Opinion Matters

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Peritoneal Dialysis in Pakistan: Getting out of Second Gear: An Update on PD Utilization in Pakistan by the Peritoneal Dialysis Working Group of Pakistan Society of Nephrology.

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Abstract:

Pakistan has huge burden of patients requiring renal replacement therapy. It is noteworthy that renal transplantation and hemodialysis services have grown exhaustingly and exponentially to meet this huge demand. Paradoxically the utilization of peritoneal dialysis as modality of renal replacement therapy has remained less than 1 per cent since its introduction in the 1980s to-date. However, initiatives in the last decade have led to an 8-fold increase in the number of peritoneal dialysis patients. This article highlights the barriers to PD utilization in Pakistan, their potential solutions, what have been sorted and what hurdles remain to be addressed. Additionally this articles sheds light on the need for governmental support, innovation potential of private sector and formulating a win-win situation for all stakeholders.

Key Words: Pakistan, peritoneal Dialysis, cost effective, modality, renal replacement therapy, automated PD cycler.

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Pakistan is experiencing a rapidly increasing burden of kidney disease, with an estimated 40.8 million individuals affected by chronic kidney disease (CKD);[1] with the country currently ranked eighth globally in terms of number of people living with kidney disease. Like most developing nations, Pakistan spends less than 5% of its Gross Domestic Product[2,3] on health resulting in a multi-factorial inability to retard progression of chronic diseases such as diabetes, hypertension and CKD. These factors include a delay in diagnosis, inability to afford diagnostic tests, medications, poor follow-up with the clinic and non-compliance to prescribed treatment. These factors when combined with a high burden of CKD result in a rapidly growing population requiring dialysis and transplantation. It is noteworthy that this demand has resulted in a manifold growth in hemodialysis and transplantation services across Pakistan while peritoneal dialysis (PD) services in comparison has only shown meagre growth. Interestingly ever since PD was introduced in Pakistan in 1980s, its utilization has never been beyond the 1 per cent mark.[4] However, the past decade has seen an increase in PD patients with the number increasing from 37 patients in 2017 to 402 patients in May 2026.

This consensus paper highlights the current situation of peritoneal dialysis in the country and sheds light on the factors which have led to its growth and how the working group plans to address the remaining barriers impeding PD utilization. It is important to note that this paper is an update on the previous

opinion published in the Pakistan Journal of Kidney Diseases in 2020 on the same subject and gives the reader a sense of how far we have come and where we plan to go with PD in Pakistan.[5]

Current State of Affairs:

As mentioned earlier accounts for less than 1% of dialysis utilization nationally, reflecting profound under-utilization compared to global trends.[4,5]This figure however misrepresents the recent growth of PD in Pakistan as it does not highlight the 91% increase in PD patients in the last 9 years (37 in 2017 to 402 in 2026) as seen in figure 1.

