

MANAGERIAL CONTROL OF THE HEMODIALYSIS CENTER FROM THE POINT OF VIEW OF HEMODIALYSIS NURSES

Fitri Arofiati

Master of Nursing Program, Universitas Muhammadiyah Yogyakarta Indonesia

Tel: +6281392462014, E-mail: arofiatifitri@gmail.com

Abstract

According to the Centered States Renal Data System (USRDS) 2001 report, over 65,000 ESRD patients die each year. The unadjusted annual death rate for ESRD patients in recent years has ranged between 20 and 22%. For nurses it has become akin to working on a “production-line” to meet the need for treatment. Increasing demand has required the nurse to become technologically skilled often to the detriment of caring. What emerges is the nurse enframed by technology, where the caring for nurses is focused through the demand of getting the patient through.

The aim of this study was to assess managerial control of the hemodialysis center of PKU Muhammadiyah hospital Indonesia, in term of access, entry and maintenance of the environment of care from the point of view of nurses.

Descriptive research method was employed to assess 12 hemodialysis nurses who were totally selected and recruited from the center. The questionnaire served as the major research instrument on this study.

The hemodialysis nurses indicated that hemodialysis center of PKU Muhammadiyah Yogyakarta Indonesia has been prepared well for all of the aspects of access, entry and maintenance of the environment of care in both procedure and managerial control. Most of nurses and health care provider are aware to provide best care for their patients.

It is significantly important to assess managerial control as part of nursing care practice based on the point of view of nurses as the evaluation process. The result can be as data base to improve quality of nursing care.

Keywords: managerial control, access, entry, maintenance of the environment of care

Introduction

Renal disease is globally recognized today as one of the top leading health problems. The number of patients with Chronic Renal failure (CRF) and subsequent need for renal replacement therapy (RRT) has reached epidemic where there is less availability of and access to dialysis services, and is proportion and is anticipated to rise further. It is estimated worldwide that over 1.1 million patients with end-stage renal disease (ESRD) currently require maintenance dialysis, and this number is fast increasing at a rate of 7% per year. If the trend continues, the number will exceed 2 million by 2010. This figure excludes developing countries therefore an underestimate of the true demand.³

End-Stage Renal Disease (ESRD) is the seventh leading cause of death in Indonesia, making hemodialysis an ever-increasing treatment modality. The number of people requiring hemodialysis and transplantation has increased significantly in Indonesia during the past decade. Individuals who developed ESRD must confront many life-style challenges that present a variety of choices related to diet, medication, and activity.⁴

In Yogyakarta, one of the big cities located at Java Island Indonesia, the number of patients with Chronic Renal failure is increasing. There are 4 big hospital including Pembina Kesejahteraan Umat Muhammadiyah Yogyakarta that have Hemodialysis service. As one of the big private hospitals in Yogyakarta, it has about 100 patients every month receiving hemodialysis therapy. Hemodialysis is a complicated, demanding, and expensive treatment. It is an integral part of a transplant program. It may be necessary to prepare the patient for surgery, maintain him through post-operative oliguria, or sustain his life following transplant failure.⁵ To reduce the risk of CRF, the patient should be closely observed and should receive adequate treatment to control or slow the problems before they progress to ESRD. Better understanding of these patients' choices, and the factors that influence them, is crucial if health care providers were to assist these patients with difficult and stressful treatment decisions.⁶ For nurses it has become akin to working on a "production-line" to meet the need for treatment. Increasing demand has required the nurse to become technologically skilled often to the detriment of caring. What emerges is the nurse enframed by technology, where the caring for nurses is focused through the demand of getting the patient through.⁷

This study sought to assess managerial control of the hemodialysis center of PKU Muhammadiyah hospital Indonesia, in term of access, entry and maintenance of the environment of care from the point of view of nurses. The study employed descriptive research method with 12 nurses who totally selected and recruited from the haemodialysis center

Responses from the questionnaire were validated through documentary analysis (records review), observation and interviews. Documents obtained include standard operating procedure (SOP) in the hemodialysis center, logbooks of nurses, and medical records of patients. Responses to close-ended questions are presented as frequencies and percent. On the other hand, answers to open-ended questions were summarized categorically; some were presented in tabular form (as frequencies / percent) while others were just presented in narrative form.

