

# END-STAGE RENAL DISEASE IN INDONESIA: TREATMENT DEVELOPMENT

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The number of cases of chronic kidney disease is growing rapidly, especially in the developing world. At a certain level of renal function, progression of chronic kidney disease to end-stage renal disease (ESRD) is inevitable. ESRD has become a major health problem because it is a devastating medical condition, and the cost of treatment is a huge economic burden. This article presents data collected from 13 nephrology centers in response to specifically designed questionnaires. These centers were divided into 7 groups on the basis of geographic location. Previous data had given the impression that the incidence and prevalence of ESRD had increased, and the results of this study support these previous data. Since a national registry of ESRD has just been developed for Indonesia and we can present only limited data in this study, the numbers in this article underestimate the true incidence and prevalence rates. Although hemodialysis facilities have been developed rapidly, further development is still required. Continuous ambulatory peritoneal dialysis as an alternative renal replacement therapy (RRT) is only now being introduced. Kidney transplantation programs expand very slowly. RRT still imposes a high cost of treatment for ESRD; therefore, these treatments are unaffordable for most patients. Recently, government health insurance has covered financially strained families requiring RRT. Since the cost of RRT for ESRD has significantly increased over time, the management approach should be shifted from treatment to prevention. (*Ethn Dis.* 2009;19[Suppl 1]:S1-33-S1-36)

**Key Words:** End-stage Renal Disease, Incidence, Prevalence, Treatment Development

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## INTRODUCTION

In developing countries, infectious disease is still a leading cause of morbidity and mortality; however, cardiovascular and other noninfectious cause are also increasing significantly. In Indonesia, numbers of chronic kidney disease patients are rising rapidly. It has become a devastating medical, social, and economic problem for patients and their families.

Previous limited data give the impression that both incidence and prevalence of ESRD in various areas of Java and Bali were increasing over time.<sup>1</sup> This conclusion was based on the data provided by a few nephrology and dialysis centers, thus limiting the ability to project the situation throughout the country.

Modalities of treatment for ESRD have been developed and grown rapidly, although the treatment costs are still unaffordable for most patients. Hemodialysis has become a part of routine medical care for ESRD but still imposes high costs of treatment. Previous data showed that the burden for the medical care of ESRD treatment has increased substantially. In 2000, the government health insurance reimbursed the costs for hemodialysis as much as 33 billion rupiah (\$3,606,557), a figure three times that reported in 1995.<sup>2</sup> Continuous ambulatory peritoneal dialysis (CAPD) and kidney transplantation have also been offered as renal replacement therapy (RRT) alternatives for ESRD.

The purpose of this study was to evaluate the magnitude of ESRD problems related to the incidence, prevalence, and treatment.

## MATERIALS AND METHODS

Data presented in this article were derived from a number of nephrology centers within both private and govern-

ment hospitals. Specifically designed questionnaires were distributed among the centers. Thirteen selected centers were included in this study, and they provided data concerning RRT for ESRD patients. Eleven of 13 centers were nephrology units of university hospitals. Data of ESRD patients who underwent hemodialysis and CAPD from 2002 until 2006 were recorded. Monthly data of new ESRD patients requiring dialysis in the current year have been provided. Information concerning kidney transplantation was obtained from a few centers only.

Incidence was derived from the number of new patients entering RRT programs in the current year, while the incidence rate was the number per million. The prevalence was defined as numbers of ESRD patients on RRT alive on December 31 in the current year, while the prevalence rate represents the number per million people.<sup>3</sup> Data provided by 13 centers included in this study were divided into 7 groups on the basis of geographic location. The population figures of the geographic areas were obtained from the Central Board of Statistics.<sup>4</sup>

Data on the financing system for ESRD treatment were provided by the government health insurance<sup>5</sup> and unpublished data of the Indonesian Society of Nephrology. Classification of the underlying diseases of ESRD patients who underwent dialysis is also reported in this study.

## RESULTS

Figure 1 shows the distribution of hemodialysis, CAPD, and kidney transplantation centers in Indonesia. The 7 groups based on the geographic variations included in this study are also depicted in this figure. Four geographic

