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Dialysis adequacy and necessity of implement health education models to its promotion in Iran

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ABSTRACT

The prevalence and incidence of Chronic Renal Failure [CRF] is increasing in the world. The main way for treatment of End-Stage Kidney Disease [ESKD] - that leads from CRF - is hemodialysis. One of the most important criteria for the evaluation of hemodialysis treatment process is the measure of dialysis adequacy. Dialysis adequacy is considered to the best therapeutic indicator for patient's clinical results and the best index for the assessment of the dialysis adequacy is the urea clearance. Although adherence accurate diet by patients is complement for hemodialysis and it is recommended for effectively control of symptoms of uremic syndrome and preventing long-term complications, many of these patients do not keep diet and fluid restriction and result in non-adequate dialysis, therefore, in order to improve dialysis adequacy, education, justify and emend patient's attitude about diet necessity of following dialysis period times precisely and on time refers are very important. Due to the complexity of the treatment and care of hemodialysis patients, as well as the needs for adequate dialysis implement for to achieve effective treatment for these patients, by designing and run an educational program based on Health Education Models, dialysis adequacy can be improved.

Key words: hemodialysis, dialysis adequacy, adherence, Health Education Models

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INTRODUCTION

One of the current factors that threaten human societies and health personnel is increasing the prevalence of chronic diseases [1]. The World Health Organization announced that 60% of deaths is due to chronic diseases that usually long-term and caused people disability and no definitive therapy available for them[2]. According to predictions, until 2030 in the United States, about 167 million people [about half of the population] will be suffer from chronic diseases[3]. One of the most important chronic diseases that associated with considerable stress for the patients and their family[1] and considered as one of the worldwide major public health problem is chronic renal failure[4,5]. This disease is a progressive kidney disorder that leads to the accumulation of urea and other toxic substances in the blood[6]. This clinical condition associated with irreversible reduced renal function[7]and frequently leads to End-Stage Kidney Disease [ESKD], which is one of the major causes of mortality and disability in the world[6,8]. In ESKD, the kidneys unable to do body's metabolic functions and maintain fluid and electrolytes balance, that resulted in dangerous and deadly condition called uremia[9]. With these condition patients have to use alternative therapies to survive, such as hemodialysis, peritoneal dialysis or kidney transplantation[6]. Among them, hemodialysis is the

main therapy method[7,10,12], so more than 90 percent of patients who needs long-term renal replacement therapy, are treated with chronic hemodialysis. Although dialysis may prevent deaths, but not able to treat kidney disease and metabolic and endocrine activity of kidney cannot be compensated by hemodialysis[3]

The growing number of patients with ESRD is not unique to Iran and is global problem[7,9]. Various diseases such as diabetes, hypertension, cardiovascular diseases, urological and renal cysts are causing ESKD[13,14]. Unfortunately, in Iran because of lack of control of diseases such as diabetes and hypertension, the prevention of chronic kidney disease has not been associated with considerable success, which about 40 percent of hemodialysis patients already has diabetes and because lack of education and not control over behavior health and diet, has been led to use of hemodialysis[15]. This failure to control such diseases in Iran, has caused increasing in an annual 12 percent in the number of patients who require hemodialysis, so the rate of kidney patients is much higher than the world average [6 percent] [16].

Stats of patients with chronic renal failure in the world and in Iran

About 600 million people in the world are afflicted by chronic renal failure [17]and annually more than 60 thousand people suffering from it lose their lives[2]. Its prevalence has been reported 242 cases per one million people with 8% growth per year in the world [6,7,10]. In 2006, the number of the ESKD patients exceeds from 2 million people and the total number of hemodialysis patients was 1.38 million in the world[16], which by 26 cases per million incidences, about 6% is added to this number each year[18]. In Iran, prevalence hemodialysis has been estimated as 357 cases per million and its incidence are 57 cases per million in population [7]. In 1993, the total number of hemodialysis patients was about 3670 people in Iran, and in 2003 reached to 8500, finally in 2013 had increased to 23200 patients [19].The whole annual cost of treating these patients is estimated at around 1500 billion rails in Iran [20]. It is expected that by the 1400, number of chronic kidney disease will be reached about 95000 people in Iran, which 50% will be undergoing on hemodialysis [21].

