

## Continuous Ambulatory Peritoneal Dialysis Cost-Effectiveness in National Health Insurance Era of Indonesia

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### Abstract

Essential treatments for patients with end-stage renal disease include Renal Replacement Therapy (RRT) consisting of hemodialysis, peritoneal dialysis, and kidney transplantation. In 2014, dialysis coverage in Indonesia was more than 1.5 trillion, making it the second highest expense in the National Health Insurance (BPJS) expenses. This study compared the cost-effectiveness between Continuous Ambulatory Peritoneal Dialysis (CAPD) and Hemodialysis (HD) in patients treated in Dr. Hasan Sadikin General Hospital. Data were collected from the Urology Department from 2014 to 2017. This was a retrospective observational study on 3 groups of patients: patients with effective CAPD each year as the first group; patients who had experienced repair of CAPD and continued to use it as the second group; and patients who discontinued CAPD due to complications and returned to hemodialysis as the third group. Each group expense was calculated with standard cost insurance for one year in the hospital. The expense was then be compared to the expense of hemodialysis for one year. A total of 89 patients in the CAPD program from 2014–2017 were treated at the department. When compared to HD, the first, second, and third group of CAPD patients experienced a cost reduction of IDR 23.227.857/person, IDR 18.127.857/person, and IDR 1.661.972.000, respectively. Total savings from the CAPD program in the hospital was IDR 1.661.972.000 from 2014. It is then concluded that CAPD could reduce the burden of government insurance in a cost-effective manner and is considered a treatment of choice in the National Health Insurance Era.

**Keywords:** Chronic kidney disease, continuous ambulatory peritoneal dialysis, cost-effectiveness analysis, hemodialysis national health insurance

### Introduction

Chronic kidney disease (CKD) has become a challenging issue worldwide, with an estimated prevalence of 13.4% (11.7–15.1%). Globally, approximately 4.902 and 7.083 million patients with end-stage renal disease (ESRD) are expected to require renal replacement therapy. Considering the rising rate of non-communicable diseases and the population continues to age, the concern of ESRD also keeps growing.<sup>1</sup>

The prevalence of CKD in Indonesia has been drastically increasing to nearly 0.2% of the total population. Of these number, the risk of developing ESRD is found in about 482,000. Approximately 18,163 individuals have ESRD in

Indonesia.<sup>2</sup> Important treatments for patients with ESRD include renal replacement therapy, which consists of hemodialysis (HD), peritoneal dialysis (PD), and kidney transplantation. Although kidney transplantation is still considered the most effective treatment for ESRD, the options of treatment are only limited to hemodialysis or peritoneal dialysis due to the rarity of living organ donors and cadaveric donors that are poorly accepted. In addition, kidney transplantation is not feasible considering the increasing incidence and prevalence of ESRD (35,000 and 120,000, respectively). Furthermore, Indonesia Renal Registry stated that around 80% of patients with ESRD are treated with hemodialysis as the most suitable choice, with peritoneal dialysis at only 2%.<sup>5</sup>

The Health Social Security Institution (BPJS) initially launched a national health insurance scheme that is premium-based in 2014. The scheme's objective was universal health coverage for approximately 250 million populations

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by 2019. This insurance scheme reimbursed all dialysis treatments, with a higher rate for hemodialysis compared to peritoneal dialysis. There are approximately only 53% of patients with dialysis access, and nearly all patients are undergoing hemodialysis.<sup>2</sup> In 2014, over IDR 1.5 trillion was spent on dialysis coverage, making it the second highest expense for BPJS.<sup>6</sup> Several economic evaluations have been conducted to evaluate the impact of dialysis financially due to this high-cost burden on the healthcare system worldwide.<sup>7-11</sup>

This research was conducted to determine the cost-effectiveness between Continuous Ambulatory Peritoneal Dialysis (CAPD) and Hemodialysis (HD) in Hasan Sadikin General Hospital.