Result

Table 1
Distribution of Nurse-Respondents According to Variables Relative to their Access to Hemodialysis Services in the Hemodialysis Center at PKU Muhammadiyah

Traveling time of the nurse-respondents from their house to the hemodialysis center	n	Percentage
10 minutes	3	25%
15 minutes	2	17%
30 minutes	6	50%
>30 minutes	1	8%
Total	12	100%
Time in Preparing Hemodialysis Machine	n	Percentage
10 minutes	7	58%
15 minutes	4	34%
>15 minutes	1	8%
Total	12	100%
Experience of difficulties in IV canula insertion	n	Percentage
Difficulty in insertion of I.V canula < 5% of the time	8	67%
Difficulty in insertion of I.V canula 5-10% of the time	1	8%
Difficulty in insertion of I.V canula > 15% of the time	1	8%
No difficulty in insertion I.V canula ever	2	17%
Total	12	100%
Perception on the adequacy of nurse station	n	Percentage
Nurses feel that the nurse station is adequate	3	25%
Nurses feel that the nurse station is not adequate	9	75%
Total	12	100%
Perceptions with regard to improvement of equipment	n	Percentage
More comfortable nurse station needed	8	67%
Improvement in facilities	4	33%
Total	12	100%

Table 1 showed that in terms of the traveling time of the nurses from their house to the hemodialysis center, it was noted that majority of the nurse-respondents (92%) travel from their home to the hospital for about 10 to 30 minutes. This means the hemodialysis center is relatively near the residence of the nurse-respondents. This implies that the hemodialysis center is relatively accessible to the nurse-respondents, hence, it is not surprising that based on the researcher's interview with hospital administrators, the nurses in the Hemodialysis Center never come late, they are always on time on their schedule and have a good attitude towards work. This translates to patients' satisfaction with the service given.

In terms of time needed for the nurses in preparing the hemodialysis machine, majority (58%) need around 10 minutes only while the remaining 42% need 15 minutes or more. The time needed in preparing the machine depends on the condition of the patient such as complications suffered and functionality of the equipment and on the experience of the nurses. Nurses who have more experience and good skill are likely to be able to prepare a hemodialysis machine in a shorter time.

With regard to experiencing difficulties in IV canula insertion, majority of the nurse-respondents (67%) said that they experience difficulties in IV canula insertion less than 5% of the time. As mentioned previously, most of the nurse-respondents have at least one year of experience as hemodialysis nurses and have undergone the needed training for the job. Nurses who have trained and have more experience are more likely to easily insert the IV canula compared with nurses who lack experience and training.

Majority of the nurse-respondents (75%) perceive that the nurse station at the hemodialysis center at PKU Muhammadiyah is not adequate. The nurse station of this unit is 2 m x 2 m, which is a very small space relative to the building size of 60 m x 8.5 m. It could not accommodate all nursing activities, especially for serving patients. Thus, it is not

surprising to find, in the same table, that 67% of the nurses perceive that they need a more comfortable nurse station to perform their activities. Nurse station is one of the important facilities that should be provided by the hospital. Through the nurse station all health care providers can meet and discuss about the condition of the patient. Nurses prepare for all of activities of care from the nurse station. A comfortable nurse station will satisfy nurses so they can work with enthusiasm and develop the quality of care.⁵

As for changing schedules of patients, 50% of the nurse-respondents never change the schedule because the patients already have regular or permanent schedule for the treatment. In some cases, the schedule might be changed because of request from the patient (as indicated by 25% of the respondents) or in emergency cases (as indicated by another 25% of the respondents). The schedules are used for one month. For afternoon shift, there are only 15 patients and the hospital still has an extra 7-bed capacity for emergency cases.