Hemodialysis and adequate dialysis in the treatment of chronic renal failure

Hemodialysis began as an exploratory attempt to sustain the lives of selected patients in the 1950s and now provides life-saving therapy to millions of individuals with kidney failure worldwide, but it would be impossible for it to replace the homeostatic role of the kidneys [22]. In the past 20 years, despite major advances in medicine and the technology of hemodialysis, the morbidity, mortality and hospitalization of chronic kidney disease patients remain high [1,12,16]. The annual mortality rate of hemodialysis patients is 18% and hospitalization is approximately 2 times greater than normal people [12]. One of the most important criteria for the evaluation of hemodialysis process is to measure the adequate dialysis [7]. Adequacy of hemodialysis increases patient survival, quality of life and biochemical outcomes and decrease disease complications and hospitalizations [23]. If hemodialysis does not possess necessary quality, blood toxin levels and clinical symptoms would not be well controlled and therefore the morbidity and mortality will be increased [9,18,24]. It is clear that by higher quality of hemodialysis, patient health status and life expectancy will be improved and complications will be in minimum levels, therefore, identification of factors influencing the adequacy of dialysis and know how to increase this adequacy is very valuable [17]. Among this factors it can be pointed out to adherence of diet, kind of filter for hemodialysis, the pump device, the duration of dialysis, underlying diseases [especially diabetes] and patient education [9,17,24], and in the general category physical factors, patient-related factors and other care team staff [22].

It should be noted that the use of some of these methods, such as using sophisticated dialyzers, increasing blood flow, the dialysis fluid speed, and dialysis time that lead to increasing dialysis adequacy, are not feasible or not cost-effective[7,19,25]. On the other hand, limitations of hemodialysis units such as the number of devices, time, the number of dialysis patients and etc. do not allow to unrestricted hemodialysis; hence should be under hemodialysis that patient's general condition will improve and economically and socially be acceptable [9,24,18]. Thus to enhance the adequacy of dialysis, other methods should be used to reduce the mortality rate, number of hospitalization, and care costs reimbursed by patients and save health care costs and improve patient’s life expectancy[7,18]. Based on mentioned points, assessment of the dialysis adequacy is one of the key factors considered in evaluating health care systems[23,26].

Methods and standards for assessment of dialysis adequacy

Many methods have been used to assessment the adequacy of hemodialysis, such as checking the patient's vital signs, measuring serum albumin, collecting dialysis water, urea kinetic method, asses of clinical signs, patient satisfaction with life, left ventricular hypertrophy, guidance of nervous, mineral metabolism, blood pressure and body fluid volume control[27]. Since the concentration of urea in the blood can be measured easily and uniformly distributed in almost all patients, it seems that the best indicator for the quality of dialysis is urea clearance. In hemodialysis urea clearance is calculated by the KT/ V formula [daugirdas formula], which has given below:

KT/V= -Ln [R-0.008 t] + [4-[3.5×R]] × UF /W

According to reliable sources, the level of less than 0.8 KT/V is considered as indication of inadequacy of hemodialysis[9,17]. In urea kinetic method by one to three times measuring the blood urea nitrogen and using criteria such as KT/V, efficiency of dialysis can be examined and be improved[27]. Nowadays to assess dialysis adequacy, generally two methods are used including URR and KT/V. Renal Physicians Association Guidelines has determined at least URR equal to 65% and KT/V higher than 1.2 to have a good dialysis adequacy[9,24,17]. Results from different studies have shown that reaching to over 1.2 KT/V or over the 65% URR proportion, is effective to improve the prognosis and the quality of life in hemodialysis patients[17,29]. Since the high KT/V rate is one of the most important goals of hemodialysis and is completely effective in prognosis[17], so its influencing factors should be under control and close monitoring[27]. According to opinion of Renal Physicians Association [RPA] and The National Kidney Foundation [NKF] & Kidney Disease Outcomes Quality Initiative [KDOQI], the KT/V rate is preferred to URR, because more accurately reflects removal urea[13,16,19]. Therefore, KT/V is used as an international index to measure the adequacy of dialysis. It is clear that the percentage of URR urea reduction has linear and direct relationship with KT/V index and it is very important. KT/V is a mathematical term that assess the adequacy of dialysis quantitatively which provides parameters related to patient's clinical signs and its initial continuous control, determines the dialysis process changes. KT/V depends on three parameter including clearance of urea, urea treatment duration and volume of distribution[9,16.17]. As recommended by KDOQI guidelines, minimum dose sufficient to dialysis is three times a week for patients that the KT/V at least should reach to 1.2[23]. If the harvest urea be insufficient, regardless to plasma urea, dialysis will be insufficient. In assessment the adequacy of dialysis, what is important is the uptake of urea during the 4-hour hemodialysis[17]. Many factors are involved in failure to reach 1.2 KT/V proration such as existence of poor access that lead to inadequate flow of blood. Other factors are repeated hypotension and angina pectoris that resulted in prematurely interrupt in hemodialysis. The renal study results in United State [USRDS] has shown that for every 0.1 increase in the KT/V to nearly 1.2, mortality was reduced by 7%, every 5% increase in URR to about 65 percent, reduces mortality by 11%[28,30]. It should be noted that on over the 1.4 KTV, reduce in mortality can be seen clearly, therefore, in 2006, the NKF&KDOQI set the KT/V target as 1.4 and 1.2 was set as a minimally acceptable rate[30].