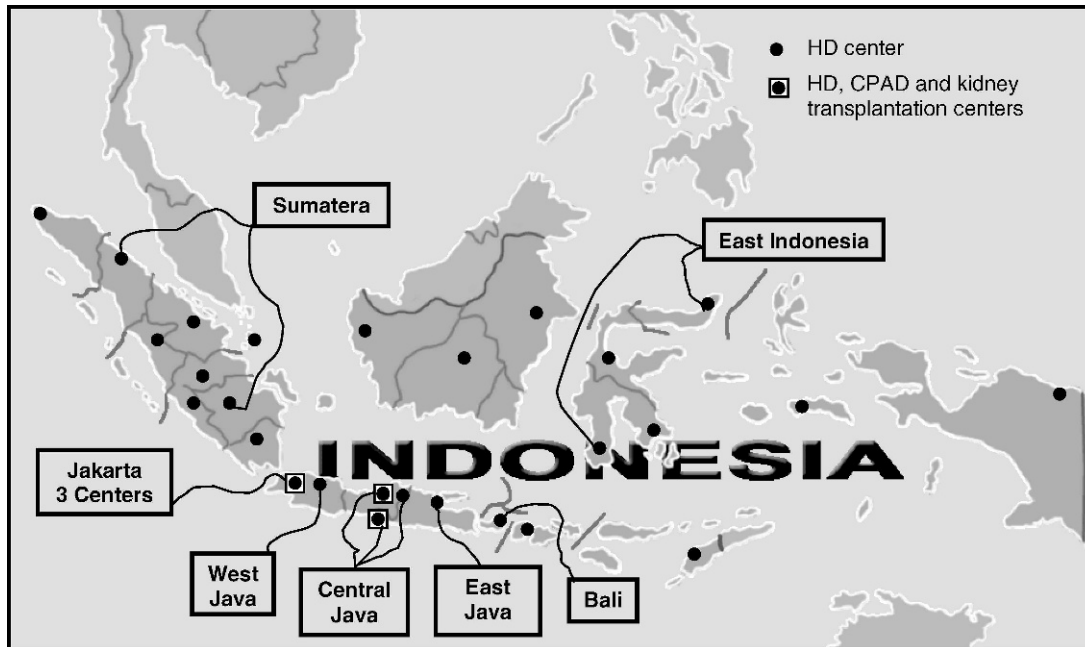


Fig 1. Distribution of dialysis centers and seven geographic areas studied

areas represent Java Island, Sumatra, Bali, and the eastern part of Indonesia. According to Central Board Statistics data, the year 2006 total population was 219.2 million. Almost 58.3% lived in Java Island, 21.1% in Sumatra, 5.7% in Borneo, and 14.8% in the eastern part of Indonesia, including Bali.<sup>4</sup>

### Incidence, Prevalence, and Causes of Treated ESRD

The incidences of ESRD patients who underwent hemodialysis from 2002 through 2006 were 2077, 2039, 2594, 3556, and 4344, respectively. The incidence rates per million population in each year were 14.5, 14.0, 18.0, 24.6, and 30.7, respectively. The prevalences of ESRD patients on hemodialysis from 2002 through 2006 were 1425, 1656, 1908, 2525, and 3079, consecutively. The prevalence rates per million populations were 10.2, 11.7, 13.8, 18.4, and 23.4, respectively. Tables 1 and 2 show incidence and prevalence of RRT for ESRD by area, 2002 and 2006.

Data from a few centers reported that causes of ESRD in patients who under-

went dialysis were glomerulonephritis (36.4%), obstructive and infective kidney diseases (24.4%), diabetic kidney disease (19.9%), hypertension (9.1%), other causes (5.2%), unknown cause (3.8%), and polycystic kidney disease (1.2%).

### Modalities of ESRD Treatment

#### *Dialysis*

Hemodialysis has become the routine medical treatment for ESRD. It is estimated that more than 250 hemodialysis units are distributed throughout the country. Data show that more than 1600 dialysis machines are now available and distributed among hemodialysis units. Hemodialysis is commonly performed twice a week for 4–5 hours per session in most ESRD patients. Dialysate fluids are mostly bicarbonate based. Most of the dialysis units offer hemodialysis only.

CAPD as an alternative dialysis therapy for ESRD is offered in 5 of the 13 centers included in this study, which use 3–4 fluid exchanges per day. This program started in Jakarta in 1999 and has been increasing slowly. In the last 3

years, the CAPD program has been developing more rapidly, and recent data show that the numbers of ESRD patients on CAPD have now reached almost 500. This is  $\approx 10\%$  of the total ESRD patients who receive HD.

#### *Kidney Transplantation*

Data concerning kidney transplantation are very limited, and they were provided by only a few centers. Kidney transplantation was first performed at Cipto Mangunkusumo Hospital, a teaching hospital of the Medical Faculty, University of Indonesia, Jakarta, in 1977. Kidney transplantation has also been performed in 3 other centers. The total number of kidney transplants performed from 1977 to 2006 in these centers was 476.

