are influenced by the availability and skill of practitioners, clinical demands, reimbursement policies, and cultural and regional historical practices.

Percutaneous technique

The percutaneous technique utilizes either a trocar or a blind modified Seldinger approach and is usually performed in a procedure room or at the bedside under local anesthesia by a nephrologist/radiologist or nurse practitioner [14–17]. The disadvantage of the trocar approach is that the large-bore trocar is placed without visualization, risking bowel or vascular injury as well as creating a track that is larger than the catheter, which may result in leakage, and this technique has been largely abandoned. A modification of this approach uses a needle, guidewire and peel-away sheath through which the catheter is inserted. As these techniques rely on the blind introduction of a needle/trocar, they are most suitable for patients who are not obese

and have not had previous abdominal surgery, peritonitis or other reasons for suspecting intra-abdominal adhesions. The modified Seldinger technique can be supported with radiological assistance such as ultrasound to assess for visceral slide, which reassures that significant bowel adhesions at the point of insertion are unlikely and helps in determining the depth from the skin to the peritoneum. Fluoroscopic visualization can be used to determine entry into the peritoneum and appropriate positioning of the guidewire and catheter. Percutaneous catheter insertion is widely used in resource-poor countries, enabling patients to receive lifesaving therapy, and has been shown to be associated with excellent outcomes [18–21].

Open surgical technique

The open surgical technique involves dissection to the peritoneum followed by either blind insertion of the catheter in the direction of the pelvis or through a mini-laparotomy-guided direct visualization of catheter placement in the pelvis. The advantage of this technique over the percutaneous approach is the ability to visualize entering the peritoneum. It is therefore safer for patients who have had previous abdominal surgery or are obese. The advantage over the laparoscopic approach is that it is more cost effective and may be performed by nephrologists and surgeons without laparoscopic skills in a procedure room or at the bedside under local anesthesia with sedation [16, 22]. However, this technique does not allow proper visualization of the peritoneal cavity, including confirmation of the pelvic position of the PD catheter and permits only limited adhesiolysis and omentopexy at the point of entry into the peritoneum.

Laparoscopic technique

This technique involves insertion of the catheter into the pelvis under direct vision, resulting in certainty of the position of placement. This technique may be supplemented by adjunctive procedures [23, 24] including hernia correction, epiploic appendicectomy, colpopexy, musculofascial tunneling, omentopexy and fixation in the paracolic gutter when the pelvis is not accessible due to adhesions [25]. These advanced techniques have been shown to produce superior outcomes than standard laparoscopic placement [24]. The relatively small incisions and ability to suture port sites allow urgent use of catheters with minimal risk of leakage.

The laparoscopic and image-guided percutaneous techniques require more sophisticated equipment and practitioner skill and is not available everywhere [26]. Image-guided insertion is typically performed under local anesthesia with or without sedation in a radiology department or operating room [27–29].

Peritoneoscopic placement

The peritoneoscopic approach is a proprietary laparoscopic-assisted technique of peritoneal catheter placement. The procedure can be conducted in a treatment room under local anesthesia. The peritoneoscope is inserted through a sleeve introduced around a trocar and is used to confirm peritoneal entry and guide catheter placement. Studies have shown comparable or better survival and complication rates with this technique compared with the open surgical method. This technique is practiced preferentially in some locations [30–33]. Like the percutaneous method, peritoneoscopic insertion is not advisable for patients with obesity and in those with prior peritonitis, multiple abdominal operations or the inability to lie flat.

The Peritoneal Dialysis Outcomes and Practice Patterns Study in collaboration with the International Society for Peritoneal Dialysis (ISPD) performed a survey of five high-income countries for which data were available describing the international variation in PD catheter practices [34]. Table 1 summarizes PD insertion practices by country.

Although organizations such as the ISPD have released best practices for PD catheter insertion [23], how best to scale known best procedural practices to better facilitate PD adoption worldwide remains unclear. One observational study at a regional PD center in the USA showed significant gaps in adherence to ISPD best practices, with 30% of patients not being evaluated for hernias and 20% not being provided follow-up care instructions. A total of 41% of patients developed a complication postoperatively [35].