In terms of health education given to the patient during discharge, majority of the nurse-respondents (58%) said that they gave information or health education related with diet and fluid consumed. Information about health care is very important for the patient to follow the program at home. Patient with ESRD should be strictly following the standard of patient care especially for diet, fluid intake and output, and medicine to prevent complications.

Table 2
Distribution of Nurse-Respondents According to Variables Relative to their
Entry to Hemodialysis Services in the Hemodialysis Center

Patient's orientation of the unit	n	Percentage
Nurses orient the patient on the first day of care	8	67%
Nurses orient the patient during the procedure	4	33%
Total	12	100%
The entry point of patient	n	Percentage
Nurse pick and lead them in the HD center	0	0%
Hospital person rather than nurse lead them to the HD center	1	8%
Third party	11	97%
Total	12	100%
Experience of having trouble in operate hemodialysis machine	n	Percentage
Nurse experience of trouble to operate hemodialysis machine 1 time in a month	6	50%
Nurse experience of trouble to operate hemodialysis machine 2 times in a month	1	8%
Nurse experience of trouble to operate hemodialysis machine 3 times in a month.	1	8
Nurse did not has experience of trouble to operate hemodialysis machine	4	34%
Total	12	100%
Kind of hemodialysis machine problem	n	Percentage
Conductivity	7	59%
Blood leak	1	8%
No trouble	4	33%
Total	12	100%
To inform the procedure	n	Percentage
Nurses inform the procedure during the first day of care	10	83%
Nurses are inform the procedure during the procedure	2	17%
Total	12	100%
Adequacy of the entry point of the center	n	Percentage
Nurses feel adequate for the entry point of center	9	75%
Nurses feel not adequate for the entry point of center	3	25%
Total	12	100%
Assessment of psychological aspect of the patients	n	Percentage
Nurses assess the psychological aspect of the patients	8	67%
Nurses did not assess the psychological aspect of the patients	4	33%
Total	12	100%
Kind of Assessment	n	Percentage
Level of anxiety	2	17%
Level of anxiety, sleeping pattern	3	25%
Family support, self esteem, sleeping pattern	3	25%
None	4	33%
Total	12	100%

Table 2 presented about 2/3 of the responses (67%) nurse-respondents orient the patients on the first day while 33% do not orient the unit to the patients on the first day,

but during the procedure on the next day. The first day of undergoing hemodialysis is the start of the process of adaptation to the changes in the lives of the patients including loss of some of their activities. Thus, orientation will somehow give support to the patients with regard to their “new” life.

In terms of the entry point of the patients, most of the respondents (97%) do not accompany the patients during entry to the unit because the patients are still able to reach the center accompanied by member/s of their family. Support from the family is needed by the patient and this is partly realized when family members accompany and bring the patients to the Hemodialysis Center. Particularly, this gives psychological support to the patient; thus, the motivation to live will be increased.⁹

As for the experience of nurse-respondents of having trouble in operating hemodialysis machines, about 1/3 of the respondents never experience such trouble while 2/3 experience troubles for about 1 to 3 times in a month. Most of the troubles of the hemodialysis machine are related to conductivity (59%). Conductivity is expressed in mS/cm (milli-Siemens/centimeter). The conductivity of pure water is zero and that of the dialysate depends on the amount of sodium in it. While there are many electrolytes in the dialysate, sodium is the major component. Different amount of potassium or calcium hardly make any noticeable change. The base conductivity is set by the maintenance technician and should be about 13.8 mS/cm. This is about 138 mmol/L of sodium, like in human blood. For some this is too low and step sodium modeling (see below) can be used to raise it to 14.0-14.2.⁸ If there is not enough concentrate the conductivity goes down and the machine beeps. Sometimes there are visible bubbles in the lines, which make the conductivity behaves erratically. Note that low bicarbonate is unsafe but hardly changes the conductivity. The dialysate concentration is expressed in terms of electrical conductivity of the prepared dialysate and is displayed constantly.

