








# Peritoneal dialysis first policy in Hong Kong for 35 years: Global impact

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## Abstract

Peritoneal dialysis (PD) first policy has been established in Hong Kong since 1985. After 35 years of practice, the PD first policy in Hong Kong has influenced many countries around the world including governments, health ministries, nephrologists and renal nurses on the overall health policy structure and clinical practice in treating kidney failure patients using PD as an important dialysis modality. In 2021, the International Association of Chinese Nephrologists and the Hong Kong Society of Nephrology jointly held a symposium celebrating the 35 years of PD first policy in Hong Kong. In that symposium, experts and opinion leaders from around the world have shared their perspectives on how the PD first policy has grown and how it has affected PD and home dialysis practice globally. The advantages of PD during COVID-19 pandemic were highlighted and the use of telemedicine as an important adjunct was discussed in treating kidney failure patients to improve the overall quality of care. Barriers to PD and the need for sustainability of PD first policy were also emphasized. Overall, the knowledge awareness of PD as a home dialysis for patients, families, care providers and learners is a prerequisite for the success of PD first.

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A critical mass of PD regional hubs is needed for training and mentorship. Importantly, the alignment of policy and clinical goals are enablers of PD first program.

#### KEYWORDS

global impact, Hong Kong, PD first policy, peritoneal dialysis

#### Summary at a Glance

Thirty five years of practice of peritoneal dialysis (PD) first policy in Hong Kong has influenced many countries around the world including governments, health ministries, nephrologists and renal nurses on the overall health policy structure and clinical practice in treating kidney failure patients using PD as an important dialysis modality.

## 1 | INTRODUCTION

Chronic kidney disease (CKD) is an important contributor to morbidity and mortality from non-communicable diseases. Globally, in 2017, 1.2 million people died from CKD.<sup>1</sup> The major causes of CKD leading to end-stage kidney disease (ESKD) are diabetes mellitus (DM), glomerular diseases, and hypertension.<sup>2</sup> The epidemic of DM contributes to the major burden of CKD. In 2010, 285 million (6%) of the adult population worldwide had DM and this is projected to increase to 8% in 2030.<sup>2,3</sup>