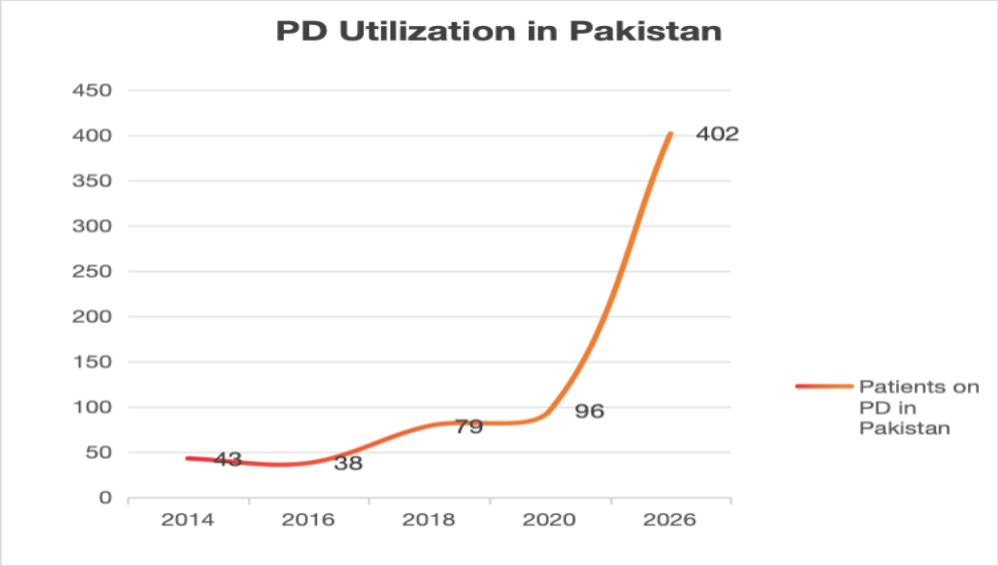

Figure 1: Peritoneal Dialysis utilization in Pakistan from 2014 to 2026

Similar, to the increase in the number of patients in the last decade, the number of centres offering PD across Pakistan have also increased from 9 centres in 2016 to 29 centres in May 2026. The distribution of these centres based on provinces is shown in figure 2.

	2016	2026
Punjab	5	20
Islamabad	1	2
KPK	2	3
Karachi	1	3
Balochistan	0	1

Figure 2: Patients on peritoneal dialysis according to the geographical distribution comparing year 2016 to 2026, a 10 year period.

PD & Pakistan

The maximum number of patients on peritoneal dialysis are from Punjab followed by Sindh, Islamabad, Kyber Pakhtunkhuwa and Balochistan respectively. The distribution of patients based on provinces as of May 2026 is shown in figure 3.

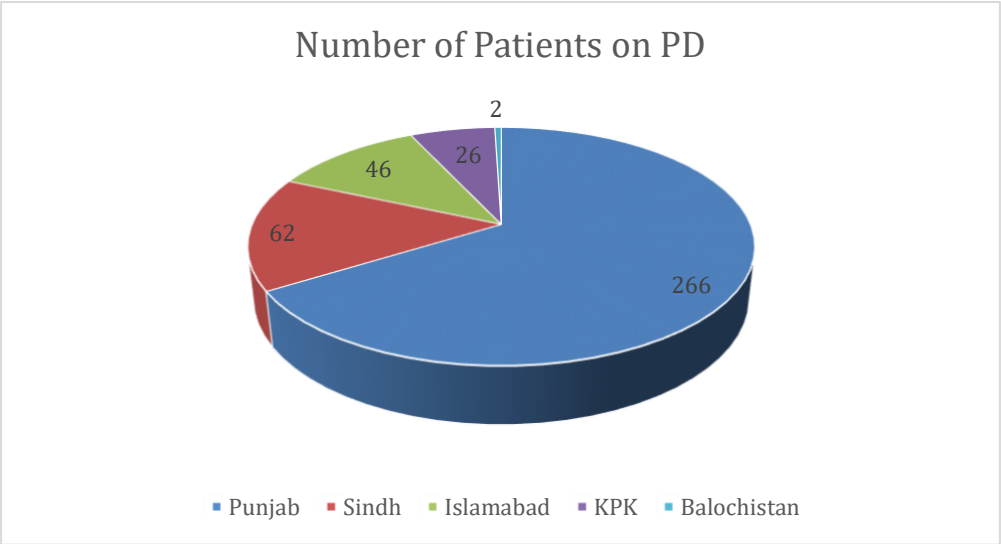

Figure 3: Pie diagram showing the patient distribution as per geographical location in Pakistan

In terms of the distribution of these 402 patients based on the modality of peritoneal dialysis being used as of May 2026 i.e. chronic ambulatory peritoneal dialysis (CAPD) or automated peritoneal dialysis (APD); most of the patients use CAPD i.e. 334 patients while the remaining 68 patients are on APD as depicted in figure 4.