One respondent (8%) indicated blood leak as a problem. Blood may leak inside the dialyzer because of ruptured fibers. This may happen even with a new dialyzer. There could be a minor leak, which is invisible, or a major leak in which blood can be seen in the dialyzer. In both cases the machine stops and sets the alarm. To resume dialysis the dialyzer should be replaced. The technicians have a rule of thumb - if the leak cannot be seen the blood in the dialyzer can be returned to the patient and if it can be seen the blood should be discarded. In any case some blood can be returned safely - this is the blood in the arterial line. Saline can push the blood from the arterial chamber and the tubing back to the arterial needle.⁸

This again shows that nurses' skill and experience are very important aspects in giving patient care. Nurses will not have trouble if they have enough skill and experience. As stated previously, most of the nurse-respondents have at least one year of experience as hemodialysis nurses and have undergone the needed training for the job. The Indonesian Nephrology Association indicated that skillful hemodialysis nurses are currently very much needed in Indonesia in general.

In terms of giving information on the procedure, it was noted from the table that 10 respondents (83%) gave the information on the first day of treatment while only 2 (17%) gave the information about the procedure of hemodialysis while the procedure is going on. Information regarding the procedure is important for patients, at especially with regard to the psychological aspect of the patients. Patients who have enough information about the procedure may feel safer and satisfied during the procedure, thus, may be more cooperative with nurses. Also, communication is essential to the delivery of nursing care. Nurses must continually strive to communicate effectively and avoid miscommunication. Communication between nurses and other health care providers is also important in order to give the best service to the patient.¹⁰

In terms of the adequacy of the entry point of the hemodialysis center, it was noted that the entry point of the center is adequate according to most of the nurse-respondents (75%). Based on the observation conducted by researcher, the entry point of Hemodialysis Center is adequate enough with two big doors without any blockades.

About 2/3 of the respondents (67%) assess the psychological aspect of the patients. Problems encountered by patients during the procedure, as assessed by nurses, include sleeping pattern disorder such as insomnia / difficulty to start sleeping (according to 50% of the nurse-respondents). This may be because of the stress the chronic illness creates stress for the patient as it requires lifelong alterations in roles or lifestyle, frequent hospitalization, economic problems, and decreased social interactions among family members. Another problem found is family's support problem (according to 25% of the nurse-respondents). The family's support problem is mostly related with economical problems wherein the family has to pay not for the procedure but for transportation and accommodation. In view of these problems, the nurses need to give the patients and their families the opportunity to express feelings of anger and concern about the limitations that the disease and treatment impose, including possible financial problems. If anger is not expressed, it might be directed inward and might lead to depression, despair, and attempts at suicide. On the other hand, if anger is projected outward to other people, it may destroy already threatened family relationships.

Table 3
Distribution of Nurse-Respondents According to Variables
Relative to the Maintenance of the Environment of Care
in the Hemodialysis Center at PKU Muhammadiyah

If the power supply is not working properly -	n	Percentage
UPS is automatically on	12	100%
Total	12	100%
Schedule to analysis water system or RO	n	Percentage
Every month	9	75%
Every 2 months	2	17%
Every 3 months	1	8%
More than 3 months		
Total	12	100%
Schedule to chemical analysis of the machine	n	Percentage
Every 2 months	4	33%
Every 3-4 months	5	47%
Every 5-6 months	3	25%
More than 6 months		
Total	12	100%
Disinfection of the Hemodialysis Machine	n	Percentage
Every after use	12	100%
Total	12	100%
Perception on the ventilation of the room	n	Percentage
Ventilation of the room is good enough	6	50%
Ventilation of the room is not good enough	6	50%
Total	12	100%
Management of the Waste Material	n	Percentage
Nurses separate the waste material based on the type	12	100%
Nurses did not separate the waste material	0	0%
Total	12	100%
Change bed sheet for every patient	n	Percentage
Nurse change the bed sheet every after used	3	25%
Nurse did not change the bed sheet every after used, but if necessarily needed	9	75%
Total	12	100%