**Methods**

Data was collected from the Urology Department from 2014 to 2017. The method of study was retrospective observational. Subjects were ESRD patients who underwent CAPD insertion. The subjects were divided into 3 groups; the first group was patients with effective CAPD each year, the second group was patients who had experienced repair of CAPD and continued to use it, and the third group was patients who discontinued CAPD due to complications and returned to hemodialysis. Each group expense would be calculated with standard cost insurance for one year in Dr. Hasan Sadikin General Hospital Bandung. The CAPD expense would be compared to hemodialysis expense for one year using incremental cost-effectiveness measure. The ethical clearance for this research was obtained from the Research Ethical Committee of Dr. Hasan Sadikin General Hospital Bandung.

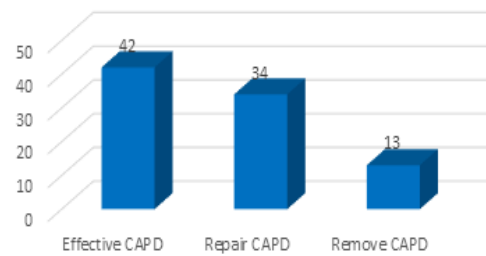
**Result**

From 2014 to 2017, Urology Department had

**Table 1 Assurance Coverage Price**

Item	Assurance Coverage (Rupiah)
CAPD operation	5.100.000
Dianeal/day	221.000
Hemodialysis	1.025.000
Arteriovenous shunt	2.100.000

Continuous Ambulatory Peritoneal Dialysis



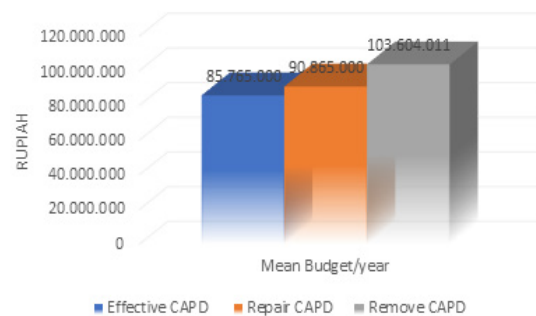
**Figure 1 Total CAPD patients from 2014-2017**

89 patients in the CAPD program. There were 56 males and 33 females with a mean age of 30 years old. All patients were divided into 3 groups, effective CAPD group 42 (47%) patients, repair group 34 (38%) patients, and removal CAPD group 13 (14 %) patients. The mean effective duration for peritoneal dialysis in 1 year was 365 days for the effective group, 37 days for the repair group, and 45 days for the last group.

The mean cost for the first group was IDR 85.765.000/year/person, IDR 90.865.000/year/person for the second group, and IDR 103.604.011/year/person for the third group. As the cost for each hemodialysis patient was about IDR 108.992.857 for a year, every CAPD group had a lower burden than HD.

The most considerable saving came from the first group with IDR 975.570.000 with a mean benefit of IDR 23.227.857 for each patient. Saving from the second CAPD group was IDR 616.347.143 with a mean benefit of IDR 18.127.857 for each patient. The patient who removed CAPD and continued hemodialysis had the least saving with IDR 70.055.000 and a mean benefit of IDR 5.388.846 for each patient.

