

Utilization, costs, and outcomes for patients receiving publicly funded hemodialysis in India



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Lifestyle transitions are making chronic conditions such as chronic kidney disease increasingly common in low- and middle-income countries, including India. According to the 2016 Global Burden of Disease Study, chronic kidney disease was the ninth leading cause of death in India, having risen from 15th rank in 2005 (<http://www.healthdata.org/india>). In a recent analysis of deaths in 1.1 million Indian households, renal failure was responsible for 2.9% of all deaths among 15–69-year-olds in 2010–2013, an increase of 50% from 2001–2003.¹ Currently, most patients with end-stage kidney disease (ESKD) in India die without receiving appropriate treatment.²

As countries such as India move towards universal health coverage, the health and economic burden imposed by chronic kidney disease—in particular how to take care of patients with ESKD—creates challenges for health systems. Although classified by the World Health Organization as a low priority service on the basis of cost-effectiveness,³ funding of dialysis has generated debates regarding societal willingness to pay for expensive medical care.⁴

The Rajiv Aarogyasri Community Health Insurance Scheme (RACHIS) was introduced in 2007 by the state government of undivided Andhra Pradesh (AP), India to provide free hospital care to poor households.⁵ The poor were defined as those with annual income below 60,000 Indian rupees (INR) (approximately International\$ [I\$] 3550) in rural areas and below INR 75,000 (I\$ 4438) in urban areas. Under the program, a private insurer provided health insurance and was paid in full by the state government. Beneficiaries were able to utilize hospital services through a network of public and private hospitals. Each household received coverage for up to INR 150,000 (I\$ 8876) per year, plus an extension of INR 50,000 (I\$ 2958) for those needing long-term care. By 2012, RACHIS was claimed to be providing free

care for 18.81 million households, constituting 81% of the population of AP.⁵

We studied the use of maintenance HD between mid-2008 and mid-2012 across all 23 districts of undivided AP using RACHIS claims data. In this report, we describe patterns of utilization of dialysis and outcomes for a large population of patients with ESKD.

Results

A total of 13,118 beneficiaries (1.4% of all claimants) received HD for ESKD during the study period, with 63.6% seeking care predominantly at private centers. **Table 1** summarizes the key findings on patient attributes and utilization patterns. The majority (73.4%) of patients were males, and the gender gap increased with age (**Table 2**). Approximately half of the patients were between the ages of 40 and 60 years. The mean age at start of HD was slightly lower for females (42.9 vs. 44.4 years; $P < 0.001$).

The number of centers providing HD increased from 50 in 2008–2009 to 89 in 2011–2012 (**Supplementary Table S1**). This was paralleled by an increase in uptake, as shown by the incidence of new patients accessing HD, from 29.5 per million of the population in 2008 to 69.8 per million of the population in 2012 (**Figure 1**). Overall, the number of patients who received HD for ESKD increased from 29.5 per million of the population in 2008–2009 to 122.2 per million of the population in 2011–2012.

The number of dialysis units for every 100 recipients of ESKD receiving treatment ranged from 0 to 1.89 across districts of AP, with only 6 of 23 districts having more than 1 dialysis unit for 100 residents (**Supplementary Table S2**).

A total of 5595 patients (42.6%) underwent a vascular access procedure: 3928 (29.9%) patients before and 2203 (16.8%) after initiating HD. A total of 488 patients (8.7%) underwent multiple procedures.

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A total of 15,064 hospitalizations were recorded in this population, 11,991 (79.6%) before starting HD. The majority (56%) of pre-HD hospitalizations were for medical management of chronic renal failure, either for starting dialysis or confirmation of diagnosis. After starting HD, hospitalizations were for the management of HD-related complications or for kidney transplantation.