Despite numerous comparative studies along with meta-analyses comparing the various PD catheter insertion techniques, a clear benefit of one technique over another has never been demonstrated, and most studies suffer from power and bias in multiple domains. As a result, international guidelines state that the choice of technique should be determined by skill and availability [8, 23, 24, 36, 37]. Those studies that show benefits of one technique over another are likely more representative of the technical ability and enthusiasm of the practitioner rather than the modality per se. For example, in the hands of a skilled laparoscopic surgeon using advanced laparoscopic techniques the complication rate and long-term outcomes are likely excellent, but in a center where the surgeon performing the procedure is not a dedicated access surgeon or where procedures are delegated to untrained or junior surgeons, these results may be significantly worse. Therefore, the insertion technique should be determined by patient, practitioner, and health resource factors, as these are far more likely to impact on outcomes than the specific technique used. Finally, all centers should strive to set up a multidisciplinary access team to select the most appropriate catheter type, insertion technique and insertion and exit site locations for individual patients, as specified in the ISPD guidelines [23].

Views on PD access insertion may differ between nephrologists and surgeons. Although many surgery programs train residents in catheter insertion, this training is often limited and affects a surgeon's willingness and ability to perform the procedure or remedy complications. Some surgeons are perceived as reluctant to respond to referrals for PD catheter insertion in a timely fashion and may delegate it to a junior member of the team [38]. However, this deceptively simple operation can result in complications that are time consuming to resolve. Some surgeons (more often those who are not properly embedded in multidisciplinary PD teams) may also be unaware of the importance of a functional PD access from the patient's perspective and how failure impacts patient's the lifes. Further, PD access often comprises only a small part of their surgical practice and reimbursement often does not compensate well for the time invested. The low overall use of PD by the health system potentiates the problem by preventing surgeons from gaining enough experience in peritoneal access, perpetuating a vicious cycle of poor outcomes, dissatisfaction with PD and low PD utilization [38]. This point highlights the need for PD access teams consisting of a PD nurse, nephrologist and surgeon, thus ensuring the most appropriate use of skills for patient outcome.

In many regions, nephrologists are increasingly taking on the role of PD access providers [14–17, 22]. Multiple studies have demonstrated catheter insertion by nephrologists is associated with equal or better outcomes compared with programs relying

Table 1. Available methods of PD catheter insertion by country*

Method	A/NZ ($n = 18$)	Canada ($n = 14$)	Japan ($n = 20$)	UK ($n = 28$)	USA ($n = 34$)
Open dissection (%)	67	54	85	63	29
Laparoscopic surgery (%)	83	77	40	70	94
Percutaneous (blind) (%)	17	31	5	30	0
Percutaneous (image guided) (%)	22	31	0	7	3

*Adapted from Wilkie *et al.* [34], SP505.
n: number of participating facilities; %: percentage of participating facilities; A/NZ: Australia–New Zealand.

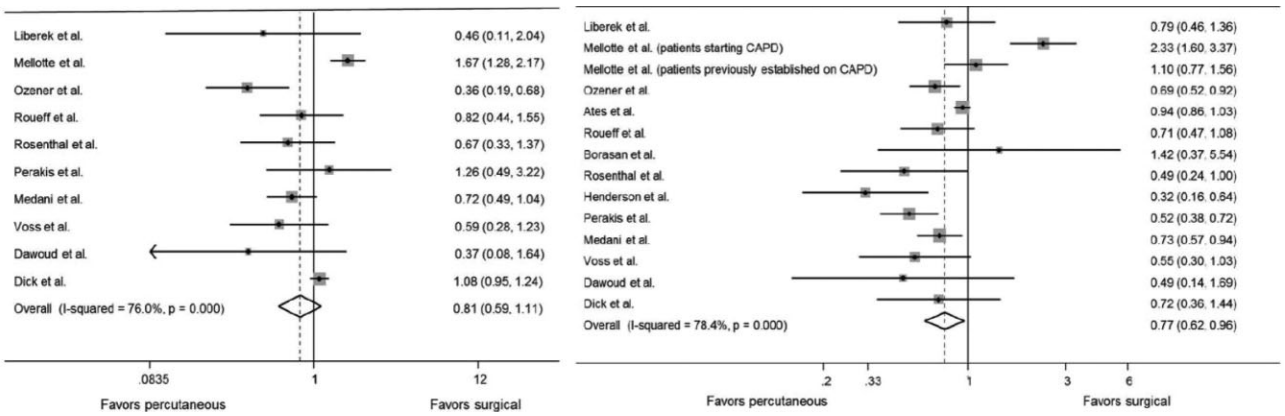

FIGURE 1: Percutaneous versus open surgical PD catheter insertion. Meta-analysis showing similar PD catheter survival and superior peritonitis rates with percutaneous compared with open surgical PD catheter insertion [8].

on surgical insertions (Fig. 1) [15, 39–42]. In part, this may be because of case selection, with difficult insertions being performed by surgeons. In a systematic review, no significant difference in catheter survival was noted between percutaneous placement of PD catheters [8] by nephrologists and surgical insertion, while the peritonitis risk was lower with percutaneous insertion. However, like surgical training, many nephrology fellowship programs do not offer opportunities for training in catheter insertion.

