Cost of Hemodialysis in a Tertiary Care Hospital in North India

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ABSTRACT

BACKGROUND: Chronic kidney disease (CKD) is a world wide public health problem with significant health consequences and involvement of high cost on treatment world wide. Although renal transplant is a cost effective treatment option for ESRD, use of hemodialysis in patients with ESRD patients remains one of the most resource intensive and expensive therapeutic intervention.

OBJECTIVE: To estimate cost of hemodialysis treatment for patients with ESRD that would help in making policy decisions and enable cost efficient utilization of ESRD programme and hemodialysis.

METHODS: 58 patients with ESRD on chronic hemodialysis were incorporated in the present study at a tertiary care teaching hospital between January 2010 to December 2010. Patients who survived less than 3 months after commencement of treatment were excluded.

RESULTS: Mean age of the study patients was 46.4 ± 8 in yrs. Among the 54 patients studied 51 % were male. 86% of patients received three sessions of hemodialysis weekly, with duration per session varying between 2 - 4 hours. Average cost was Rs. 2001.84 per session. Estimated total annual burden was Rs. 209449.10 per patient. Average cost borne by hospital was Rs. 951.84 per session/patient (47.55 % of cost borne by the patient); cost borne by hospital per patient per year was Rs. 123647.70.

Principal expenses (% wise) were: staff salary cost 20.84 %, instrument cost (purchased locally from market) 32.50%, salary cost 20.84%, and rental cost 18.20 %.

CONCLUSION: The costs estimated in this study comparable with national average cost of hemodialysis in India but lower as compared to that in other SARC countries; approaches to reduce cost further are needed. JMS 2012;15(1):47-50.

Key Words: Fixed cost, variable cost, hemodialysis, cost centers, depreciation, cost per session

Chronic kidney disease (CKD) is a world wide public health problem with significant health consequences and involves high cost of treatment world wide. CKD patients often delay treatment due to lack of noticeable symptoms associated with renal disease as well as ignoring these symptoms. This usually results in decline of kidney function which

ultimately leads to End Stage Renal Disease (ESRD).¹ Although Renal transplant is a cost effective treatment option for ESRD,² use of Hemodialysis in patients with ESRD remains one of the most resource intensive but expensive therapeutic intervention in India.³ Shortage of kidneys transplantation and the increase in demand for RRT will have to be met by dialysis. Of the dialysis modalities currently in use HD places a higher demand especially trained staff. Dialysis has been found reasonably effective at sustaining life in the majority of patients with ESRD.³ Patients with ESRD must rely on dialysis for the remainder of their lives unless they undergo kidney transplantation. Additionally growing number

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of ESRD patients will devour a greater proportion of health care budget. The present study is aimed at determining the cost per session of hemodialysis and annual economic burden of hemodialysis on patient and Hospital. An accurate estimate of cost of Hemodialysis treatment for patients with ESRD would help in making policy decisions and enable cost efficient utilization of ESRD programme (HD), most common treatment modality.

Methodology

A prospective study at Hemodialysis Centre of a tertiary care Teaching Hospital (Sher-i-Kashmir Institute of Medical Sciences, Srinagar, India) was conducted between January 2010 to December 2010. Patients with ESRD and who underwent hemodialysis, were incorporated in the study. Patients who survived less than 3 months after commencement of treatment were excluded. Relevant data was collected by using a predesigned proforma and semi structured interview of the patients and staff at hemodialysis centre was conducted. Case records and electronic data base of hospital were also examined for supplementing the data.

The variables recorded for cost analysis were:- (Direct and Indirect costs)

Cost of Laboratory investigations

Cost of instruments purchased locally from market

Cost of Drugs purchased from market

Cost of diet

Staff salaries (Physician, technologist etc.)

Average variable cost was calculated as total variable cost divided by total number of dialysis sessions during the year of study.

Non medical Supply cost calculated were:-

Electricity cost, cost of water, sanitation cost, Linen & Laundry, building cost after depreciation plus maintenance and equipment capital cost after depreciation plus maintenance.

Data was scientifically organized and statistically analyzed to identify major cost centres and important variables determining cost of services. A descriptive statistical method to describe demographic variables and disease factors was used. A linear regression model was used to examine the effects of risk factors on variable costs for dialysis patients.

