DIFFICULTY IN ACHIEVING HEMODIALYSIS ADEQUACY IN HEMODIALYSIS UNIT, Dr. SOETOMO HOSPITAL, SURABAYA, INDONESIA

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ABSTRAK

Mempertahankan hemodialisis yang memadai di unit hemodialisis diperlukan bagi kelangsungan hidup pasien dialisis. Namun, tidak pasien di RSUD Dr Soetomo tidak begitu saja mampu memperoleh layanan hemodialisis yang memadai. Terdapat berbagai hambatan yang bisa menjelaskan mengapa pasien tidak mampu mematuhi dosis yang diperlukan. Dalam studi ini dibahas pengaruh frekuensi ketidakpatuhan pasien dengan hemodialisis, frekuensi perawatan yang terlewatkan, dan beberapa ukuran hasil lainnya. Penelitian ini melibatkan 508 pasien unit hemodialisis yang mendatangi unit hemodialisis RSUD Dr Soetomo dari 1997 hingga 1999, 212 di antaranya dilaporkan meninggal, sehingga evaluasi dilakukan menurut jenis kelamin, usia, penyakit yang mendasari, dan kondisi komorbiditas. Lamanya waktu yang mereka habiskan di bawah hemodialisis juga dihitung dan dianalisis. Hal ini menunjukkan jumlah kematian selama tahun pertama pengobatan adalah tinggi, terutama pasien diabetes. Bahkan 110 pasien (52%) meninggal dalam waktu kurang dari 12 minggu setelah memulai pengobatan hemodialisis. Rujukan terlambat juga menyumbang untuk hasil yang buruk. Beberapa aspek yang mungkin untuk menjelaskan hasil yang buruk diidentifikasi dan dianalisis, yaitu demografi dan struktur sosial-ekonomi pasien dan organisasi dari sistem perawatan kesehatan di Indonesia. Penelitian tambahan juga diperlukan sehingga pasien dialisis dapat memperoleh dosis dialisis yang memadai seperti yang kita harapkan untuk meminimalkan angka kematian.

ABSTRACT

Maintaining adequate hemodialysis in the hemodialysis unit is necessary to the survival of dialysis patients. However, it is not such a simple case that the patients under treatment of Soetomo Hospital could achieve adequate hemodialysis. There have been found numerous obstacles that could explain why those patients were unable to comply with the required dosage. In this study, we accounted the frequency of the patients' non-compliance with the hemodialysis, the frequency of treatments that the patients skipped, and some other outcome measures. This study involved 508 patients attending the hemodialysis unit of Soetomo Hospital from 1997 to 1999, 212 of whom were reported dead, and thus were evaluated according to their gender, age, underlying disease, comorbidity conditions. The length of time they spent under hemodialysis was also calculated and analyzed. The finding was that the number of mortality during the first year treatment was high, especially of the diabetic patients. Even 110 patients (52%) died in less than 12 weeks after starting the hemodialysis treatment. The late referral also accounted for the poor outcome. Some aspects which were likely to explain the poor outcome were identified and analyzed. They were the demographic state and the socio-economic structure of the patients and the organization of the health care system in Indonesia. Additional studies are also needed so that the dialysis patients can achieve adequate dialysis dose as we expect to minimize the mortality rate of dialysis patients.

Keywords: *hemodialysis, compliance, diabetic patients, demographic state, socioeconomic structure, health care system, dr Soetomo Hospital*

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INTRODUCTION

The number of dialysis patients able to survive in Soetomo Hospital is considered low. Several reports have documented that in U.S, Europe and Japan, the number of dialysis patients who were able to survive is higher. In other words, the mortality rate of patients under dialysis treatment in Soetomo Hospital is higher. The factors that contribute to this discrepancy are the disease suffered by the dialysis patients that will cause End Stage Renal Disease (ESRD), the utilization of treatment modalities, the poor health care system with its poor dialysis facility, the poor quality of predialysis care, the incompatible use of membranes (cellulose membranes), the absence of administration of the erythropoetin agent, the presence of hypertension-cardiovascular disease, the disturbances of Ca-P metabolism, and malnutrition.