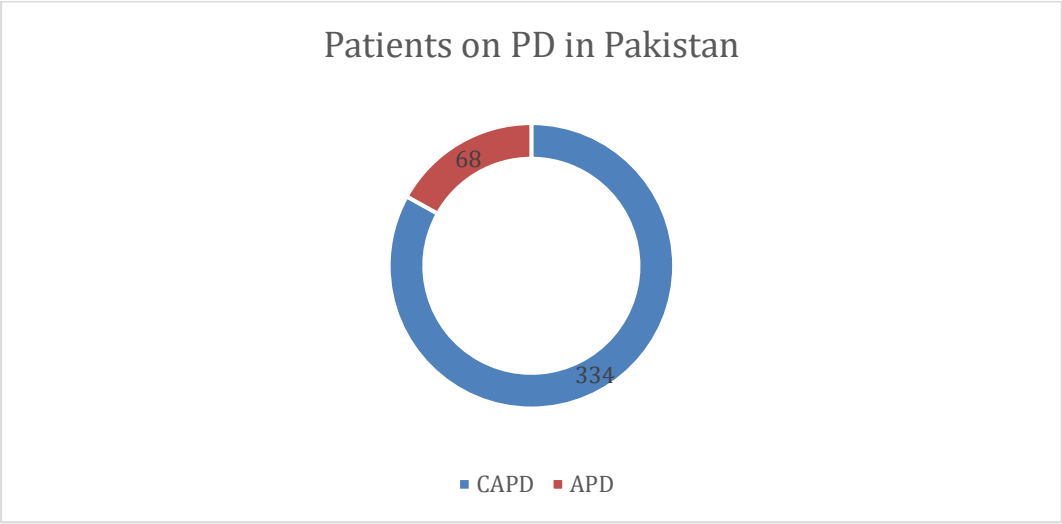

Figure 4: distribution of peritoneal dialysis patients according to CAPD and APD.

How we got here: From Inception to Structured Programs.

Early History (1970s – 1990s)

Peritoneal dialysis (PD) in Pakistan began in the 1970s with the first programs established in major public sector hospitals. During this period, PD was primarily used as an acute modality, and only a handful of chronic patients were maintained on therapy. Lack of dedicated supplies, trained nursing staff, and standardized catheter insertion techniques limited expansion. By the late 1980s and early 1990s, the number of patients on continuous ambulatory peritoneal dialysis (CAPD) remained extremely small and confined to a few tertiary centers.[6]

Expansion and Commercial Support (Late 1990s – 2006)

The late 1990s and early 2000s marked the first real expansion of PD in Pakistan after structured industry support and organized training programs were introduced. Dedicated PD nurses, patient home visits, and troubleshooting services improved confidence among nephrologists. Patient numbers increased and crossed the hundred-patient mark nationwide. For the first time, PD began to be viewed as a viable maintenance renal replacement therapy rather than only a temporary option.[7]

Decline and Stagnation (2007 – 2015)

During the initial expansion phase, a single industry partner played a central role in supporting and sustaining peritoneal dialysis programs across Pakistan. However, due to financial constraints, the company later transferred its distribution rights to another multinational organization with a primary focus on hemodialysis services. Following supply disruptions and shifting focus toward hemodialysis infrastructure, PD utilization declined over the next few years. Many centers stopped offering PD due to inconsistent fluid availability, lack of trained staff, and misconceptions regarding infections and survival. During this period, PD was offered only after vascular access exhaustion. Consequently, technique survival appeared poor because patients were relatively sicker and started late in the disease course. The number of patients on continuous ambulatory peritoneal dialysis (CAPD), which had previously shown encouraging growth, declined sharply, reaching approximately 31 patients nationwide by 2009.[8]

4. Reawakening Phase (2016 – 2020)

Following a period of stagnation, after 2016, the renewed academic engagement, workshops, and collaboration among a small but committed group of nephrologists gradually revitalized PD programs across the country. Improved physician training and increasing familiarity with standardized protocols led to measurable growth over the subsequent five years, with the number of CAPD patients reaching 76 by April 2020. Despite this progress, overall PD utilization remained low relative to the expanding dialysis population, and most patients continued to depend on in-center hemodialysis services concentrated in major urban centers. Notably, more than 90% of CAPD patients during this period were from Punjab and Islamabad, underscoring persistent regional disparities in access to home-based renal replacement therapy.