The use of more technologically intensive techniques, such as (advanced) laparoscopic and image-guided techniques is relatively limited in most countries and continues to be deprioritized because of a lack of skill and training and low demand. However, these methods expand the pool of patients eligible for PD and improve their outcomes, and it is important to ensure appropriate availability and optimal utilization of these techniques, especially in regional centers of excellence [23, 24, 29].

PRACTICE BEFORE AND DURING COVID-19

The ISPD has published guidelines on recommended PD catheter insertion techniques and postoperative care [23]. The extent of adherence to these recommendations, however, is not known. Few outcome data are available, such as from the North American PD Catheter Registry [43]. Laparoscopic PD catheter insertion approaches [44–47] have a reported 5-year patency rate of 96–99% [47]. Similar success has been reported by interventional radiologists utilizing ultrasonographic and fluoroscopic guidance [25]. The Cleveland Clinic published their 10-year experience with laparoscopic PD catheter insertion and reported minimal immediate postoperative complications (0.9%). More than half of patients were undergoing PD or were transplanted in the long term (median follow-up of 4 years); the median survival time for patients on PD was 8 years [48]. Other scenarios where timely PD catheter insertion can be lifesaving include in the emergency room [49], as urgent start [50, 51] and in patients with vascular access failure [52]. The Saving Young Lives Project of the ISN has used acute PD as a lifesaving treatment for children with AKI in Africa, Asia, and Latin America [53].

Beginning in March 2020, PD initiation was hampered when several countries suspended the insertion of PD catheters along with other elective surgeries during the COVID-19 pandemic. This seriously impacted the ability of patients with kidney failure to benefit from home dialysis. However, other health systems continued PD catheter placement programs. One study conducted in the Dominican Republic presented data from 946 patients treated across seven centers during the pandemic. Over the course of 3 months, 95 catheters were placed in incident patients, 72 by surgical and 23 by a percutaneous technique; 64 started treatments at home and the remaining patients were in training at the time of the report. The procedure followed the routine protocol applied in the clinics [54]. Similar experience has been reported from Saudi Arabia with ambulatory PD (APD) [55, 56]. Furthermore, patients on APD stayed at home, followed up by a telemonitoring system, obviating the need for in-person follow-up visits.

PD can deliver outcomes equivalent to those reported with other dialysis options, including continuous renal replacement therapy and intermittent HD for patients with AKI [57–62], as demonstrated during the COVID-19 pandemic [63]. Based on this experience, the US Centers for Medicare & Medicaid Services, Ontario Renal Network and UK Renal Association provided recommendations that PD catheter insertion was lifesaving and/or nonroutine during COVID-19. These policies allowed surgical PD catheter insertions to resume where they had been interrupted [64].

Table 2. 2021 E-survey results

Survey question	Response, % (*n*)
Respondent region	
Europe	51.6 (16)
North America	35.5 (11)
Middle East	6.5 (2)
Asia	3.2 (1)
South America	3.2 (1)
Minimum qualifications to place a peritoneal dialysis (PD) catheter	
MD	32.3 (10)
Surgeon	29.0 (9)
No specific requirements	19.4 (6)
Proctored/trained	12.9 (4)
Unknown	6.5 (2)
Legal or absolute requirements for where PD catheters placed	
None	67.7 (21)
Operating theater	16.1 (5)
Unknown	9.7 (3)
Yes	6.5 (2)
Legal or absolute requirements for who places PD catheters	
None	77.4 (24)
Surgeon	9.7 (3)
Unknown	6.5 (2)
MD	3.2 (1)
Yes, multiple options	3.2 (1)
Patients started on PD/year	
>20	45.2 (14)
10–19	32.3 (10)
5–9	16.1 (5)
<5	6.5 (2)
Who places PD catheters	
Surgeon	45.2 (14)
Surgeon and/or nephrologist	29.0 (9)
Surgeon and/or radiologist	9.7 (3)
Nephrologist	6.5 (2)
Surgeon and/or nephrologist and/or radiologist	6.5 (2)
Radiologist	3.2 (1)
Where are PD catheters placed in hospital	
Operation room	51.6 (16)
Operation room and/or bedside	12.9 (4)
Operation room and/or bedside and/or procedure room	9.6 (3)
Radiology suite	6.5 (2)
Operation room and/or radiology suite	16.1 (5)
Operation room and/or bedside and/or radiology suite	3.2 (1)
During COVID-19 pandemic, delay or barriers to placement of PD catheters experienced	
No	51.6 (16)
Yes	48.4 (15)
If yes, country-wide or country-specific barriers or delays?	
N/A	54.8 (17)
Country specific	35.5 (11)
Hospital specific	6.5 (2)
Country wide	3.2 (1)
Was the problem solved?	
Yes	51.6 (16)
N/A	38.7 (12)
No	9.7 (3)

Omitted questions: 1, 2, 10, 11, 14, 16 and 17 (open-ended essay questions that were impossible to quantify).