Results

58 patients were incorporated in the present study. Mean age of the study patients was 46.4 ± 8 in years. Among the 58 patients studied 51% were male. Two patients expired during study and two patients were lost to follow up. Eighty six percent (n=50) of patients received three sessions of HD weekly with duration per session varying between two to four hours (average 3 hours). The breakdown of costs incurred are shown in table 1 as under :-

Discussion

The exact cost of RRT in developing countries is hard to estimate and varies with the prescription and the way a unit is set up. The overall treatment cost although less in developed countries because of lower staff salaries and the low cost of drugs is still 10-20 times higher than the per capita gross national product and remains out of reach of most of the Hemodialysis population.

As per December 2007 index Rajya Sabah , per capita income in India was 20734 per annum 26% of total population live below poverty line with daily earning Rs 20/-only. Government spends barely US \$ 8 per capita on health.⁽¹⁾

Chronic kidney disease (CKD) is a world wide public health problem. Although Renal transplant is a cost effective treatment option for ESRD, use of Hemodialysis in patients with ESRD remains one of the most resource intensive and hence expensive therapeutic intervention in India. India has 950 nephrologists 700 dialysis centers, 4000 dialysis machines and 20,000 patients undergoing dialysis at these centers.¹ These centers are owned predominantly by private sector and are hence concentrated in cities. Government hospitals admit patients on the basis of severity of disease and hence patients on maintenance dialysis are forced to visit to private hospitals.⁴

Cost of each Hemodialysis session in India varies from RS 150/- in Government hospitals to Rs 2000/- in some corporate hospitals.¹ Average national cost of each session of hemodialysis in India is Rs. 1,100/-.^{1,2} Monthly cost averages to

Table 1. Showing breakup of cost incurred per session of Hemodialysis

Item	Cost per session in Rs.	Total Annual cost	% of total cost
Cost of lab investigations	90.00	11700.00	4.50
Cost of instruments purchased	650.00	33800.00	32.50
Cost of drugs purchased	250.00	32500.00	12.50
Cost of disposables	15.00	1950.00	0.75
Staff salaries physician, technologist	416.68	54080.00	20.84
Cost of hemodialyzer	150.00	19500.00	7.5
Total	1571.68	153530.00	
Non Medical Supply Cost			
Building cost after depreciation @ 1% of capital cost annually 920/sqft (civil engg records SKIMS)	364.10	47330.30	18.20
Maintenance cost @ 15 /sq feet (CPWD memo)	6.0	780.0	0.35
Cost of equipment after depreciation @10 % of capital cost annually	52.20	6786.00	2.6
Maintenance cost @ 5 %	3.08	400.40	0.15
Electricity 750/- per kilowatt, Water @ 120 liters per session	1.08	140.40	0.05
Rs 5.50 per tape	1.0	130.0	0.05
Sanitation, linen and laundry cost	2.70	351.00	0.15
Total	430.16	55918.10	
	2001.84	209449.10	

Table 2. Cost borne by Hospital

Item	Cost per session in Rs.	Total Annual cost	% of total cost
Cost of lab investigations	90.00	11700.00	9.47
Cost of disposables	15.00	1950.00	1.5
Staff salaries physician, technologist	416.68	54080.00	43.89
Building cost after depreciation @ 1% of capital cost annually 920/sq.ft (civil engineering records SKIMS)	364.10	47330.30	38.31
Maintenance cost @ 15/sq ft (CPWD memo)	6.0	780.0	0.637
Cost of equipment after depreciation @10 % of capital cost annually	52.20	6786.0	5.47
Maintenance cost @ 5 %	3.08	400.40	0.31
Electricity 750/- per kilowatt, water @ 120 liters per session Rs 5.50 per tape	2.08	270.00	0.21
Sanitation, linen and laundry cost	2.70	351.00	0.3
Total	951.84	123647.70	

Cost borne by Patient	Rs. 1050.00 per session
Total Annual economic burden on patient could be	Rs. 85800.00
Cost borne by Hospital	Rs 951.84 per session/patient (47.55 % of cost per session)
Annual economic burden borne by Hospital per patient/year	Rs 123647.70
Principal expenses borne by Hospital Salary cost	43.89 %
Building cost	38.31 %

FIGURE 1: Percentage cost borne by Hospital and patient per session

Rs. 12,000/-and yearly Rs. 1,40,000/-. This is cheapest in world yet more than 90% of the Indians cannot afford it. As 26% population live below poverty line where daily earnings is Rs. 20/-.¹