Modern Era and Structured Programs (2020–Present)

PD academy of Pakistan

In 2020 likeminded nephrologists interested in PD joined together and Formed PD academy of Pakistan. This provided a dedicated forum to focus on future of PD. It was felt from the start that healthcare professional education and professional development was the corner stone for future success.

Industry Interest

It was around the same time (from 2017) that Byonyks Medical Device company entered the market with the ambition of launching in 2020, Automated Peritoneal dialysis (APD) cycler in Pakistan. This created a further interest among the nephrologists as technology was added to the manual CAPD option. Feeling the pressure of fluid shortages, parallel development of local fluid production was paramount. Byonyks therefore had developed a collaboration with Medipak, a local intravenous solution manufacturer and having experience of making 2 liter solutions for acute peritoneal dialysis and urology irrigation procedures. A rigorous R&D among both industry collaborators was initiated. With COVID in 2020 and 2021 further highlighted the need of home based therapy and supported the idea of using APD in ICU settings although it was not possible at that time.

There has been a significant conceptual transition in recent years from the opportunistic use of peritoneal dialysis to more structured, planned PD-first approaches in appropriately selected patients. Rising travel expenses, increasing pressure on overcrowded hemodialysis facilities, recent transmission of Infections such as HIV outbreak in dialysis units, and growing patient knowledge and preference for home-based therapy have further accelerated PD adoption.

This renewed momentum has been driven by committed nephrologists who consistently promoted home-based renal replacement therapy despite persistent systemic and infrastructural challenges. Academic leadership and structured program development under the umbrella of PD Academy of Pakistan, the Pakistan Society of Nephrology and the Indus Health Systems have played a pivotal role in restoring confidence in PD as a sustainable long-term modality. The role of international organizations like the International Society for Peritoneal Dialysis, the International Society of Nephrology and Asia Pacific Society of Nephrology has been very significant. Through initiatives such as the PD Academy of Pakistan and joint educational programs, these partnerships have facilitated multiple national workshops, dedicated PD sessions within PSN conferences, and the establishment of fellowship opportunities and training pathways. Importantly, emerging ISPD-recognized training centers within the country have begun providing structured mentorship for both clinicians and PD nurses through team-based as well as individual training, strengthening the multidisciplinary workforce required for sustainable PD delivery. In addition, under the umbrella of the PD Academy and in collaboration with PSN and ISPD, two international peritoneal dialysis symposiums have been successfully conducted with participation from leading international faculty and broad national representation. These meetings have served as important academic platforms for knowledge exchange, skill development, and collaborative networking, and are now being developed into a regular biennial program to sustain continued professional engagement in PD education and practice. These collaborations have also enabled adoption of updated peritonitis prevention guidelines and alignment with international training standards, thereby integrating global best practices into local programs. All of these initiatives have led to significant success in promoting PD locally and Pakistan’ s PD journey gaining a lot of spotlight with invited spotlight session for the ISN and newsletter write-ups for the ISPD.

This collaboration between national leaders and international partners has led to standardized training programs, better infection control, and increased institutional capacity. As a result, PD use has steadily risen, with more than 400 patients now on peritoneal dialysis across the country. This growth shows

increased awareness, structured mentorship, and more cooperation between institutions, reflecting a gradual but significant change in Pakistan's renal replacement therapy scene.

Current Landscape of Peritoneal Dialysis in Pakistan

At present, peritoneal dialysis services in Pakistan are delivered through a limited number of tertiary care institutions and selected private-sector practices. Structured programs are operational in centers such as Indus Hospital & Health Networks Karachi, Fatima Memorial Hospital, Omar Hospital and Bahria International Hospital in Lahore. These institutions have demonstrated that with trained nursing teams, standardized patient education, and regular follow-up systems, PD can be implemented successfully within diverse healthcare models, including philanthropic and private settings.

This expansion is also reflected in the growing involvement of major public sector institutions. Mayo Hospital Lahore and Lahore General Hospital, two of the largest tertiary care hospitals in the country, are now functioning as PD centers in collaboration with Kidneys Beyond Borders, a charitable organization providing free PD services to deserving patients. Such partnerships have played an important role in improving access and demonstrating the feasibility of PD delivery within the public healthcare system.