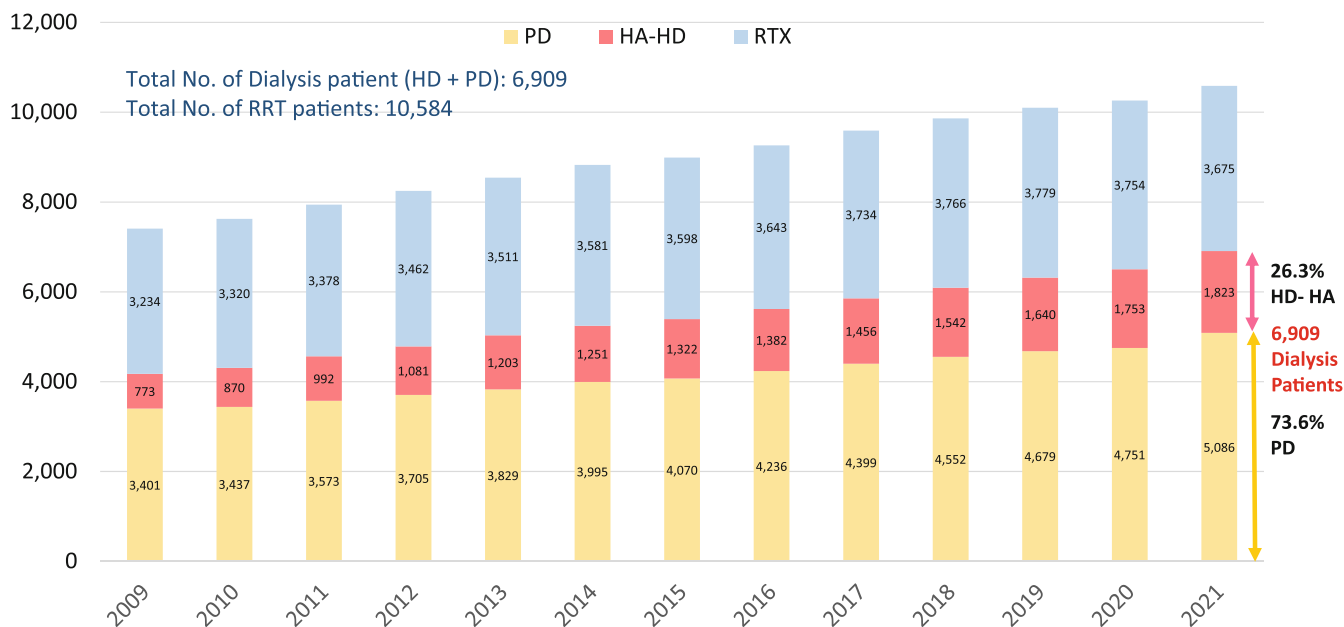
Availability of kidney replacement therapy (KRT) makes possible the long-term application of life-saving but costly treatment for patients with ESKD. The number of people receiving KRT exceeds 2.5 million and is projected to double to 5.4 million by 2030.<sup>1</sup> Currently, the most common KRT modalities are haemodialysis (HD) and peritoneal dialysis (PD). Continuous ambulatory peritoneal dialysis (CAPD) and automated peritoneal dialysis (APD) at home are effective methods of KRT and were found to be less expensive than in-centre chronic haemodialysis in most countries. Nowadays, home based dialysis such as PD is considered to be a preferred option particularly under the circumstances of pandemics as COVID-19. Hong Kong (HK) had carried out intermittent PD therapy since 1969 and now has the highest PD patient proportion around the world, attributed to successful “peritoneal dialysis first” (PD-First) policy since 1985.<sup>4</sup> 35-years of successful PD practice in HK has made a positive global impact and pushed forward the PD implementation all over the world especially in Asia-Pacific countries. Starting from early 2000, representatives from Ministries of Health of Thailand and Singapore had visited HK officially to learn the experience of PD First. Throughout these years, the leading nephrologists of Hong Kong have been invited by Ministries of Health from China, Taiwan, Malaysia and Mongolia to share the experience of PD First Policy of Hong Kong. The PD First Policy of Hong Kong with over 70% PD had also been officially complimented by the Secretary of Department of Health and Human Services of USA as exemplary in 2019. This was made when the Secretary was promoting the Executive Order of Advancing American Kidney Health Initiatives: USA wants to ensure 80% of new kidney failure patients in 2025 either are receiving dialysis at home or are receiving a transplant.