Table 3 described about the case of a power failure, the blood pump stop and the venous line clamp closes. The dialysate flow pump, heater, blood leak detector, and level detector are non-functional. All function lights go out. A steady, audible alarm will sound for seven minutes that cannot be silenced with the mute key. It can be silenced manually, however, by removing the 9-volt battery from the back of the machine. In the event of the power failure during treatment, the UPS is automatically on, or blood pump can be manually operated to

return the blood to the patient or to keep the blood in recirculation if a quick resumption of power is anticipated. Either option is accomplished with the auxiliary hand crank supplied with the machine.

Analysis of water system in Hemodialysis Center is one of the important procedures in the maintenance of the environment of care. Table 3 showed that most of the respondents (75%) agree to do the analysis of the water system every month. According to the standard of patient care, analysis of the water system in the Hemodialysis Center has to be done every month to prevent infectious disease and complications for patients.

The system includes a monitoring box at the nurse's station with visual and audible alarms to monitor the R.O. unit and reservoir levels. Hemodialysis, hemofiltration, and hemodiafiltration require special water-treatment processes to prevent adverse patient outcomes of dialysis therapy resulting from improper formulation of dialysate with water containing high levels of certain chemical or biological contaminants. The Association for the Advancement of Medical Instrumentation (AAMI) has established chemical and microbiologic standards for the water used to prepare dialysate, substitution fluid, or to reprocess hemodialyzers for renal replacement therapy. The AAMI standards address: a) equipment and processes used to purify water for the preparation of concentrates and dialysate and the reprocessing of dialyzers for multiple use and b) the devices used to store and distribute this water. Water treatment systems used in hemodialysis employ several physical and/or chemical processes either singly or in combination. These systems may be portable units or large systems that feed several rooms. In the United States, >97% of maintenance hemodialysis facilities use RO alone or in combination with deionization. Many acute-care facilities use portable hemodialysis machines with attached portable water treatment systems that use either deionization or RO. These machines were exempted from earlier versions of AAMI recommendations, but given current knowledge about toxic

exposures to and inflammatory processes in patients new to dialysis, these machines should now come into compliance with current AAMI recommendations for hemodialysis water and dialysate quality.⁵

With regard to the chemical analysis of the machine, it was noted that the respondents have varying responses - 5 (41.7%) respondents will ask for chemical analysis every 3 to 4 months, while 4 (33.3%) will ask every 2 months and 3 (25%) respondents will ask the analysis every 5 to 6 months. The actual practice to analyze the chemical aspect of the machine is every 4 months. Based on the results, most probably, the 4 nurses who answered every 2 months and 3 nurses who answered every 5 to 6 months did not know the schedule of program. Based on standards, the chemical analysis of the machine should be performed every 6 months to prevent infectious disease and complication. Knowledge / ability of nurses regarding the chemical analysis of the machine is needed to make sure that the machine is functional and ready to be used. Neither the water used to prepare dialysate nor the dialysate itself needs to be sterile, but tap water can not be used without additional treatment. Infections caused by rapid-growing NTM (e.g., *Mycobacterium chelonae* and *M. abscessus*) present a potential risk to hemodialysis patients (especially those in hemodialyzers reuse programs) if disinfection procedures to inactivate mycobacteria in the water (low-level disinfection) and the hemodialyzers (high-level disinfection) are inadequate. Other factors associated with microbial contamination in dialysis systems could involve the water treatment system, the water and dialysate distribution systems, and the type of hemodialyzer. Understanding the various factors and their influence on contamination levels is the key to preventing high levels of microbial contamination in dialysis therapy.

In terms of disinfection of machine, all respondents (100%) always disinfect the hemodialysis machine every after use. This is one of the hospital measures to maintain

quality of care and to prevent nosocomial infection, and consequently, complication. This shows that the hospital has good standard and quality in the process of caring.