Trends in PD catheter insertion, including E-survey

To better understand the global trends in PD catheter insertion procedures and the impact of COVID-19, an electronic questionnaire was administered to 82 nephrologists from 17 countries (Appendix B). The target audience of this voluntary survey was clinicians involved in starting patients on home dialysis taken from the mailing lists from the International Home Dialysis Roundtable [65] (Table 2).

The completion rate for this survey was 38%. Forty-five percent (14/31) of the respondents indicated that surgeons place PD catheters. About 77% (24/31) noted that there were no rules to

Table 3. Factors to be addressed to increase PD catheter insertion

Factor to address	Suggested strategies
Patient feasibility	Education about PD to healthcare teams
	Promotion of ISPD PD access guideline
	Predialysis education
	Auditing patients starting PD after choosing PD
Multidisciplinary PD teams: PD catheter insertion training	Availability of digital learning of theory
	Provision of hands-on training for percutaneous and advanced laparoscopic techniques
	Ensure that learning materials and teaching are available locally and in appropriate languages
Healthcare practices	Awareness of advantages of PD to patients and the healthcare system
	Adequate reimbursement to individuals and hospitals for PD catheter insertion in private systems
	Provision of finance to support an appropriate number of professionals and facilities

govern who can place a PD catheter. Additionally, 52% (16/31) of respondents indicated that the procedure currently takes place exclusively in the operating room, although 67.7% (21/31) stated that there are no legal requirements about where the procedure is conducted.

Specifics about the types of barriers to conducting the procedure varied. However, 52% (16/31) respondents identified availability of physical space, time and practitioners as important impediments to optimizing PD catheter insertion. Survey respondents were split on the impact of COVID-19 on practitioners' ability to continue the procedure, with 48% (15/31) saying the pandemic increased delays or barriers and 52% (16/31) indicating it did not—although the vast majority of those that did see barriers also noted that they were resolved during the course of the pandemic.

In many cases, the challenges around capacity and staff availability improved as COVID-19-related hospitalizations decreased, with the shift of policy to accommodate patients with COVID-19. According to one respondent from Sweden, hospital staff created regular planning meetings for better coordination and to prioritize access to resources. In the UK, a respondent noted that the facility reorganized operating theaters to be better equipped to optimize catheter insertion opportunities for patients with COVID-19. In one system in Lebanon, the key to continuing PD catheter placement was improving public health protocols and guidance for staff and patients regarding COVID-19 vaccines, testing and lockdowns. Similarly, in the Netherlands, protocols regarding percutaneous PD catheter insertion by fluoroscopic guidance and urgent-start PD were published [66]. Respondents from Canada and the USA indicated that decisions to make catheter placement for dialysis an essential procedure were critical to continuing the practice through the pandemic.

In some cases, operations that were implemented prior to or immediately at the start of the pandemic helped facilitate greater PD catheter insertion access and capacity. In the USA before the pandemic began, one institution created a program for PD units to invite surgeons to 'meet the PD nurses, tour the clinic, see patients in training, see dialysis equipment, and view a brief PowerPoint…regarding medical and economic benefits of PD as renal replacement therapy', which helped improve engagement. Another facility in the USA noted that at the beginning of the pandemic, one key to increasing capacity and moving beyond surgeon placement was to also have interventional radiologists place catheters.

However, a majority of the responses were from Europe and North America, which limits the generalizability of the survey findings.

PD CATHETERS: SUGGESTED ACTIONS FOR IMPROVEMENT

Three factors should be addressed to increase the availability and quality of PD catheter insertion. As shown in Table 3, these are patient and healthcare awareness of PD feasibility, training of clinicians to insert PD catheters and funding to maximize personnel, pathways and physical facilities for PD catheter insertion.

Awareness of PD feasibility

The steps needed to increase the uptake of PD at the patient and system levels have been discussed in depth by Blake *et al.* [67]. The need for shared decision making with patients and their caregivers at all stages of PD delivery has been reinforced by the recent ISPD prescribing recommendations [68]. The misconception that people with previous abdominal surgery, obesity, aortic aneurysms, or polycystic kidneys are not eligible for PD has been addressed by the 2019 ISPD PD access guideline [23]. With the use of advanced laparoscopic PD catheter insertion techniques, there are few situations where there is an absolute surgical contraindication to PD catheter insertion [69].