## 2 | HISTORY: PD FIRST POLICY IN HK

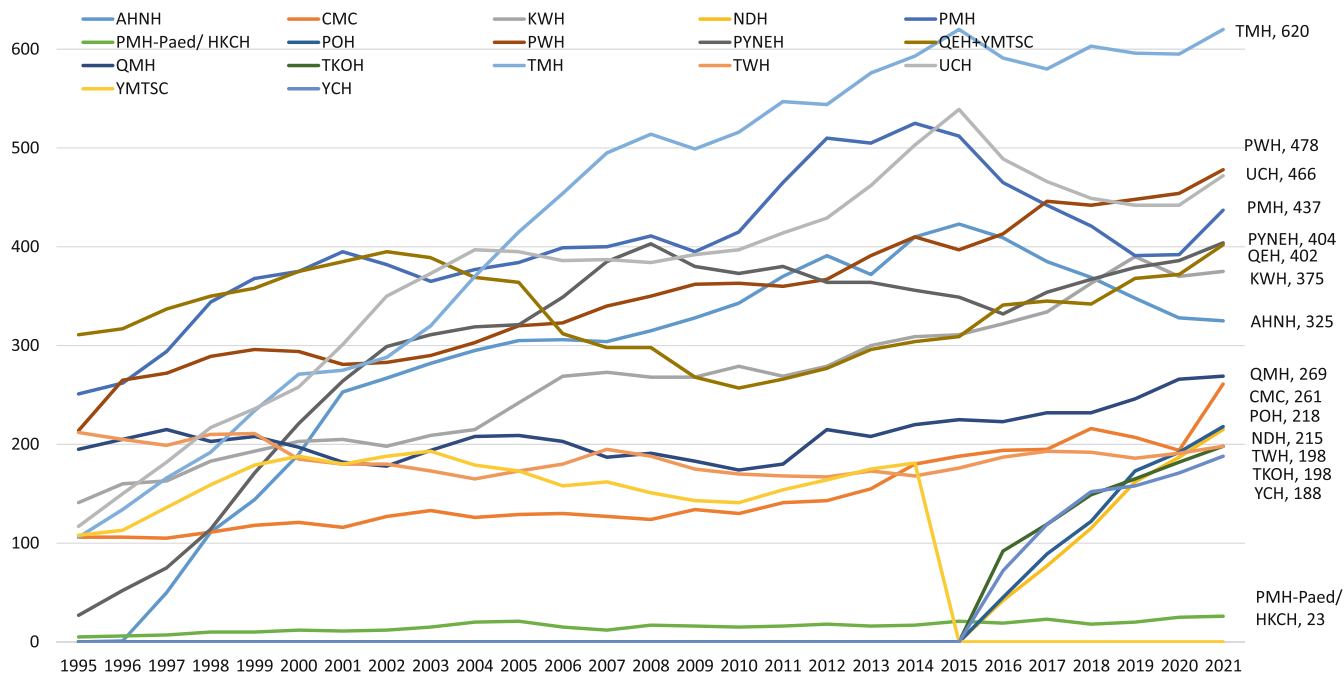
There have been many milestones of KRT in HK from the 60s to 80s. Maintenance HD and intermittent PD were started in 1969 and CAPD was initiated in early 1980s. In the year 1985, a “PD-First Policy” was introduced by the Central Renal Committee (CRC) of the Medical and Health Department, which was established to help planning and development of KRT provision in HK. The Policy was further promoted by the Hospital Authority (HA) of HK Government to meet with the rising numbers on waiting list for dialysis provision,<sup>5,6</sup> as CAPD was shown to be a cost-effective treatment for ESKD. This policy meant that PD was provided as the first-line dialysis regimen unless a medical contraindication dictated otherwise. At the start of the PD-First Policy, all patients put on PD were on CAPD.<sup>6</sup> The official data from other countries such as the United Kingdom<sup>7</sup> showed that limited treatment was being made available for ESKD patients over the same period, and HK took the first step to start CAPD first treatment. Afterwards, APD was gradually introduced into the program and further expanded due to APD machine subsidy provided by charitable organizations from 1997. In HK, the principle is to start CAPD first, with APD reserved for patients with high membrane transport status or compelling psychosocial needs,<sup>5,8</sup> as both CAPD and APD have been shown to provide high-quality dialysis for patients in HK. In 2021, there were 6909 patients on dialysis in HA with 73.6% on PD and 26.3% on HD (Figure 1). The mild decrease in the PD population from 82% in 2009 to 73.6% in 2021 was due to a planned increase in HD provision by the HA to support the proactive switch of patients on PD to HD before their PD finally failed. From 1996 to 2021, dialysis patients in HA increased 3.06 times from 2261 to 6909, with PD patients increasing from 1865 to 5086, a 2.73-fold increase.

Hong Kong has 16 renal centres providing peritoneal dialysis treatment. As of 2021, 15 centres have over 180 PD patients (Figure 2). Hong Kong Children Hospital is providing PD treatment for the paediatric population and has 26 patients in 2021. It is of note that one of the important factors for a successful PD programme is the centre size which has a significant impact on technique survival.<sup>6</sup> This is related to the medical and nursing expertise in PD, the

Number of ESKD Patients on RRT in HA  
Prevalent Counts of the 3 Modes of RRT, as of 31 Dec each year



**FIGURE 1** Number of end stage kidney disease (ESKD) patients on kidney replacement therapy (KRT) in Hospital Authority in Hong Kong as shown by the prevalent counts of the three modes of KRT-Transplant, HD and PD as of 31 Dec each year. From 1996 to 2021, dialysis patients in HA increased 3.06 times from 2261 to 6909, with PD patients increasing from 1865 to 5086, a 2.73-fold increase. Source: Data are from Hong Kong Renal Registry, Central Renal Committee, Hospital Authority