Most kidneys are obtained from living related donors, since kidneys from cadaveric donors are not fully accepted yet because of social and cultural problems, lack of a legal process, and lack of technical ability to carry out these procedures. The shortage of living donors has become a serious problem in kidney transplantation; therefore, many patients

**Table 1. Incidence of renal replacement therapy for end-stage renal disease by area, Indonesia, 2002 and 2006**

| Area           | 2002         |           |            |                           |                                       | 2006         |            |            |                           |                                       |
|----------------|--------------|-----------|------------|---------------------------|---------------------------------------|--------------|------------|------------|---------------------------|---------------------------------------|
|                | RRT Modality |           |            | Total New Patients on RRT | Incidence Rate per Million Population | RRT Modality |            |            | Total New Patients on RRT | Incidence Rate per Million Population |
|                | HD           | CAPD      | Transplant |                           |                                       | HD           | CAPD       | Transplant |                           |                                       |
| West Java      | 176          | 0         | 0          | 176                       | 4.7                                   | 886          | 33         | 0          | 919                       | 23.5                                  |
| Central Java   | 792          | 7         | 4          | 803                       | 23.0                                  | 1219         | 108        | 1          | 1328                      | 37.8                                  |
| East Java      | 255          | 0         | 0          | 255                       | 7.2                                   | 695          | 0          | 0          | 695                       | 19.5                                  |
| Jakarta        | 452          | 55        | 6          | 513                       | 61.2                                  | 659          | 96         | 10         | 765                       | 87.9                                  |
| Sumatra        | 164          | 0         | 0          | 164                       | 8.6                                   | 378          | 45         | 0          | 423                       | 22.0                                  |
| Bali           | 49           | 0         | 0          | 49                        | 15.2                                  | 137          | 19         | 0          | 156                       | 46.2                                  |
| East Indonesia | 189          | 0         | 0          | 189                       | 18.3                                  | 370          | 0          | 0          | 370                       | 34.8                                  |
| <b>Total</b>   | <b>2077</b>  | <b>62</b> | <b>10</b>  | <b>2149</b>               | <b>14.5</b>                           | <b>4344</b>  | <b>301</b> | <b>11</b>  | <b>4656</b>               | <b>30.7</b>                           |

RRT = renal replacement therapy, HD = hemodialysis, CAPD = continuous ambulatory peritoneal dialysis.

undergo kidney transplantation abroad. The cost of kidney transplantation and the requisite immunosuppressive agents and both the quantity and quality of human resources should also be considered major problems.

Data from 3 kidney transplantation centers showed that 49 ESRD patients entered a kidney transplantation program from 2002 through 2006. Kidney transplantation from emotionally related donors is now also accepted. Single center data show that of 31 kidney transplantations, 8 kidneys were obtained from spouses and close relatives (emotionally related donors), 4 from parents to children, 2 from children to parents, and the rest from siblings. Overall, 1-year graft survival is difficult to calculate because of the limited data provided in this study. From 31 kidney transplantations, 5 patients had renal

allograft loss and returned to hemodialysis, and 3 patients died with a functioning kidney allograft because of cerebrovascular disease, septicemia, or heart failure within 1 year of transplantation.

Triple-drug therapy is standard immunosuppressive therapy in kidney transplantation. The immunosuppressive drug combination consists of either cyclosporine A, azathioprine, and a corticosteroid or tacrolimus, mycophenolic mofetil, and a corticosteroid. The dose of tacrolimus or cyclosporine A is adjusted according to blood monitoring and time since the transplant and stability. Cyclosporine A levels at C0 or C2 can be measured.

#### *Financing System*

Government health insurance covers government hospital medical care, in-

cluding treatment for ESRD. Recent data show that the financial burden for ESRD treatment increased from \$5,776,565 in 2002 to \$7,691,046 in 2006. Government health insurance data in 2006 showed that 4946 hemodialysis patients and 263 CAPD patients were insured through socialized health insurance. An estimated 15 million people have benefited from this insured medical care facility. Recently, underprivileged people have also been covered by the government through the Financially Unfavorable Family Health Insurance. This program started in 2005 and was expected to cover 60 million people, and it includes ESRD treatment. In 2006, as many as 5418 ESRD patients from poor families were insured by the government.<sup>5</sup> For those included in this program, all costs for hemodialysis and CAPD with 3 fluid