Beyond organized institutional programs, many enthusiastic nephrologists in private practice continue to offer PD to selected patients. In many cases, modality choice remains physician-driven rather than guided by a uniform institutional policy or national framework. This has resulted in variability in patient selection, catheter insertion expertise, training duration, and follow-up protocols across centers.

Automated Peritoneal Dialysis (APD) is available in select facilities but remains limited by affordability and equipment access. In addition, logistical considerations, including supply chain continuity for PD fluids and consumables, particularly in geographically distant areas, continue to influence sustainability and uptake. The absence of a national PD registry further limits comprehensive assessment of technique survival, complication rates, and overall penetration of the modality.

Despite these structural constraints, increasing academic discussions, institutional workshops, and growing patient interest in home-based therapy indicate that PD is no longer viewed solely as a secondary option but is gradually gaining strategic relevance within the national renal replacement framework.

Role of NGOs:

Internationally almost 80-90% patients of dialysis are sponsored by the government due to the huge recurring cost of dialysis. Although a significant number of philanthropic organizations exist and the health card by government has supported for hemodialysis for almost 90% of the patients in Pakistan, yet PD has been ignored till now. In this scenario the role of NGOs is important for supporting PD. Indus hospital and Kidney beyond borders are the two main organizations supporting PD and some more as Karachi institute of kidney diseases and Usman Memorial hospital and Al Mustafa trust organizations are showing interest.

Indus Hospital: Indus Hospital healthcare network was instrumental in realizing the importance of home-based therapy for several reasons, among them, most significant was a need to cater for a younger dialysis population in Pakistan for providing them opportunities to fulfill their lifetime goals, such as education, employment and being useful member of the society. Currently Indus Hospital a significant number of patients and expertise in catheter placement and well-trained PD care givers. This was possible with dedication, collaboration within Pakistan through PD academy and PSN, industry support and international academic support from ISPD, ISN and APSN over the years.[9]

Kidneys Beyond Borders (KBB): KBB an NGO by the alumni graduates of King Edward Medical college and currently in USA came into existence in early 2024 to support home based dialysis as is the trend in USA also. This became a big supporter of PD and is funding 33 patients on CAPD and APD. This created more awareness among the patients and nephrologists equally and an option for patients to enquire and choose the modality.

Addressing Key Barriers to PD Utilization in Pakistan: Progress and Ongoing Efforts

Several concerns have historically limited the wider adoption of peritoneal dialysis (PD) in Pakistan. Rather than dismissing these as unfounded, it is important to acknowledge them while highlighting the ongoing efforts aimed at systematically addressing each barrier.

Infection Risk: Strengthening Prevention and Standardization

Peritonitis remains a major concern in peritoneal dialysis (PD) programs worldwide. In Pakistan, inconsistencies in earlier training practices and exit-site care likely contributed to increased concern about infection-related technique failure. In response, many centers have emphasized structured patient education, the use of disconnect systems, and standardized exit-site care protocols aligned with International Society for Peritoneal Dialysis recommendations. In parallel, the PSN PD Task Force is developing national PD standard operating procedures to harmonize practices across centers. Notably, with early recognition, most episodes of peritonitis can now be effectively managed on an outpatient basis.

Moreover, a broader assessment of infection risk highlights that patients receiving maintenance hemodialysis in Pakistan remain at substantial risk for blood-borne viral infections due to repeated vascular access and shared dialysis facilities. Hussain et al. reported a hepatitis C seroconversion rate of 53.3% among hemodialysis patients in Sheikhupura[10], underscoring the importance of contextualizing infection risks across dialysis modalities. By contrast, peritoneal dialysis (PD), as a home-based therapy that does not require repeated extracorporeal circulation, substantially reduces this specific category of infection risk.

Thus, rather than serving as a deterrent, infection control has become a focus area for quality improvement and protocol standardization within expanding PD programs.