**FIGURE 2** PD services in all 16 Hospitals of Hospital Authority from 1995 till 2021, as of 31/12 each year. TMH, Tuen Mun Hospital; PWH, Prince of Wales Hospital; UCH, United Christian Hospital; PMH, Princess Margaret Hospital; PYNEH, Pamela Youde Nethersole Eastern Hospital; QEH, Queen Elizabeth Hospital; KWH, Kwong Wah Hospital; AHNNH, Alice Ho Miu Ling Nethersole Hospital; QMH, Queen Mary Hospital; CMC, Caritas Medical Centre; POH, Pok Oi Hospital; NDH, North District Hospital; TWH, Tung Wah Hospital; TKOH, Tseung Kwan O Hospital; YCH, Yan Chai Hospital; PMH-Paed/HKCH, Princess Margaret Hospital-Paediatric/Hong Kong Children Hospital. Source: Data are from Hong Kong Renal Registry, Central Renal Committee, Hospital Authority

Current expenditure on health as % of GDP	Total <sup>a</sup>	Public	Private
United States	17.0	14.4	2.6
Japan	11.1	9.3	1.7
United Kingdom	10.3	8.0	2.3
Australia	9.3	6.3	3.0
Hong Kong	6.5	3.4	3.0
Taiwan	6.1	3.9	2.2
China	5.4	3.0	2.3
Vietnam <sup>b</sup>	5.3		
Myanmar <sup>b</sup>	4.7		
Singapore	4.5	2.2	2.2
Indonesia <sup>b</sup>	2.9		

**TABLE 1** Comparison on health expenditure between Hong Kong and selected economies of different countries and regions

<sup>a</sup>In descending order from the highest total current expenditure on health as % of GDP. Source: Food & Health Bureau: Hong Kong's Domestic Health Accounts 2019/20.

<sup>b</sup>WHO Global Health Expenditure Database, 2019 figures, retrieved on March 26, 2022.

dedicated staff, well-designed patient training programmes and integrated back-up facilities.<sup>6</sup> It is of note that some centres in HK have reduced the patient number when they reached 500. The main reason is to reduce crowdedness in the centre to improve the hygiene and infection control once the size of the PD centre has reached a certain threshold (Figure 2).

### 3 | GLOBAL IMPACT

In August 2006, the 11th Congress of International Society for Peritoneal Dialysis (ISPD) was organized in HK, with over 2500 participants from 68 countries. During this congress, Asian academic nephrologists and government officials participated in a roundtable discussion on how to increase the utilization of PD to cope with mounting demand for KRT and to improve clinical and financial management of patients with ESKD in Asia. PD-First Policy model was presented in the roundtable, and participant nephrologists agreed that PD was well suited to act as first-line therapy in an integrated approach to kidney care and wider utilization of PD can help to contain expenditures on the treatment of ESKD.<sup>9</sup> Globally, the health care expenditures, both in public and private sector, are still increasing. Table 1 compares the overall health expenditure between Hong Kong and selected economies of different countries and regions in year 2019–2020. As for current expenditure on health as % of GDP, United States is the highest at 17% while Indonesia is the lowest at 2.9% among these selected economies. The provision of cost-effective and high-quality dialysis for ESKD patients is always on the agenda of Health ministries across the world as this is one of the areas that can help to contain the overall health expenditures.

However, despite its advantages, PD is still under-utilised in many countries. Experience of HK and other regions and countries where PD utilization are broader would be quite helpful to kidney health professionals and dialysis facilities around the world to promote further on use of PD.

## 4 | COUNTRY WITH PD-FIRST POLICY

### 4.1 | Thailand

Following HK experience, Thailand took PD-First Policy as a health benefit for patients under universal coverage health care scheme (UCS) in October 2007. As PD is cheaper, requires fewer staff, and is home based dialysis with minimal infrastructure, the advantages of PD-First policy were recognized by the Thai government. It helped to increase access to dialysis for ESKD patients who are under the UCS, to extend financial risk protection of the ESKD patients, and to minimize the impact on the overall national healthcare budget.<sup>10</sup> The Thai PD-First policy was implemented in January 2008. Thai government provided free PD treatment to its citizens within a controlled budget.<sup>11,12</sup> Prior to 2008, only one-quarter of the Thai population had coverage for KRT.<sup>10</sup> Since the start of PD-first Policy, PD penetration in Thailand has increased dramatically from 2007, with an increase by 100% of PD patients just in 2008.<sup>12</sup> Outcomes of PD are comparable with internationally acceptable standards.<sup>10</sup>

