

*Editorial Comment*

**An Indian model for cost-effective CAPD with minimal man power and economic resources**

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ropoietin (EPO) and iron is comparatively lower in CAPD patients compared to HD patients in India to the advantage of CAPD as a favorable RRT.

**Introduction**

Chronic peritoneal dialysis is used as renal replacement therapy (RRT) among a large number of patients in the developing Asian economies. The socioeconomic status of the emerging economies is diverse and hence, the cost and utilization of peritoneal dialysis (PD) varies widely [1].

**The growth of PD in South Asia**

CAPD for chronic kidney disease (CKD) was initiated in India in 1991 with other South Asian countries following the Indian model [4, 5]. MHD is the major form of RRT in most patients except in Mexico, Thailand and Hong Kong where CAPD utilization is high [2]. Despite the relatively few contraindications and the added advantage of it being a simple home therapy, the penetration of CAPD has been only 18–20% yearly in India and lately, the PD first policy in Thailand has lead to an exponential increase in CAPD.

**State of RRT in South Asia and the need for growth of PD**

Only 3–5% of all patients with end-stage renal disease (ESRD) in India get some form of RRT from the existing pool of 900 nephrologists [2, 3]. As referral pattern varies widely in India for uremia therapy, there is no robust national database on the prevalence and incidence of dialysis therapy except for isolated reports. The cost of maintenance hemodialysis (MHD) for a single session varies from US \$10 to 65 and most patients are maintained on twice-a-week dialysis. One-third of the 30 000 MHD patients are in the major metropolitan cities of Chennai, Delhi, Mumbai and Kolkata, whereas the majority of the Indian population lives in small towns and villages far away from cities. The hidden cost of travel to the hemodialysis (HD) center and loss of daily wages for the patient and the accompanying person is not usually calculated when the cost of HD is taken into consideration. The unmet needs of RRT must be covered by continuous ambulatory peritoneal dialysis (CAPD) that is available even in remote places in the country. There are ~7000 prevalent patients on chronic peritoneal dialysis in India. The cost is substantially less with PD, and the four industries which are involved in CAPD in India have network systems to deliver dialysis supplies to the residence without any additional cost. The use of eryth-

In developing countries in Asia, PD offers certain clear advantages over HD such as simplicity, reduced need for trained technicians and nurses, minimal technical support requirement, lack of electricity dependence, online water purification and home-based therapy with institutional independence which has potential cost savings.

**PD and government**

Containing cost and promoting PD is possible only through government support and health care insurance as shown by the example of the Thailand, Mexico and Hong Kong experience. About 60–90% of the patients cannot afford RRT due to social factors related to poverty [2, 3, 6]. A look at the Indian CKD registry data shows that 37.3% of patients have a monthly income of less than US \$100, the majority are males (69.5%) (GDP US \$1050), 31.4% are diabetics and with age between 19 and 60 years (www.ckdri.org). This harsh reality with hardly any insurance coverage for Indian PD patients precludes the growth and expansion of PD programs. A recent development of reimbursing dialysis for the federal government employees and the initiatives

taken by some of the state governments in providing access to dialysis to certain sections in the society has also expanded the CAPD program in India.

### The role of the pharmaceutical industry

Domestic manufacture of PD fluid and accessories in India, China, South East Asia and Latin American countries has reduced the cost of treatment. The cost of currently used EPO, phosphate binders, vitamin D analogs and calcimimetics in India is given in Table 1, which is cost-effective.

In Asia and Africa, if the dialyzate manufacturing companies bring down the cost of their products on par with the GDP per capita income, a positive effect will be seen on PD utilization. The appropriate use of smaller exchange volumes (6 L/day) in patients with smaller body size or those with residual renal function can positively impact the daily cost of PD without compromising adequate dialysis. A reduction in complications of PD by implementing better 'connectology' techniques that aim at decreasing peritonitis rates may reduce the associated hospitalization and treatment costs [7]. Although expensive, in the author's single-center experience by using a single exchange of icodextrin in patients with congestive cardiac failure and during episodes of peritonitis, this has proved to be a cost-saving exercise in reducing hospitalization.

In CAPD patients with high transport status, vegetarianism leads to progressive depletion of serum albumin stores impacting survival as shown in our study [8–10]. They should be closely monitored for malnutrition by subjective global assessment while on CAPD, as nutritional intervention can slow down or improve malnutrition without switch to HD [9]. We do not recommend HD as a primary modality for vegetarians with high transport status. An intensive nutritional intervention with enteral feeding will be cheaper than switching over to amino acid-containing solution in developing countries.