Cost Considerations: Re-framing the Economic Perspective

Cost remains a decisive factor in modality choice in Pakistan’ s out-of-pocket healthcare system. However, a broader health-economic perspective reveals that direct consumable comparisons alone do not fully capture the true financial implications of dialysis therapy.

Current evaluations increasingly incorporate indirect and hidden costs, including transportation expenses for thrice-weekly in-center hemodialysis, productivity loss for both patients and caregivers, infrastructure and electricity expenditures, higher erythropoietin requirements frequently observed in HD, and greater staffing demands for dialysis units. Workforce analyses demonstrate that fewer personnel are required to manage equivalent PD cohorts compared to HD, reflecting important operational efficiencies.[11]

Contemporary international data further supports the economic viability of PD. A large national cohort study with 14-year follow-up demonstrated lower lifetime cost per quality-adjusted life year (QALY)

for PD compared with HD, even after adjustment for comorbidities and propensity matching[12]. More recent cost-utility analyses have reinforced these findings, showing that PD frequently offers superior cost utility across several health-economic dimensions when long-term outcomes are considered.[13] Additionally, systematic reviews of renal replacement therapy economics have consistently reported that, while kidney transplantation remains the most cost-effective modality overall, PD is generally more cost-effective than HD in a majority of healthcare systems, particularly when indirect and societal costs are included.[14]

From the Pakistani context, although PD fluids and consumables represent the main recurring cost, their market prices remain lower than those reported in many high-income countries. Ongoing efforts to improve procurement efficiency, expand public – private partnerships, and establish subsidized care models aim to enhance the affordability and long-term sustainability of peritoneal dialysis. When assessed from a broader health-system and societal perspective—rather than focusing solely on consumable costs—PD has the potential to be a cost-competitive, and in many situations a cost-advantageous, renal replacement therapy option in Pakistan. The current interest by the industry has ensured a continuous supply of PD fluids now for CAPD and APD and more players are joining hand to ensure the availability of fluids in future.

Patient Survival: Reassessing Outcomes and Strengthening Confidence in Peritoneal Dialysis

Concerns about patient survival remain a key factor influencing dialysis modality selection among both clinicians and patients. Historically, perceptions of poorer outcomes with peritoneal dialysis (PD) have contributed to its underuse in many settings. However, an expanding body of international evidence indicates that overall survival with PD is broadly comparable to hemodialysis (HD), particularly during the early years of renal replacement therapy.[15] Several cohort studies and registry analyses further suggest that PD may confer early survival advantages in selected patient groups, along with additional benefits such as superior preservation of residual renal function and greater flexibility in treatment delivery.[16]

In Pakistan, increasing emphasis is being placed on enhancing clinician familiarity with peritoneal dialysis (PD), incorporating structured modality education into pre-dialysis counseling, and expanding training opportunities for nephrology teams to improve patient selection and ongoing management. These efforts seek to address persistent misconceptions about clinical outcomes and to promote informed, shared decision-making between patients and healthcare providers. As local expertise and programmatic experience with PD continue to expand, growing confidence in its clinical effectiveness may support a more balanced and patient-centered approach to dialysis modality planning.

A Transition from Barriers to Structured Solutions

Collectively, these developments reflect a shift in mindset: from viewing infection, survival, and cost as insurmountable obstacles to addressing them through structured protocols, data monitoring, and collaborative learning. The emphasis is increasingly on quality assurance, early patient education, standardized training, and system-level planning.

While challenges persist, the ongoing efforts to strengthen infection control, optimize patient selection, and refine cost models suggest that the barriers to PD expansion in Pakistan are neither immutable nor prohibitive. Instead, they represent areas of active engagement and progressive improvement within a rapidly evolving renal care landscape.