## 5 | COUNTRY WITH PD-FAVORED POLICY

### 5.1 | China

China has the largest population (more than 1.4 billion) in the world. A Chinese multicentre cross-sectional study of chronic kidney disease (CKD) revealed the high CKD prevalence of 10.8% in China.<sup>13</sup> The burden of CKD in China is increasing due to the ageing population and the increasing problem of metabolic disease.<sup>14,15</sup> The rapid growth of ESKD population and the relatively insufficient medical and economic resources has put a big burden on the government. PD had been introduced in China for more than 40 years and had got significant development by more and more frequent communications between HK and mainland

China. Due to general advantages of PD such as expenditure advantage, simplicity, and minimal requirements for medical resources such as labour, space, and equipment, PD particularly benefits ESKD patients in China's vast rural areas in minimizing the impact on their lives by reduction of inconvenience and financial burdens of hospital visit. Hence, PD is highly valued by Chinese government.<sup>15</sup> Uraemia is one of the major serious diseases covered by National Social Medical Insurance with high-reimbursement policy. In order to pave the way to ESKD care taking into account of the conditions in China, the Ministry of Health (MOH) held a working meeting of PD Training Demonstration Centre in Beijing on June 2011 and had vigorously advocated and promoted PD in China. The meeting marked the start of the national work of PD promotion for ESKD patients. The MOH identified 31 hospitals as the first batch of national PD training centres, and 28 hospitals as the cultivation units of PD training centres across the country. Increasingly more promotion on PD by PD healthcare professionals has started. To address the imbalance between rapid development of PD and the shortage of well-trained PD doctors and nurses in more rural areas, the Department of Nephrology of The First Affiliated Hospital of Sun Yat-sen University established a satellite program in January 2008 across Guangdong Province.<sup>16</sup> They had set up 13 PD satellite centres with 26 PD nephrologists and 32 nurses who have followed a unified training program and common PD practices. The total number of PD patients and the satellite units treated by the program increased substantially with significant improvement in patient clinical outcomes.<sup>16</sup> Since 2011, the Chinese Society of Nephrology has organized 22 training programs for PD standard operating procedures. Around 4000 nephrologists had been trained by 2013.<sup>14</sup>

Following the Chinese government policies and through the efforts of PD care professionals, the prevalence of PD has been substantially increasing in China. Nowadays about 1024 hospitals provide PD therapy for more than 120 000 ESKD patients throughout the country, accounting for nearly 15% of the total dialysis patients.<sup>15,17</sup> Currently, China has become the country with the largest number of PD patients around the world. The major hospitals in the first-tier cities have high-quality PD centres. Besides, the quality of the PD centres in other regions or underdeveloped areas have greatly improved. The use of PD in supporting the ESKD patients in rural areas of China has allowed a significant improvement in the access of dialysis care, patient survival and quality of life in this disadvantaged population.

## 6 | COUNTRIES WITH HOME DIALYSIS-FAVoured POLICIES

### 6.1 | The United States

In United States, home dialysis (PD and HHD) persists at a lower rate.<sup>18</sup> The National Kidney Foundation–Kidney Disease Outcomes Quality Initiative (NKF-KDOQI) Home Dialysis Conference in late 2017 was held to identify the barriers to starting and maintaining patients on home dialysis therapy.<sup>19</sup> In 2018, the second NKF-KDOQI Home Dialysis Conference was held, focusing on developing practical action points that would benefit not only home dialysis programs but also patients and their care partners.

During the conference, initiatives were suggested to help minimize barriers for the uptake and retention of home dialysis therapies. In March 2019, US Department of Health and Human Services (HHS) made an announcement of a goal of changing Medicare reimbursement payment methods to encourage a shift toward home dialysis and kidney transplantation for KRT. Three months later, the United State HHS issued executive order about Advancing American Kidney Health (AAKH) Initiative. One of the three goals of the initiative is ensuring that 80% of new kidney failure patients in 2025 is either receiving dialysis at home or are receiving kidney transplant.