A method of disinfection of a dialysis machine is having a water treatment module, an extracorporeal circuit and a dialysate circuit. The said extracorporeal circuit comprising of an arterial line and a venous line and a dialyzer having a blood side thereof, comprising the following steps: after performing a dialysis session with said dialysis machine, during which said arterial and venous lines are connected to a patient, connecting said arterial and venous lines to first and second ports in said machine, at least one of said ports in fluid communication with a source of heated water; and circulating water heated to a high level disinfection temperature below the boiling point of said water through said water treatment module, said ports and into said extracorporeal circuit including through said arterial and venous lines and said blood side of said dialyzer and dialysate circuit for a sufficient time to achieve a high level disinfection of said machine including said arterial and venous lines and blood side of said dialyzer of said extracorporeal circuit.

Another method of disinfection of an extracorporeal circuit comprising an arterial line and a venous line and a dialyzer of a hemodialysis machine, without removing said extracorporeal circuit from said machine or exposing said extracorporeal circuit to chemical cleaning agents, said hemodialysis machine having a hydraulic circuit with a heater placed therein, comprising the steps of: placing said arterial and venous lines into fluid communication with said hydraulic circuit of said hemodialysis machine; circulating water through said hydraulic circuit and through said heater; heating said water with said heater to a high level disinfection temperature below the boiling point of said water; circulating said water heated to said high level disinfection temperature through said arterial and venous lines and dialyzer of said extracorporeal circuit for a time sufficient to achieve a high level disinfection of said extracorporeal circuit.

The second method, wherein said hydraulic circuit further comprises a reverse osmosis filter and a dialysate circuit and wherein the method further comprises the step of circulating said water heated to said high level disinfection temperature through said reverse osmosis filter and said dialysate circuit. For further comprising the step of prompting the patient to place said arterial and venous lines into fluid communication with said hydraulic circuit upon completion of a dialysis session with said machine, so as to enable said arterial and venous lines and said dialyzer to be disinfected with said water heated to said high level disinfection temperature.

In terms of ventilation, 6 (50%) of the nurse-respondents feel the ventilation is good enough and 6 (50%) feel that it is not good enough. Based from the standard of patient care, the ventilation in this room is good enough to maintain hemodialysis machine, which should be in the range of 21°C – 23 °C to make patients comfortable.

As to the segregation of waste material, it was noted that all nurse-respondents always separate the waste material. This is one of the hospital measures to maintain quality of care to prevent nosocomial infection. This proves that the hospital has good standard and quality in the process of caring. Dry and wet waste materials are separated. Medical materials such as needle, syringe and non-medical materials such as plastic are also separated with color codes to facilitate easier recognition including the infectious materials like needle, syringe, material which can be contacted with blood / body fluid while non-infectious materials are paper, medical equipment used etc.

Lastly, with regard to the changing of patients' bed sheets, it was noted that most of the respondents (75%) did not change bed sheet for 1 (one) day unless it was dirty already or the patient has infectious disease, or the bed sheet has blood or body fluid. This is because of limited stock. To maintain good quality in patient care, bed sheets should be cleaned every after use.

Standard mattresses and pillows can become contaminated with body substances during patient care if the integrity of the covers of these items is compromised. A mattress cover is generally a fitted, protective material, the purpose of which is to prevent the mattress from becoming contaminated with body fluids and substances. A linen sheet placed on the mattress is not considered a mattress cover. Patches for tears and holes in mattress cover do not provide an impermeable surface over the mattress. Mattress covers should be replaced when torn; the mattress should be replaced if it is visibly stained. Wet mattresses, in particular, can be a substantial environmental source of microorganisms. The removal of wet mattresses was an effective infection-control measure. Efforts were made to ensure that pads and covers were cleaned and disinfected between patients using disinfectant products compatible with mattress-cover materials to ensure that these covers remained impermeable to fluids. These should be laundered between patients or if contaminated with body substances.¹²

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