Effective factors on dialysis adequacy

Hemodialysis as a treatment method affects lifestyle, health status and role of the person in society. Despite recent advances in the treatment of these patients, health-related quality of life in these patients is lower than the ordinary people. These patients due to the nature of the disease and conditions for treatment [hemodialysis], faced with many problems such as low self-confidence, isolate from social, lack of mobility and employment problems, reduction in the activity, fatigue and ultimately disappointment about the future[7,10,18]. ESRD patients will be faced with many problems by different therapy method and drug treatment to survive. Hemodialysis patients have to follow four components to improve their health status and increase life expectancy including continuous dialysis sessions, follow medical prescriptions, fluid restriction, and keep special diet[8,31,32].

With regard to impact of patient related factors on dialysis adequacy, unfortunately, there is a dearth of information on this issue, by following or refusing prescriptions and therapy commands in the same hemodialysis procedure condition, adequacy of dialysis in some patients is better than others[22].

The necessity to implement Health Education Models

Hemodialysis patients due to their specific environment and culture, need special and steady education in order to adapt to physical and mental disabilities. Although adherence of special diet by patients is supplements to hemodialysis and is recommended for effectively control signs and symptoms of uremic syndrome associated with long-term prevention of disease, but many patients do not follow diet and fluid restriction; hence, it appears that effective educational interventions that can reduce the complications and side-effects, will be necessary[8]. In order to promote the adequacy of dialysis, extend life expectancy and improve quality of life in hemodialysis patients, except from heed to technical points, explanation and changing patient's attitudes about following proper diet and recommended dialysis duration and on time refers to health centers are extremely important[11]. Treatment of these patients without participation of these patients and do some self-care activities cannot be very effective and desired results will not have achieved; and education is the right tools to increase client knowledge, self-management, self-efficacy and self-care[20]. Results of various studies have shown that patients with higher self-efficacy scores, had lower blood urea and weight difference between two dialysis sessions has been associated with self-efficacy score[33].

It also has been shown that increasing knowledge of hemodialysis patients led to the development of self-management and better outcomes for hemodialysis[20]. Reliable sources, highlighted the education to patients as a

factor influencing the amount of urea and harmful substances in the blood [temporal concentration of urea] between two dialysis sessions[9].

The role of patients in dialysis adequacy is essential and complex, and this subject needs to meticulous attention for start, acceptance and maintenance remarkable behavioral changes, which including the following items:
•Fundamental changes in dietary habits, often different from the patient's family and cultural traditions
•Capacity for new multiple and daily treatments which often imposes economic charges to patients.
•Allocate time for commuting, treatment and partial improvement, that at least required 6 to 8 hours every three days a week.
•Psychological adaptation to unfamiliar chronic diseases needs, be responsible, and gain different experiences from dialysis treatment personnel.
•The acquisition of skills that require a clear and regular communication with younger medical personnel who often have little experience in their life.
•Other issues, such as fatigue that occurs during dialysis[34].

Several factors such as manner, self-efficacy, social support, underlying disease, perceptions of treatment can explain not following medical instructions by hemodialysis patients. Psychological interventions have shown that patient obedience can be increased, although maintenance long-term behavior will associate with some problems[35,36].

In recent decades with international guidance for the enhancement of patient care hemodialysis, significant progress has been made in the treatment of hemodialysis[5,37]. Considering the increasing rate of ESRD patients and its consequences such as requiring to hemodialysis and emergence public health problems, makes it imperative to take active policies in health care system[12,38,39].