Total savings from the CAPD program over



**Figure 2 Mean Peritoneal Dialysis Budget A Year for Each Group**

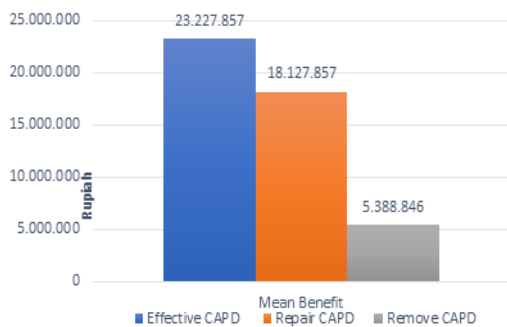


Figure 3 Saving Budget For Each Person with PD Over HD in A Year

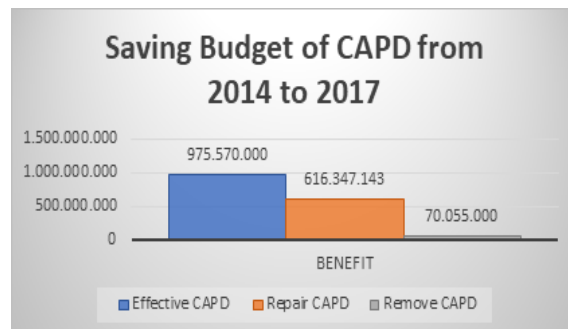


Figure 4 Saving Budget of CAPD from 2014 to 2017

HD was IDR 1.661.972.000 from 2014-2017 in Dr. Hasan Sadikin General Hospital Bandung.

### Discussion

Dialysis is performed in two forms: hemodialysis (HD) and peritoneal (PD). The mechanism of hemodialysis is filtering blood to remove toxic, excessive fluid and salts using a machine. Hemodialysis was firstly used in 1967 in Indonesia and has continued to be used to handle ESRD patients. There were approximately 382 operating centers across the country in 2015.<sup>3</sup> Another dialysis method is peritoneal dialysis (PD), which uses the peritoneal membrane as a dialysis solution. The most commonly used in Indonesia is continuous ambulatory peritoneal dialysis (CAPD); however, the solution has to be changed up to 4 times/day.<sup>12</sup> The National Health Insurance of Indonesia (JKN) covers two-times/week HD sessions with various reimbursements that depend on the classes, ranging from IDR 786,200 to IDR 982,400.<sup>13</sup> Literature have shown that peritoneal dialysis has higher cost-effectiveness; however, it is still underperformed. This issue occurs because many dialysis centres in Indonesia are still unwilling to conduct PD, with only 3% of PD out of 30,544 patients undergoing dialysis.<sup>4</sup> Other countries have shown a much higher proportion of PD out of the total dialysis. A study in Hong Kong showed a ratio of nearly 3:1 for PD compared to hemodialysis (71.8% to 25.6%).<sup>14</sup> The reason for such a higher proportion is that peritoneal dialysis is more cost-effective compared to hemodialysis in developed countries. The differences between hemodialysis and peritoneal dialysis from a cost-effectiveness perspective are the healthcare employees' incentives and

logistic resources. Hemodialysis costs more than peritoneal dialysis regardless of the addition of adjustment.<sup>11,15</sup> However, some developing countries have a higher unit cost (contributed by the delivery cost of dialysis soluble used in PD) of peritoneal dialysis compared to hemodialysis.<sup>2</sup> Furthermore, the primary reason for a low rate of PD in Indonesia is limited knowledge and the reluctance to promote peritoneal dialysis. Peritoneal dialysis is difficult to implement because of insufficient data regarding costs and quality of life, and healthcare professionals. Furthermore, since Indonesia is geographically vast, access and transportation are very limited, leading to limited dialysis access in remote areas.<sup>2</sup> In order to convince decision-makers and stakeholders to expand peritoneal dialysis for patients in remote areas, in which weekly HD routine seems impossible, studies regarding the quality of life and costs of patients with ESRD are necessary. The primary research question is how cost-effective PD differs from HD.<sup>2</sup>

The results of these studies indicated that PD had more saving for the JKN burden. Even the patient who had ineffective CAPD and went back to hemodialysis still provided some cost-benefit to the government insurance system. Total saving from the CAPD program over HD was IDR 1.661.972.000 from 2014-2017 in Dr. Hasan Sadikin General Hospital Bandung. The optimal PD should be considered with the best surgical technique and a skilful surgeon to reduce the incidence of ineffective CAPD. This is means that surgeon who want to insert CAPD catheter must have licences/qualified for this.

CAPD is concluded to reduce the burden of government insurance cost-effectively. The optimal PD should be considered a superior treatment choice to HD in National Health Insurance Era.

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