### 6.2 | Canada

PD in Ontario is more cost-efficient (almost 2/3 the cost of in-centre HD) and less capital and labour intensive, associated with an equal or, in some aspects, better quality of life compared to in-centre HD. The Ontario Ministry of Health and Long-Term Care established a provincial PD initiative in 2005 to increase PD use. Increasing the use of PD through this initiative is one strategy to meet the growing needs of dialysis and to sustain timely access to KRT. A three-phase implementation plan was proposed, which is to increase the use of PD from 18% in 2005 to 30% in 2010.<sup>20</sup> As interest for home dialysis (PD or home HD [HHD]) is growing in Canada, recent Canadian studies looked into the technique survival of home dialysis. One study showed that the relative technique failure risk was not proportional over time and the beneficial association with HHD was only apparent after the first year of dialysis.<sup>21</sup> A registry study found that in Canadian incident KRT patients, although HHD was associated with appreciably lower risks of mortality and treatment failure compared to PD, this association appeared to be attenuated in the most contemporary era.<sup>22</sup> In May 2012, the Ontario Renal Network announced new ESKD patient care targets to be achieved by 2015 in terms of independent dialysis. The initial results demonstrated that both incident and prevalent rates of home dialysis have been increasing consistently.<sup>11</sup>

### 6.3 | Australia and New Zealand

Australia and New Zealand are identified as having Home Dialysis favoured policies. For instance, in New Zealand, almost 30% patients are on PD. Home-based dialysis is less costly as it requires lower infrastructure and staffing ratios than hospital or satellite dialysis centres. The Kidney Health Australia (KHA) economic health report 2010 estimated that up to AUD 4 billion can be saved with a greater uptake of home treatment dialysis options (home HD and peritoneal dialysis [PD]) than hospital-based treatment for patients with kidney failure.<sup>2</sup>

## 7 | COVID-19 AND PD

Mortality among maintenance dialysis patients with coronavirus disease 2019 (COVID-19) is reported to be as high as 20%.<sup>23</sup> PD has advantages over in-hospital HD in a pandemic. Fewer number of hospital visits are

required by patients on PD to meet the healthcare providers face-to-face as patients can be managed via telemedicine.<sup>24</sup> Inpatient support from the healthcare provider is not required while the patients are receiving PD.<sup>24</sup> Infection with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has been reported to be significantly lower in patients receiving PD (1.38%) compared with those on HD (3.55%).<sup>25</sup>

The COVID-19 pandemic has removed some previous barriers to PD uptake. More patients would prefer home dialysis to avoid going to hospitals/dialysis units and to allow self-isolation. More kidney units prefer this to reduce the number of patients attending their units and to maintain social distancing. Telehealth and home dialysis foster greater home-based care, less travel time, and fewer trips to the clinic.<sup>26</sup>

The use of telehealth has been noted to have increased during the pandemic. Remote Patient Monitoring (RPM) is part of telehealth allowing creation of a “virtual clinic” where the patient does not need to visit the healthcare facility.<sup>27,28</sup> RPM allows monitoring of biometric parameters, direct communication between patients and their healthcare providers, timely management decisions, and prescription generation.<sup>27</sup> Remote monitoring of patients receiving PD can help them troubleshoot any problems, reduce their anxiety and sense of isolation, and enhance health literacy and patient satisfaction.<sup>27</sup> It also helps to maintain the medical record accurately and more easily.<sup>26</sup> The healthcare provider can adjust device settings remotely, provide a quick resolution to solve catheter flow problems and monitor the use of PD fluids to ensure timely delivery of additional supplies.<sup>27</sup> Remote management might enable PD for some patients who were otherwise considered to be unsuitable for dialysis.<sup>29</sup>

## 8 | LEARNINGS FROM HONG KONG'S PD-FIRST POLICY

Learnings from Hong Kong's PD-first Policy mainly include how various factors, such as government policies, education, economic and