In fact, all of the above mentioned factors have become the main problem in our unit. Charra has suggested that the long duration of dialysis which can cause better fluid removal and control blood pressure will positively affect the survival rate. This could not happen in our unit as a large number of our hemodialysis patients were not adequately dialyzed that they underwent overload syndrome, hypertension and had dominant uremic symptoms. Therefore, many of them died during the first three months of dialysis and the cardiovascular failure was noted as the major cause of death.

The non-compliance of dosage of the prescribed quantity of dialysis which commonly happened among the dialysis patients treated in Soetomo Hospital becomes one of the major obstacles to achieve optimum dosage. The patients' non-compliance, therefore, can negatively influence clinical outcomes. The reason which could explain why the dialysis patients shortened and skipped the prescribed quantity of dialysis is identified as the patients related causes, i.e., the patients personal problem in Finance and in transporting themselves to the hospital for dialysis treatment. The paper is aimed to describe the difficulty of our unit to achieve hemodialysis adequacy.

Present Status

The Republic of Indonesia which consists of more than 3,000 islands, with its area of 1,919,317 square km, at the1990 census, has 179.4 million of population (90 million females and 89.4 million males). The fact that Indonesia with its enormous population and low Gross Domestic Product (GDP) leads a condition in which the patients of renal disease may have limited access to have Renal Replacement Therapy (RRT).

A survey in the United States stated that the number of patients with ESRD under regular hemodialysis treatment has increased sharply during the past 30 years. Comparatively, in Indonesia, of which socio-economic structure is not well-developed, the patients with ESRD not only have increased in numbers, but also have more complicated problems to comply with the prescribed regular hemodialysis treatment. The number of hemodialysis patients hospitalized keeps increasing and so does the number of patients with multiple chronic comorbid diseases.

Dr. Soetomo Hospital which is located in Surabaya, East Java – one of the 26 provinces of Republic Indonesia of which population is over 30 million also serves as a referral center for patients from the eastern part of Indonesia. The hemodialysis unit in Soetomo hospital provided in a 350 meter square building serves more than 120 ESRD patients every month. There are 10 hemodialysis machines in two shift-operation per day, run by 3 nephrologists and 8 trained nurses and 2 technicians. The ratio of the nurses to the patients is one to six. Cellulose membranes are used as the dialyzer membranes and acetate dialyses are mostly used for all hemodialysis patients. A re-use dialyzed program is also actively run in the hemodialysis unit of our center.

MATERIALS AND METHODS

This paper used a retrospective study as the patients who were receiving HD therapy had the treatment in a period of time between January 1997 and December 1999. The recorded data of 212 patients who died during that time were analyzed; the dialysis and hospital records of the patients were reviewed. The data of the patients are on the subject of demographic characteristics, primary renal diagnosis, type of vascular access, the date of starting dialysis, gender, primary health care insurance provider, results of laboratory test and patient outcomes, such as hospitalization, mortality and comorbidity condition including artherosclerotic heart disease, hypertension, coronary artery disease, diabetes mellitus, peripheral vascular disease, and cerebral vascular disease.

Of 508 patients attending the hemodialysis unit from 1997 – 1999, 212 patients died (142 males and 70 females). The following criteria were used in analyzing the hospital recorded data. (1) The primary renal diagnosis was generally based on clinical course, laboratory and X-ray findings. (2) Patients with diabetic nephropathy invariably had retinopathy and/or insulin dependence prior to the introduction of dialysis. (3) Myocardial infarction was diagnosed by history, physical examination, ECG and serum enzyme analysis; Sepsis was diagnosed by positive blood cultures associated with leukocytosis or leukopenia, hyperthermia or hypothermia, or acidosis. (4) Sudden death was identified in those patients who had cardiac arrest while on dialysis or in those who were found dead at home within an interdialytic period. Unattended deaths in the hospital were not included in this group. (5) Patients with coronary heart disease and peripheral or cerebral vascular disease were grouped under atherosclerotic vascular disease. (6) Patients diagnosed with diabetic glomerulosclerosis or with evidence of glucose intolerance requiring hypoglycemic agent were categorized as having diabetes mellitus. (7) Hypertension was considered present if the blood pressure was greater than 160/100 mmHg or if the patient was already on antihypertensive medications.