Strategic Priorities for Expanding Peritoneal Dialysis in Pakistan

While the gradual increase in peritoneal dialysis (PD) utilization in Pakistan over recent years is encouraging, significant efforts are still required to achieve meaningful expansion of PD programs nationwide. Importantly, successful models from several low- and middle-income countries demonstrate that scaling peritoneal dialysis does not require reinventing new systems but rather adapting proven strategies to local healthcare contexts. Experiences from countries such as Sri Lanka and Palestine illustrate how coordinated policy support, structured training programs, and partnerships between healthcare institutions, government bodies, and international organizations can facilitate the successful expansion of PD services even within resource-constrained settings. These examples highlight the importance of strategic planning, workforce development, and national data systems in improving access to PD and strengthening home-based renal replacement therapy programs. For instance, the development of PD programs in Palestine demonstrated that a coordinated institutional effort was able to expand PD services from virtually no patients to more than 170 individuals within five years, highlighting the feasibility of building sustainable home-based dialysis programs in challenging healthcare settings.[17]Similarly, collaborative initiatives involving international nephrology partnerships and local training programs in Sri Lanka have contributed to strengthening PD capacity, improving clinician expertise, and establishing new PD centers across the country.[18]These experiences emphasize that effective PD expansion relies on coordinated policy support, training of healthcare personnel, engagement with industry partners, and the development of national data systems to guide planning and evaluation.

Pakistan is increasingly moving in this direction. Efforts are underway to strengthen collaboration between nephrology centers, develop national data platforms, and promote programmatic approaches to PD expansion. Learning from successful experiences in comparable health systems may help accelerate the adoption of PD as an accessible and sustainable modality of renal replacement therapy within the country.

Local Manufacturing and Supply Chain Stability

Sustainable PD expansion requires reliable and affordable access to PD fluids and consumables. Encouragingly, local industry in Pakistan has begun to take significant steps toward domestic manufacturing of PD equipment, including cyclers and dialysis fluids. Such initiatives have the potential to reduce dependence on imported products, lower costs, and ensure a more stable supply chain. However, regulatory challenges related to the import of raw materials and packaging components, including PD bags, along with evolving regulatory requirements from the Drug Regulatory Authority of Pakistan (DRAP), continue to pose operational challenges and at the same time a positive response is obvious from DRAP in terms of approvals of PD fluids and APD cyclers in recent past. Addressing these regulatory and logistical challenges through constructive engagement between industry, clinicians, and regulatory authorities will be essential to fully realize the benefits of local production.

Government Support and Public Financing Mechanisms

Government support remains a critical driver of dialysis modality adoption. While hemodialysis programs in Pakistan receive substantial public sector subsidies, support for PD has historically been limited. Recently, encouraging progress has been observed with the Government of Punjab with constructive talks continuing to reach a logical conclusion of allocating a defined budget for PD under the Chief Minister Health Card program, to support patients to receive PD as a dialysis modality. This

represents an important step forward; broader implementation and expansion of such initiatives will be necessary to meaningfully improve access. Replicating similar financing mechanisms across other provinces, particularly Sindh, could play a pivotal role in ensuring equitable access to PD as part of the national renal replacement therapy strategy.

An important neglected sector is the private health insurance providers, a concerted effort to include this group will also be an important step to widen the financial support system for PD patients.

Developing National Data Systems: The Role of the PD Registry

Robust data systems are essential for guiding policy, evaluating outcomes, and advocating for resource allocation. Recognizing this need, the Pakistan Society of Nephrology-PD Task Force has undertaken significant efforts toward establishing a national PD registry. Work is currently underway to compile and upload patient data from institutions across the country that are actively providing PD services. Once operational, this registry will provide valuable insights into patient demographics, outcomes, complications, and program performance, thereby enabling evidence-based planning and strengthening the case for broader PD adoption.

Strengthening Collaborative Leadership and Coordination

To translate these initiatives into sustained and scalable growth of peritoneal dialysis (PD) services, strong and coordinated leadership within the nephrology community is essential. Institutionalized collaboration among clinicians, policymakers, industry partners, NGOs and healthcare organizations is required to address structural barriers, align regulatory and financing frameworks, and embed best practices in PD delivery at a national level. The ongoing efforts of national PD advocacy groups and professional networks represent an important step toward establishing a unified policy platform capable of guiding program expansion, informing evidence-based decision-making, and positioning PD as a core component of national dialysis strategy rather than a peripheral option.

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