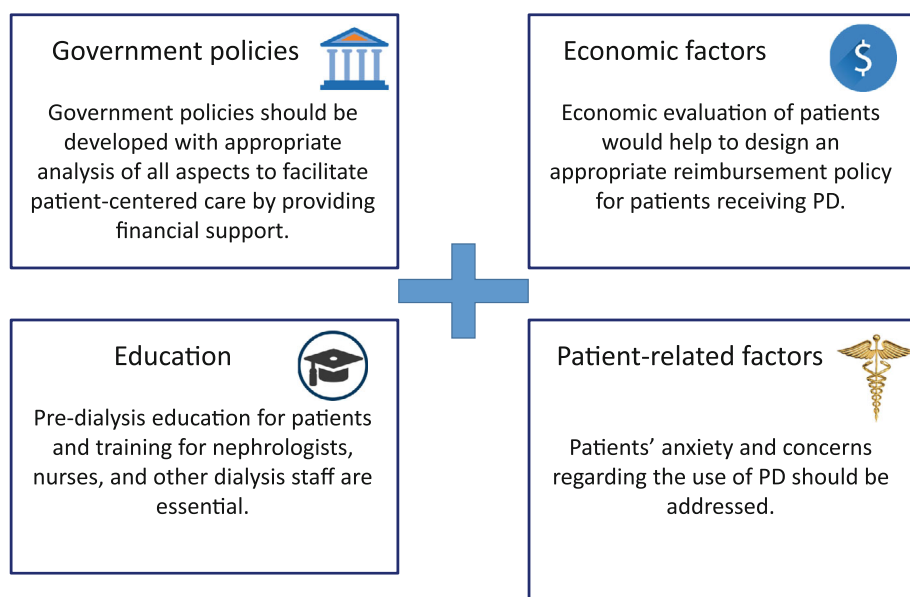
patient-related factors, play an important role in the successful implementation of the policy.<sup>6,11,30</sup> Overall, Hong Kong is a successful PD-first example and its strategies for success could be adopted by other countries (Figure 3).

## 9 | WHAT ARE THE BARRIERS TO PD AND HOW TO EXPAND THE USAGE OF PD?

Even though PD is beneficial for patients requiring KRT, it remains an underused modality. Various barriers prevent or reduce the use of PD among patients, such as government policies, inadequate training of healthcare professionals, cost-related factors, and patient-related factors.

Inadequate PD training for nephrology fellows and healthcare professionals has been a major barrier to PD initiation and retention.<sup>31</sup> The dialysis reimbursement policies vary across countries and this difference can affect the use of PD among patients.<sup>6,11</sup> PD rates have been reported to be low in countries where reimbursement for PD is insufficient. PD programs are disincentivized by government reimbursement policies favouring HD. As reimbursement systems are reported to be complex and vary significantly among countries, different reimbursement policies could impact PD use dramatically.<sup>6,11</sup> Cost is also one of the barriers that may affect the use of PD. The cost of PD is still high in certain developing countries compared with HD because of lower labour costs and the higher price of importing PD solutions and disposables.<sup>6,32,33</sup> The annual PD provision costs in developing countries are reported to be much higher than the per capita gross national income.<sup>6</sup> Certain patient-specific barriers exist in the utilization of PD as well. Patients' disinterest in home-based dialysis, lack of social support, patient burnout, fear of peritonitis, burden on family members, medical contradictions, and lack of confidence in the quality of PD care may affect the usage of PD.<sup>34-37</sup>

PD usage can be increased by several different approaches. Economic evaluations should be done including details on patients' quality of



**FIGURE 3** Learnings from Hong Kong's PD-first Policy



life and employment status.<sup>6,30,37</sup> Governments should identify key opinion leaders and provide training for nephrologists, nurses, and other dialysis staff. Patients and experts in nephrology should attend educational programs with unprejudiced data on PD and HD. National guidelines and policies should be developed to address patients' fears and to educate them in medical and nonmedical aspects.<sup>6,30,37</sup> Telemedicine and reimbursement policy can also play an important role in enhancing PD usage. The emergence of the COVID-19 pandemic provides an opportunity for PD as a home therapy for ESKD patients to enhance its utilization.<sup>37</sup>

## 10 | CONCLUSIONS

PD First policy has been practiced in Hong Kong for over 35 years. It has also created a significant impact globally on the use of PD and home therapy as a means of treatment for our ESKD patients. While we celebrate successes of the practice, the challenges of various barriers and sustainability issue of PD therapy have to be addressed.<sup>38</sup> It is through concerted efforts of Government, health policy makers, PD healthcare professionals, patients and caregivers that such barriers can be overcome and the PD utilization can be enhanced to provide a cost-effective high quality treatment for our patients.

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## CONFLICT OF INTEREST

The authors declare that the contents presented in this paper have not been published previously in whole or part.

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