A large number of indigent patients without medical insurance that could not adequately receive

hemodialysis treatment as they quit the treatment prematurely due to finance reason were not accounted in this group as the database of these patients were not available. In other words, uninsured patients unable to pay for a chronic maintenance program or patients who died of ESRD before hemodialysis treatment are not included for the absence of their database. On the contrary, the patients covered by medical insurance which was mostly supported by the government could provide more complete database so that it enabled us to complete our analysis in this study.

Hemodialysis patients are considered "the skippers" when they could not fulfill the frequency of treatment more than one time in a month. Hemodialysis patients are considered "the shortened" when they reduce the time of the prescribed treatment more than 10 per cent. It is suggested as late referral when the implantation of vascular access at the initiation of dialysis was less than a month. Demographic, clinical and laboratory data at the time of initiating dialysis were reported using descriptive statistics (mean + standard deviation).

RESULTS

Our data reported that of the 508 patients treated from January 1997 to December 1999, 212 patients (142 males and 72 females) died. The mean age of the patients who died was 49.6. 110 patients (52%) died less than 12 weeks after starting the dialysis. The primary renal diagnosis of 508 patients was grouped into two: Non-Diabetic Mellitus patients (430 patients; 170 of whom died) and patients with Diabetes Mellitus (78 patients; 42 of whom died) (Figure 1).

Evaluating the comorbidity of the 212 patients treated in our centre, there were found that the occurrences of cardiovascular diseases, diabetes mellitus, hypertension were 144, 78, 182 respectively. It was shown that before initiating hemodialysis the patients showed a major indication of nausea and vomiting (14 patients; 13.2%), severe weakness (32 patients; 30.2%), volume overload (56 patients; 52.8%), and miscellaneous (4 patients; 3.8%). The baseline laboratory data reported that at the initiation of hemodialysis the mean blood urea nitrogen concentration was 119 $\pm$ 28 mg/dL, the mean serum creatinine concentration was 15 $\pm$ 7 mg/dL, and the mean serum albumin concentration was 3.6 $\pm$ 0.89/dL, while the majority of patients were anemic with the mean hemoglobin level of 6.9 $\pm$1.59/dL.

The frequency of late referral of both male and female patients was 74% (157 patients: 88 males and 69 females). The length of hospital stay of hemodialysis patients was considered high that a patient arranged 24 days to being hospitalized. The frequency of hospital admission of Non-DM patients was that 53.01% of the number of non-DM patients was one time admitted to the hospital, 19.8% two times, 20.48% three times, 6.02% four times and 1.2% five times (Table 2). The frequency of hospital admission of DM patients showed that 30.34% of the number of DM patients was one time admitted to the hospital, 30.34% two times, 8.7% three times, 17.39% four times and 4.3% five times (Table 3). From the data, we calculated that the average of the frequency of hospital admission of both Non-DM and DM patients was 2.4 times per year.

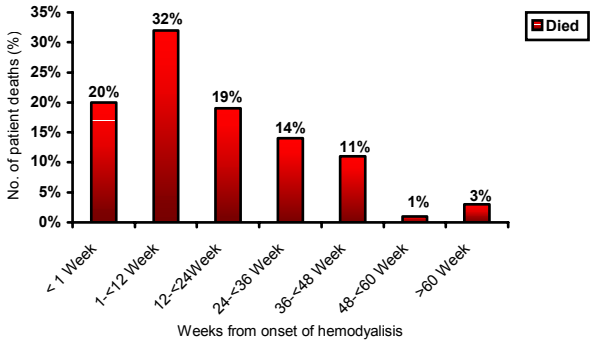


Figure 1. Trends in Adjusted First Week Death Rates for Hemodialysis Patients

The major cause of death of the 212 patients was cardiovascular disease or acute myocardial infraction with or without congestive heart failure and/or arrhytmia (82 patients, at the mean age of 50). Septicemia was considered as the other cause of death of 65 patients at the mean age of 47. Then, sudden death at the dialysis patients or unattended at home were also reported common among the dialysis patients. This happened to 65 patients at the mean age of 56 (Table 1).