PD catheter insertion training

The respective merits of different PD catheter insertion techniques have been discussed in depth in the 2019 ISPD PD access guideline [23]. Although advanced laparoscopic techniques were promoted as the gold standard, the guideline recognizes the many situations where percutaneous catheter insertion is preferred. Having access to more than one method of PD catheter insertion maximizes access to PD. As an example, if access to surgery is limited, as occurred during the COVID-19 pandemic surges in many centers, PD centers with access to percutaneous insertion techniques could continue PD catheter insertions [70]. Therefore training clinicians in all insertion techniques needs to be prioritized to improve the rate-limiting step of PD catheter insertion to enable greater uptake of PD as a dialysis modality.

Enabling and training nurses to insert PD catheters percutaneously will increase access to PD catheters; this is already

routinely done in some centers in the UK and Brazil. Training is often done locally on a one-to-one basis supported by national training curricula. Webinars on percutaneous PD catheter insertion for nephrologists have been developed. The ISPD has made E-learning videos on enhancing the technique with image-guided techniques (available at www.pduinir.com). E-learning needs to be followed up with practical hands-on experience. This can be done by setting up links with centers willing to provide training and by organizing workshops at local, national and international meetings, such as through the ISPD and ISN Sister Renal Center Programs. AVATAR (avatar.org.in) is another example of an international initiative that promotes PD catheter insertion through workshops open to international participants.

Training in surgical PD catheter insertion also needs to be readily available [24]. Laparoscopy is generally available in many countries, but to insert PD catheters successfully, surgeons need training in the associated advanced techniques, including omentopexy and adhesiolysis, and how to address the complications of PD catheter insertion. Theoretical training is provided by the ISPD PD University Programme (www.pdusurgeons.com). Hands-on workshops are limited by the expense of skills labs, obtaining the models and other equipment needed. Proctoring sessions can then be provided within specialist centers or by providers in the center of the trainee.

PD catheter insertion pathways

As discussed by Blake *et al.* [67], PD catheter insertion is potentially a rate-limiting step for starting patients on PD. Along with trained 'inserters', access to operating theaters with appropriate equipment, availability of anesthetists and hospital facilities for pre- and postoperative care are all needed and need to be funded. Furthermore, PD catheter insertion needs to be prioritized so procedures are not cancelled because of other pressures on surgical resources. Provision should be made for urgent surgery, such as for urgent-start PD, repositioning nonfunctioning catheters and to replace catheters for infection reasons. Enabling PD catheter insertion is going to depend on healthcare systems [71]. In private systems, PD catheter insertion prioritization will depend on reimbursement to the hospital and the individual surgeon. In public healthcare systems, awareness of the advantages of PD both for the patient and the healthcare system is needed to enable the necessary pathways to be adequately financed and resourced.

CONCLUSIONS

The COVID-19 pandemic has reignited the interest in PD as a dialysis modality, both for those with chronic kidney failure (to protect them from COVID-19) and for managing the surge of cases with AKI due to COVID-19. Despite the long history of the technique, PD catheter insertion remains neglected and has been identified as a rate-limiting step for starting patients on PD. The challenges range from those related to policies regarding catheter insertion (who can perform, where it can be done and insufficient prioritization as essential care) to issues related to individuals and hospitals (insufficient training in catheter insertion in nephrology and surgical training programs, lack of availability of operating rooms, and reimbursement issues). The value of a successful catheter insertion and functioning for the patient is often not appreciated. These problems can be overcome and sustainable and scalable programs established, as has been shown in examples of successful programs worldwide. In recent years, leadership by the PD community in PD catheter insertion has allowed rapid scale-ups. A judicious mix of expertise coupled with a referral/collaboration mechanism with expert centers that can undertake catheter insertion in more complex cases will expand the pool of patients and improve choices for patients who need dialysis. There are several areas of improvement—including patient selection, appropriate technique, multidisciplinary teams, appropriate training and shared decision making. Several stakeholders, such as the ISPD and ISN, have developed resources and training tools on enhancing insertion techniques. Awareness of the advantages of PD both for the patient and health system is needed to enable the necessary pathways to be adequately financed and resourced, and prioritizing PD catheter insertion is foundational to the success of PD.

SUPPLEMENTARY DATA

Supplementary data are available at *ckj* online.

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AUTHORS' CONTRIBUTIONS

All authors contributed to the research and writing of the article. V.J. put together all sections and finalized the manuscript. All authors read and approved the final version.

CONFLICT OF INTEREST STATEMENT

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