The results of our study reveal that cost of hemodialysis per session is Rs. 2,001.84 amounting to annual burden of Rs. 2,09,449.10 approximately. Cost of hemodialysis in Kashmir is higher than average cost in other states of India (Rs. 1100/-per session) but lower than other SAARC countries. The reason

FIGURE 2: Percentage of principal cost Per session of hemodialysis**Table 3. Risk factors associated with increased cost of Hemodialysis**

		Number	Percentage
Gender	Male	30	51.71 %
	Female	28	48.27
Disease	Hypertension	23	42.6
	High lipid Levels	18	33.3
	Cardiovascular Disease	12	22.2
	Diabetes Mellitus	36	66.7
	Anemia	41	76.0
	Cerebrovascular Disease	4	7.4
	Cancer	2	3.7
	Urinary tract infection	3	5.6
	Chronic obstructive pulmonary disease	5	9.2
	Liver Function disorder	3	5.6

was that our patients had to buy instruments, hemodialyzer and other drugs from market as the same were not available in hospital during the study period.

In Iran the annual cost of dialysis is similar to other developing countries but significantly less than the cost in developed countries. Cost of each session of hemodialysis in Iran was US 74 dollars.⁵

Lai reported in a study that age, gender, DM ,CVS disease are risk factors for hemodialysis outcome and cost.⁷

True differences in cost can be as a result of various factors including different management protocols, age, other co-morbidities like diabetes mellitus, hypertension obstructive uropathy, urinary tract infection, pregnancy etc.⁸ Other factors can be labor costs and cost of drugs etc. Chang used Anderson model to analyze the predisposing factors enabling and need factors of 2385 patients who continued hemodialysis treatment for over 2 years. The results showed that age gender, diabetes, cardiovascular disease, decreased albumin, urbanization are associated with significant differences in predicting the health expenditure for the following year and female patients utilize more health resources than males.⁶ Most studies reported diabetes as one of the most effective predictive of the cost of medical expenditure for dialysis.⁹

Arora reported that female patients tend to have more physician visits high out patient expenditure and length of stay than males.¹⁰ However, our study revealed more utilization of hemodialysis services by male gender in the percentage of 51%.

Tabish SA, Ajaz Mustafa and Rangrez RA in a study conducted in a tertiary care hospital in India reported 61.48 % cost on salary, 12.81% on drugs and 18.67% on other activities of total budget.¹¹ Our study revealed 20.84% cost on salary, 12.84% cost on drugs, 32.50 % cost on instruments and 18.20 % on building rental. Principal expenses born by hospital were in the percentage of 43.89 % on salary and 38.31 % on account of building rental.

Limitation

The shortcomings of this study are that Values for overhead costs may not have fully reflected the true overhead cost. A subjective bias may have existed. Secondly labeled prices are not generally charged from patients and these patients get discounts on labeled prices because of the rapport developed with chemists because of chronicity of disease.

Despite these shortcomings we believe that the results of our analysis give a good indication of the magnitude of true cost.

Conclusion

Results of this study could enable health policy makers to design a fair and more convincing reimbursement system for dialysis procedures in future.

Change in dialysis delivery could lead to a more efficient resources utilization. Since the cost of Peritoneal Dialysis is lower, from the public health care providers view, either more patients could be treated with in a fixed budget or the same number of patients could be treated at a lower cost.

In our single centre study, we found that the annual cost of dialysis is comparable to other states of India and cheaper than other SAARC countries. Approaches to reduce cost further are needed by:-

- 1) Reduce number of ESRD patients by preventing progression to Chronic Kidney Disease by timely and appropriate treatment of Diabetes, Hypertension, Glomerulo nephritis, obstructive Nephropathy, UTI, Vasculitis and pregnancy.
- 2) Continuous Peritoneal Dialysis can be utilized as a cost reduction measure in selected group of patients.
- 3) Kidney transplant is most cost effective treatment mode for ESRD.
- 4) Hemodialysis can reduce transportation charges and is

better option in certain patients. This will also reduce Work days lost on treatment.

- 5) Insurance reimbursements is an option to meet out cost of treatment, this will help both patient and hospital in a long way especially kidney transplant.

Satellite units, free standing centers and charitable NGO owned hemodialysis centres can in a long way prove as cost reduction options.

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