Table 1. Causes of Death of 212 Patients

Causes	Age, years, mean	Frequency	
		No. of Patients	%
Cardiovascular	50	82	39
Sepsis Infection	47	65	30.5
Sudden Death	56	65	30.5

Table 2. The Frequency of Hospital Admission of Non-DM Patients

Frequency	No. of Patients (%)
1 time	53.01
2 times	19.80
3 times	20.43
4 times	6.02
5 times	1.20

Table 3. The Frequency of Hospital Admission of DM Patients

Frequency	No. of Patients (%)
1 time	30.43
2 times	30.43
3 times	8.70
4 times	17.39
5 times	8.70
6 times	0
7 times	0
8 times	4.3

Table 4. The Frequency of Dialysis on 212 Patients who Died

Frequency	No. of Patients (%)
10 times	7.10
6 times	23.54
4 times	61
< 4 times	8.3

Ninety-five percent of 212 hemodialysis patients was obtained from government funded insurance, while the rest was uninsured (self-pay). The frequency of dialysis on 212 patients who died was 7.16% of the those patients had 10 times dialysis treatment per month, 23.54% 10 times, 61% 4 times, and 8.3% less than 4 times (Table 4). According to our data, the number of patients that shortened and skipped the dialysis treatment because of transportation was 40.3%. It was reported that 86.1% of the patients were driven by others and 13.9% drove themselves.

DISCUSSION

Mortality rate is a measure of hemodialysis outcome that can be learnt as a standard to evaluate the adequacy of maintenance hemodialysis. The factors that influence the high mortality rate are the disease causing ESRD suffered by the patients, the utilization of treatment modalities, poor health care system with its poor dialysis facility, poor quality of predialysis care, the use of membrane (cellulose membranes), the absence of administration of erythropoetin agent, the presence of hypertension-cardiovascular disease, the imbalance of Ca-P metabolism and malnutrition.

HD adequacy can be evaluated by measuring kt/v, BUN, PCV, blood pressure, weight, albumin, hospitalization and quality of life. It can be seen in the patients' symptoms. In this study, we evaluated HD adequacy by measuring BUN, serum creatinine, PCV, haemoglobin, albumin, blood pressure, and also such symptoms as uremia, overload syndrome, weakness, nausea and vomiting. We did not calculate kt/v because we lacked of immediate laboratory evaluation. The problem was in financing the laboratory evaluation that most of our patients could not afford to pay as they were from low income population.

In this study, we reviewed the demographic, clinical and characteristics of the patients who died. The retrospective data were then processed to determine whether the dose of dialysis was adequate or not. Outcome indicators at the beginning of dialysis were used as the indicators of the predialysis care. Numerous obstacles in achieving the adequate dose are evaluated. In multi-center study, 3% of inadequately delivered hemodialysis treatments were caused by non-compliance, wide variation was found in the type of barriers to adequate dialysis, depending on the facility (Sehgal et al. 1998).

In our unit, one of the numerous barriers the patients could not comply with the prescribed quantity of dialysis was the non-compliance in terms of shortening the time and skipping the number of treatments. This ranged from 8.3% to 61.1% while in a report of another study showed that it ranged from 5.1% to 11% (Sherman 1994, US Renal Data System 1997, DeOreo 1997).