Due to the nature this chronic and debilitating disease patient are forced to use long-time hemodialysis and on the other hand, with regard to the actual and potential patient problems are dynamic and variable, it seems to be sensible and necessary to use models that maintain and improve patient health as much as possible[4]. Because of complexity of the treatment and care of hemodialysis patients, as well as the complexity of human behavior for making health decisions and existence various health behavioral theories & models that engage in health promotion, and needs for adequate dialysis implement for to achieve effective treatment for these patients, by design and run a training program based on health education models can have a positive effect on one of the most important personal factors that affect adequate dialysis promotion. Eventually by health reform and adopt patient's appropriate behavior, improve the dialysis adequacy that caused positive treatment results and reduce morbidity and mortality.

Dialysis adequacy and studies conducted in Iran

Despite significant improvements in dialysis adequacy in hemodialysis patients in developed countries, in developing countries, including Iran, still in majority of patients KTV is less than 1.2[28,30]. Generally, in Iran more than 60% of dialysis patients KT/V are less than 1.2, while that in developed countries more than 90% of KT/V rate is between 1.3 to 1.6[30]. Various studies have shown that dialysis adequacy in different Iranian cities is not acceptable[9,11]. Studies were conducted in dialysis centers in Ahvaz, Hamadan, Kashan, Kurdistan and Sari shoved that 86, 80, 90, 100, and 58% of patients had KT/V below 1.2, respectively[7,28]. Another study confirmed that dialysis adequacy in Iran is not in good condition and in 80, 64, 70% of patients in Arak, Tehran, Rasht, dialysis adequacy was being less than 1.2, respectively[18]. Also KT/V Kohgiluyeh Boyer Ahmad had the same condition [51% of KT/V was less than 1.2][16].

Shahdadi et al., [19] in order to investigate the effected of increasing blood flow rate on complications and dialysis adequacy in 45 hemodialysis patients at 6 month bygone had 3 times in week, each time 3 to 4 hours, in two sessions that in first session [pre-test] adjustment blood flow rate on 230 ml/min that at the end of dialysis KT/V was measured; in second session [post-test] 15% and 20% of blood flow rate in patients under and upper 65 Kg of body weight, was increased and KT/V was measured again at the end of dialysis. Result showed that patients KT/V before and after intervention were 1±0.1 and 1.3±0.1 respectably, so there was a significant difference between two groups for dialysis adequacy[19].

In another study that performed by Tayebi et al.[21] to evaluate the effects of Hatha yoga exercises on adequacy of dialysis in two groups of patients, one as a control group [31] patient's hemodialysis in the Shahid Labbafinejad hospital and another as the case group [31] hemodialysis patients in the Baqiatallah hospital, which Hatha Yoga exercises are performed after the initial training by yoga instructor for one hour, twice a week during two months. In both groups dialysis adequacy was calculated before and after intervention. The results demonstrated that there was a significant difference in average dialysis adequacy between two groups [$P<0.001$][21].

In another study conducted by Saei et al. [7] as clinical trial aimed to investigate the effect of continuous care model on dialysis adequacy in hemodialysis patients in military hospitals. Dialysis adequacy was measured before and after intervention on 35 hemodialysis patients from Imam Reza Hospital [as the target case] and 35 hemodialysis patients from Hajar Hospital [as the control group]. Continuous Care Model is a native and Iranian model [designed by Tarbiat Modarres University faculty members] in the nursing profession that used to control coronary artery disease problems and consists of 4 stages orientation, sensitization, control and evaluation, which by applying this model the quality of life for heart patients can be promoted. This model is suitable for diseases that have chronic nature, and its application was tested for disease in hemodialysis patients due to their chronic nature. The intervention was conducted in target group for three months and after data analysis, it was shown that applying continuous care model has increased significantly dialysis adequacy [P<0.001][7].

CONCLUSION

Due to the increasing prevalence of renal failure diseases, we cannot expect to improve outcomes of patients on maintenance dialysis by merely concentrating on adequacy of dialysis, therefore achieving educational program based on Health Education Models to improve dialysis adequacy in hemodialysis patients can reduce mortality caused by these diseases and improve their quality of life, savings in treatment cost in healthcare systems and reducing patient reimbursement of care expenses.

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