Outcomes. Of all the subjects who started HD, 2.3% received a kidney transplantation, 17.1% were reported as dead, and 63.5% had ceased treatment of their ESKD (i.e., stopped reporting to dialysis centers). After 6 months of HD, 10.2% had died, and 36.2% ceased treatment (Table 3). The median duration that the incident population received HD was 170 days for females and 198 days for males. For patients who did not drop out, the median survival was 1320 and 1372 days for females and males, respectively (Figure 2). The hazard ratio (95% confidence interval) for the risk of death or discontinuation was 0.95 (0.92–0.99) for males compared with females, 1.005 (1.003–1.006) for each year increase in age and 1.07 (1.03–1.12) for those using services at public versus private dialysis centers.

Cost of care. The total cost of HD-related care was I\$ 63.2 million, accounting for 3.1% of all claim expenses during the study period. A total of I\$ 59.9 million was spent on HD and I\$ 4.26 million on vascular access procedures. An additional I\$ 3.26 million was spent on hospitalizations for other indications in these patients. The mean annual expenditure per patient on HD-related care was I\$ 4821 (Supplementary Table S3). In aggregate, HD-related expenditure as a proportion of all RACHIS claims

increased 7-fold, from 0.75% in 2008 to 5.2% in 2012 (Figure 3). Supplementary Tables S4 and S5 show details of indications for hospitalization and associated costs.

Discussion

This is the first large-scale study to present population-based data on utilization of HD and outcomes of care for ESKD in India. Our data came from more than 68 million people who were eligible to receive free care, constituting more than 80% of the population in the undivided AP.

The year-on-year increase in uptake in treatment suggests that programs such as this are making inroads in addressing the high unmet need for dialysis, albeit at the cost of a significant economic burden on the health system.

A notable finding is the poor survival and high drop-out rate, with only 53% patients continuing dialysis for >6 months. Even the dropout and transplant-censored survival was below the global standards. According to the United States Renal Data System Report, the expected remaining lifespan on dialysis is approximately 10.5 years for dialysis patients 40–44 years of age and approximately 5.5 years for those aged 60–64 years.⁶

A recent systematic review from Africa⁷ suggested high mortality and dropouts among patients who received dialysis for ESKD. Overall, only approximately 10% of African adults with incident ESKD continued dialysis for more than 3 months, with patients stopping dialysis after a mean of 6.5 sessions only. Only a minority of patients received financial support for their dialysis, unlike in the present report.

The high dropout rates, most of them early in the course of treatment, deserve closer examination. Because we were able to track all unique patients across different dialysis facilities, the likelihood that any patient would be continuing dialysis elsewhere or received a transplant using their own funds either within or outside the jurisdiction of RACHIS is extremely low. Therefore, such dropouts can be safely assumed to have culminated in death. These data are consistent with previous single-center reports from India.⁸ Finally, it is possible that some patients with acute kidney injury were miscoded as having ESKD but recovered kidney function sufficiently to discontinue dialysis.

Given that treatment through this program was provided without charge, factors other

Table 1 | Patient characteristics and HD utilization details

| Characteristic | Value |
|--|--------------------------------|
| No. of beneficiaries who received HD | 13,118 |
| Annual incidence (per million of the population) | 49.2 (20.8–77.5) |
| Prevalence (per million of the population) | 73.7 (09.3–138.0) |
| Males (%) | 73.4 (72.6–74.1) (n = 9621) |
| Mean age (yr) | 44.0 (43.8–44.3) |
| Males | 44.4 (44.2–44.7) |
| Females | 42.9 (42.5–43.4) |
| No. of days receiving HD | |
| Males | 198 (46–393) |
| Females | 170 (42–386) |
| No. of HD sessions | 40 (20–110) |
| Percentage of patients utilizing >60% of HD at private hospitals | 63.64 (62.80–64.46) (n = 8348) |
| Percentage of patients receiving vascular access procedure | 42.65 (41.80–43.50) (n = 5595) |

HD, hemodialysis.

Values median and (25th–75th percentile) unless otherwise noted.

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