**Table 1.** Current cost of EPO, phosphorus binders, vitamin D analogs and calcimimetics in India<sup>a</sup>

Drug	Cost (US \$)
Sevelamer HCL (400 mg)	0.38
Sevelamer carbonate (400 mg)	0.50
Lanthanum carbonate (250 mg)	0.19
CaCO <sub>3</sub> (500 mg)	0.10
Ca acetate (667 mg)	0.04
1-alpha vitamin D <sub>3</sub> (0.25 mcg)	0.12
Calcitriol (0.25 mcg)	0.32
Doxercaliferol	0.50
Cinacalcet (30 mg)	1.06
Mircera (50 mcg)	102.20
Mircera (75 mcg)	153.30
Mircera (100 mcg)	205.40
Epex (2000 U)	19.80
Erypro/relipoietin (2000 U)	10.00
Iron sucrose (100 mg)	4.25
Cresp (25 mcg)	25.33
Repoietin (2000 U)	3.33

<sup>a</sup>Mircera—methoxy polyethylene glycol epoetin beta Epex; erypro, relipoietin, repoietin—EPO alpha; Cresp—Darbepoetin.

### Once-in-a-lifetime payment scheme for chronic peritoneal dialysis—a novel initiative

The 'Once-in-a-lifetime payment' scheme for patients paid to the manufacturing industry for PD supplies enabled the expansion of the PD program in India since 2003 [3]. With a legal agreement between the patient and the dialysis industry, supplies consisting of a double bag transfer set, mini caps, etc. are provided until the patient continues on CAPD. The lifetime scheme currently costs Rs 700 000 (US \$15 500) for three exchanges including all supplies delivered at the place of residence either as a single upfront payment or three installments over a period of 3 years. Under circumstances such as a switch to HD, renal transplantation or death, the remaining credit amount is refunded to the patient or family after deducting a nonrefundable amount of US \$1100. This has the added advantage of there being no cost escalation until the patient dies or switches mode of therapy.

The total number of patients enrolled is ~3600 patients by different dialysis providers in India. The current expenses for those under the umbrella of this lifetime scheme are US \$375–500/month while doing three to four exchanges, respectively. Similar schemes are also available for automated PD at a higher cost.

All ESRD patients anywhere in India are free to avail the scheme. A multicenter retrospective study from South India showed that of the patients who survived on PD for  $\geq 3$  years, 46% belonged to the once-in-a-lifetime payment scheme and 21% were fully reimbursed from their employers [11].

### PD Suraksha insurance for peritonitis

A novel initiative was introduced in 2010 by a medical insurance company involving a payment of US \$58/year ensuring coverage for peritonitis treatment including hospitalization and antibiotics for PD patients in India. All hospitalization expenses are insured up to a sum of US \$1063/year with a premium of only US \$58/year. If the patient requires catheter removal, the cost of the new catheter, implantation surgery and hospitalization is included. This scheme also provides care for the cost of HD during the interim period when the catheter has to be removed for infection.

### Renal home care

Another unique initiative in India is the establishment of a 'renal home care' program initiated by the dialysis industry recently. This works like a call center where patients can call toll free and receive advice on CAPD from booking a doctor's appointment to instructions on catheter care and when to consult their doctor regarding complications. Each patient is given a unique patient ID number to facilitate this process. They provide training and conduct pre- and post-training evaluation to assess the effectiveness of the training provided. Reinforcement to patients to adhere to the training protocols and reminders for appointments ensure adequate patient compliance. This service is provided in English and in eight local languages.

## A survey of 275 south Asian nephrologists to assess roadblocks for CAPD expansion

The issues raised by the nephrologists were peritonitis by 30%, catheter-related problems by 10%, lack of timely CKD education by 91%, the lack of infrastructure and inadequacies of functioning HD unit by 42% and the lack of extended care facility support by 28%. Twenty-one percent felt that they had inadequate knowledge of CAPD. Although patient preference for PD was 73%, 74% of physicians were concerned about reimbursement from hospitals, insurance agencies and other sources.

As there is a global shortage of nephrologists, PD as a simple RRT can be a more suitable modality in the hands of trained nurses and technicians under the guidance of few nephrologists who have expertise on PD [12–14]. Innovative schemes such as once-in-a-lifetime payment for PD therapy and Suraksha insurance for peritonitis and generic medications for treatment of comorbidities have increased the penetration of PD with better survival.

*Conflict of interest statement.* None declared.

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