Orginal Article
Eurasian Journal of Critical Care

Evaluation of Patients with Chronic Renal Failure Admitted to the Emergency Department

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Abstract

Objective: The aim of this study is to retrospectively investigate the files of patients with Chronic renal failure (CRF) who have undergone any dialysis program and have been admitted to the emergency department, drawing attention to the preferred treatments with the most common diagnoses, together with demographic and clinical information.

Materials and Method: A total of 683 patients with CRF who were admitted to the emergency department of Meram Medical Faculty, Turkey in the last 5 years were searched and 224 patients, 189 of whom had hemodialysis (HD) and 35 of whom had peritoneal dialysis (PD), were included in the study. The demographic data, complaints and laboratory findings at the time of the admission to the emergency department, diagnoses, treatments and clinical outcomes were analysed.

Results: Sixty nine patients 69 patients had applied to the emergency department more than once. The most common presenting complaint in the HD group was shortness of breath, and for the PD group it was abdominal pain. Fourteen point three percent of all patients (14.3%) died at the end of clinical follow-up. The presence of a history of cerebrovascular disease, antibiotic use in the emergency department, and ventilator use were found to be statistically significant in terms of mortality related factors.

Conclusion: The complaints pattern of patients on routine dialysis is quite wide. In some patients, medical treatment in the emergency department consists only of HD treatment. This shows that some of the dialysis patients need additional dialysis.

Keywords: Emergency department, chronic renal failure, treatment

Introduction

Chronic renal failure (CRF), whose incidence and prevalence is increasing worldwide, has reached a serious level and has become a public health problem[1,2]. CRF, which has high mortality and morbidity rates due to the problems encountered during the disease process or replacement and the complications it develops, decreases both the quality of life of the patient and the cost of diagnosis and treatment[3,4,5,6,7]. In the acute and chronic period of the disease, due to its nature and complications, as well as handicaps developed during the replacement of the deficiency, many patients present to clinicians in emergency conditions[8,9]. In the United States more than half a million hospitalizations are performed each year among patients with end-stage renal disease. The average length of hospital stay of these patients is 11 days[4]. This investigation is to learn about this group of patients more closely, to know and treat problems that threaten their lives, to discover what may reduce their mortality and morbidity, and to know better, when the necessary precautions should be taken. This knowledge will also shed new light on treating clinicians, as it will also cause the breaking of the chain in the pathophysiological process that causes the complaints. For this purpose, chronic renal failure patients who were admitted to the emergency department of Meram Medical Faculty, Turkey and who have continued a regular dialysis program were examined retrospectively; with the aim of drawing attention on the most common diagnoses and the treatments preferred, together with the demographic and clinical information of these patients.

Corresponding Author: Emine KAYA **e-mail:** efkdoktor@gmail.com
Received: 09.08.2019 • **Accepted:** 29.08.2019
Cite this article as: Kaya E, Cander B. Evaluation of patients with chronic renal failure admitted to the emergency department. Eurasian J Critical Care. 2019;1(2):71-76

Materials and Methods

The records of 683 patients with N18.9-Unidentified Chronic Renal Failure according to the ICD-10 diagnostic coding and who were admitted to the emergency department in the last 5 years were reviewed retrospectively. Of these, patients who had undergone hemodialysis (HD) and peritoneal dialysis (PD) for at least 3 months, who were 18 years of age, and who had adequate file records in the emergency department were included in the study. Other patients were excluded from the study. The demographic information, clinical history, complaints at the time of the admission to the emergency department, laboratory findings at the time of admission, the names of the clinical consultations requested on behalf of the patient, the diagnoses they received, the treatments given and the clinical outcome (discharged with full recovery and exitus) were found. The type and number of comorbidity and the number of patients were collected in the light of the information recorded in the files as were the other data.

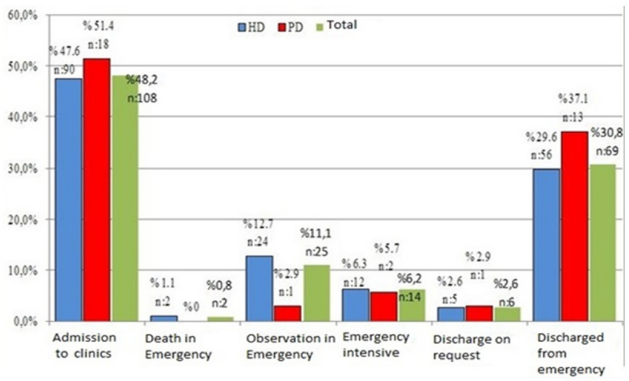
The information received from the files reviewed was entered as data in the SPSS.15 program. The descriptive statistics of numerical data were performed in the SPSS package program. The normal distribution analysis was performed and the normally distributed data were compared with the Student-t test. The data that did not comply with the normal distribution were compared with the Mann-Whitney U test. The Chi-square test was used for the categorical data.