**Table 2. Prevalence of renal replacement therapy for end-stage renal disease by area, Indonesia, 2002 and 2006**

| Area           | 2002         |           |            |                       |                                        | 2006         |            |            |                       |                                        |
|----------------|--------------|-----------|------------|-----------------------|----------------------------------------|--------------|------------|------------|-----------------------|----------------------------------------|
|                | RRT Modality |           |            | Total Patients on RRT | Prevalence Rate per Million Population | RRT Modality |            |            | Total Patients on RRT | Prevalence Rate per Million Population |
|                | HD           | CAPD      | Transplant |                       |                                        | HD           | CAPD       | Transplant |                       |                                        |
| West Java      | 67           | 0         | 0          | 67                    | 1.8                                    | 190          | 26         | 0          | 216                   | 5.5                                    |
| Central Java   | 579          | 3         | 18         | 600                   | 17.2                                   | 1227         | 156        | 16         | 1399                  | 39.8                                   |
| East Java      | 139          | 0         | 0          | 139                   | 3.9                                    | 326          | 0          | 0          | 326                   | 9.2                                    |
| Jakarta        | 356          | 65        | 6          | 427                   | 50.9                                   | 728          | 151        | 47         | 926                   | 106.4                                  |
| Sumatra        | 118          | 0         | 0          | 118                   | 6.2                                    | 238          | 41         | 0          | 279                   | 14.5                                   |
| Bali           | 61           | 0         | 0          | 61                    | 18.9                                   | 187          | 33         | 0          | 220                   | 65.1                                   |
| East Indonesia | 105          | 0         | 0          | 105                   | 10.2                                   | 183          | 0          | 0          | 183                   | 17.2                                   |
| <b>Total</b>   | <b>1425</b>  | <b>68</b> | <b>24</b>  | <b>1517</b>           | <b>10.2</b>                            | <b>3079</b>  | <b>407</b> | <b>63</b>  | <b>3549</b>           | <b>23.4</b>                            |

RRT = renal replacement therapy, HD = hemodialysis, CAPD = continuous ambulatory peritoneal dialysis.

exchanges are covered by government health insurance, while CAPD with 4 fluid exchanges is only covered at 80%. Costs for kidney transplantation are also covered partly by government health insurance.

### DISCUSSION

Chronic kidney disease is a public health problem for both developed and developing countries. At a certain level of renal function, the progression of kidney disease to ESRD is inevitable. Worldwide data show that >1 million ESRD patients are on RRT, while as many as 2 million more are in need of such therapy.<sup>6,7</sup> In developing countries, accessibility to RRT is still limited for most ESRD patients because RRT is expensive, especially in the absence of national insurance programs.

As reported in other developing countries,<sup>8</sup> the true magnitude of ESRD in Indonesia remains unknown. Predicted numbers of ESRD requiring RRT are not known since a national registry for ESRD has only recently been developed. Incidence, incidence rates, prevalence, and prevalence rates presented in this study are far lower than those expected because data from dialysis centers included in this study were limited. Consequently, the presented data do not represent the national data. However, results of this study indicate increasing trends of incidence and prevalence of ESRD. In this study, the incidence numbers appear to exceed those for prevalence because of high numbers of patients who die during dialysis or withdraw from the program. In this study, glomerulonephritis was the leading cause of ESRD among patients in a dialysis program, which is consistent with findings of previous reports.<sup>1</sup> A renal registry, when fully operational, would offer an

important source of information on several aspects of ESRD, including etiology, treatment modalities, and trends of morbidity and mortality.<sup>2,9</sup>

Central Board Statistics of Indonesia reported that in 2005 the total population was 219.2 million.<sup>4</sup> In 2006, government health insurance data showed that 5000 ESRD patients were dialyzed, for an estimated prevalence rate of 357 per million population. If this number reflects the true national prevalence, nearly 80,000 people would have had ESRD in 2006 in the whole country. As many as 4946 hemodialysis patients and 263 CAPD patients are insured by socialized government health insurance, while 5418 patients are insured by "Financially Unfavorable Family Health Insurance."<sup>5</sup> If the private insurance company covers 1785 patients calculated from 5 million people with the same prevalence rate, 12,412 or 15.5% of all ESRD patients requiring dialysis have been treated. The total costs of dialysis treatment have become a burden for the government. In India and Pakistan, treatment of ESRD is still a low priority for cash-strapped public hospitals, and less than 10% of all patients receive RRT.<sup>10</sup>

Most dialysis units provide hemodialysis only; therefore, dialysis choices have been offered only in those centers where both hemodialysis and CAPD facilities are available. While patients' preferences and their medical or clinical conditions are considered first in the selection of dialysis modality, the accessibility of the treatment facility and healthcare financing systems also play a role. Kidney transplantation programs are less well developed than are other modalities of treatment. The shortage of donors needs to be overcome and high success rates for this procedure achieved before prospective donors can be approached with confidence.

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