The reasons of the non-compliance would be discussed in the following. (a) The poor health care system with its poor dialysis facility. Soetomo hospital is a hospital run by public authorities that has a very limited government funds. This condition made our unit which served more than 120 ESRD patients every month and had 10 units of hemodialysis machines with 3 nephrologist and 8 trained nurses had to work in 2 daily shifts, and the ratio of nurse to patient was one to six. Besides, hemodialysis treatment in our unit was not adequately customized for each patient, but it was in a package with acetate dialysate and one type of dialyzer for all cases. We also faced a problem of water treatment monitoring that it could not be carried out as

frequently as indicated. (b) Transportation. Transportation became one of several causes why the patients skipped and shortened the treatment. The majority of hemodialysis patients in our unit relied on public transportation in transporting themselves to and from the dialysis unit of Soetomo Hospital. There was a positive correlation between transportation problem and the number of skipped treatments in the United States that 66.8% of the patients was driven by others, 7.9% relied on the public transportation, such as bus, subway, train and taxi, and 25.3% drove themselves or walked (US Renal Data System 1997). Meanwhile in our data, 86.1% of the patients were driven by others (relied on public means of transportation) and 13.9% drove themselves. The number of patients who shortened and/or skipped their treatment because of transportation problem was 85 (40.3%). (c) Reimbursement. Reimbursement may play a role in the inadequate HD delivery as well as low incomes and low educational levels, and limited access to health care. In fact, the number of patients with government-funded insurance (95%) greatly exceeded the number of those without insurance. As a result, a number of patients who were not covered by insurance would miss the dialysis treatment. Uninsured patients who were unable to pay for services would not be able to receive chronic maintenance program. We assume that the quantity and the quality of the therapy is totally dependent on the health care system of the country. It is obvious that when the gross domestic product of this country is low, the percentage of subjects with ESRD receiving HD treatment is low. We believe that this happened as a large number of patients who were not covered with medical insurance had dropped-out from out hemodialysis unit. It seemed that the main reason for the high mortality rate of dialysis patients in Soetomo Hospital was insufficient dose of dialysis delivered to the patients due to the high cost of dialysis and being uninsured.

To solve the problem of dialysis cost, our center takes a series of action, such as reducing the dosage of dialysis, curtailing the duration of dialysis, providing a limited size of the hemodialyzers and dialysates, also applying the re-use dialyzers.

The overall cost of HD treatment is difficult to quantify. Although the patients are covered by insurance, they may still have a financial problem that they could not afford to pay the transportation fare, transporting them to and form Soetomo Hospital which is located far away from their house. The cost for transportation cannot be precisely calculated, but it may be higher than what the insurance provides. Besides, the loss of working hours incurred by the patients and their relatives would add the economic burden for the patients.

Many investigators have reported that the frequency and duration of hospitalization has been used as a measure of morbidity or as an objective measure of quality of life.1 The increased rate and duration of initial hospitalization is reasonable to be closely related with the late referral. The delayed referral to a nephrologist will most likely result in emergency dialysis followed by higher morbidity and mortality. The frequency of hospital admission of the selected population of 212 HD patients who died was still high. And so was the length of hospitalization. The average hospitalization of each patient was 2.4 times a year (ranged 1 – 8 times) and the average period of hospitalization of each patient was 24.2 $\pm$ 17.4 days per year (ranged 1 – 93 days).

The number of mortality of HD patients treated during the first three months was high, particularly of the diabetic patients. Although we were unable to examine the outcome of late initiation of dialysis, however, our data show that the patients in our center had suffered from malnutrition for a prolonged period before starting dialysis. We believed it to be caused by nausea or vomiting that we found it occurred for 3 months and/or more among our HD patients. Besides, we also found that the patients had a high incidence of comorbidity conditions. When the patients started the first time dialysis, we found many of them have left ventricular hypertrophy (LVH), ischemic heart and cardiac failure (Iseki 1994, Collins 1994). 85 % of ESRD patients in our unit was reported having LVH. Appropriate medical care before suffering from ESRD and early referral to the nephrologist would be very helpful to prevent such condition to happen.

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