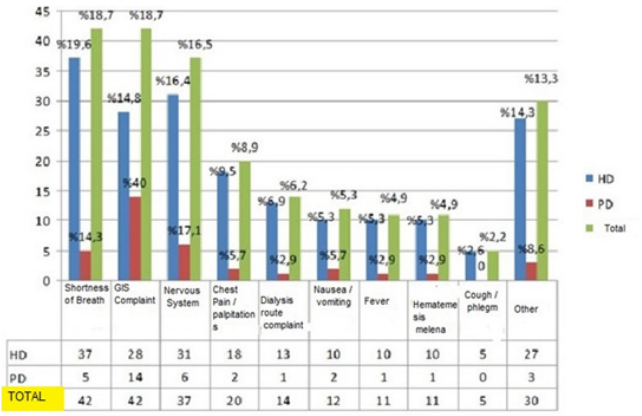
Results

Of the 224 patients included in the study, 189 were undergoing HD and 35 were going into PD. **(Table 1).** The mean HD duration of HD patients admitted to the emergency department was 41.9 months (3–180), 36.8 months (3–138) in PD patients, and 41.1 months (3–180) in the whole patient group. All 224 patients had 388 visits to the emergency department. Sixty nine (69) of the 189 HD patients (36.5%) had applied more than once. In 35 PD patients, this rate was 14 (40%).

Table 1. Gender distribution of dialysis patients admitted to emergency department

	Male	Female	Total
Haemodialysis	102	87	189
Peritoneal dialysis	16	19	35
Total	**118**	**106**	**224**





Of the 224 patients, 192 (85.7%) were treated and discharged from the emergency department or clinic, and 32 **(14.3%)** died in the emergency department or the clinics they were transferred to. The mean age was 60.4 years in the HD group, 53.6 years in PD patients and 59.3 years in the whole group.

It was determined that of the total 224 patients, 33.5% (75 patients) were discharged on the same day from the emergency department after their treatment and care or were discharged due to the patients refusing treatment, **48.2**% (**108 patients**) were hospitalized in the relevant clinics, 0.9% (2 patients) died in the emergency room on the same day, 17.5% (39 patients) were not hospitalized in any clinic but followed up in the emergency department **(Graph 1)**.

The distribution of patients according to the clinics to which they were transferred were as follows: 24.1% (54 patients) of the patients were transferred to the nephrology clinic, 12.5% (28 patients) to ICU (Internal Care Unit), 16.5% (37 patients) to the emergency department observation or intensive care unit, 3.1% (7 patients) to the general surgery clinic, 2.2% (6 patients) to the cardiology service, 1.8% (4 patients) to the gastroenterology service and the remaining 6.3% (14 patients) were taken to to the urology, neurology, cardiovascular surgery clinic, neurosurgery, haematology or gynaecology clinics. When the total number

is considered, 126 (66.7%) of the 189 HD patients and 21 (60%) of the 35 PD patients were taken over by a particular branch for clinical follow-up and treatment.

Of the 39 patients (observation: 25, emergency intensive: 14 patients) admitted to the emergency department, 20 were followed up in the emergency department without any hospitalization. Of these 20 patients, 5 were followed up in the intensive care unit and 4 died. All of the 15 patients who were followed up with emergency observation without any hospital admission were discharged after the completion of their treatment. The duration of emergency observation was 1-5 days. The duration of the emergency stay was 1-7 days.

Thirty one point seven percent of all patients 31.7% of all patients examined were found to have Diabetes Mellitus (DM), 55.8% had Hypertension (HT), 19.2% has Coronery Artery Disease (CAD), 7.1% had HF, 4.5% had Chronic Obstructive Pulmoner Disease (COPD) and 5.4% had a history of Cerebrovasculer Event (CVE).

The frequency of admission complaints of the patients were shortness of breath, Gastrointestinal System (GIS) complaints, neurological system complaints, chest pain and palpitations, dialysis problems, nausea, vomiting, fever, hematemesis and melena, and coughing and phlegm. The frequency of these complaints in HD and PD groups and the number of cases are shown in **Graph 2**.

Fourty eight point six percent of all patients (48.6%) who were admitted to the emergency department and underwent peritoneal dialysis were found to have complaints of GIS (GIS complaint, hematemesis, melena, nausea, or vomiting). This rate was almost twice that of HD patients. When the entire patient population was examined and when the dyspnoea complaint was classified into cardiovascular complaints, 27.6% of the patients had presented with complaints related to the cardiovascular system.

Seventy three percent (73%) of the 189 HD patients (139 patients), 77.1% of the 35 PD patients (27 patients) and 74.1% (166 patients) of all patients were evaluated by internal medicine. The clinics where the consultation was required following internal medicine were monitored by cardiology (13.8%), neurology (7.9%), and general surgery (7.4%) in HD patients while the infectious diseases clinic was the second most commonly consulted branch in PD patients (11.4%)

Eighteen point three percent of all patients (18.3%) were discharged from the emergency department without any diagnosis. An infective status was reported in 27.6%, a respiratory system disease was diagnosed in 22.3%, Cardiovasculer System (CVS) was diagnosed in 13.1%, and hyperkalaemia and acidosis were diagnosed in 12.5%. Diagnosis rates of hyperkalaemia and acidosis were 13.7% in HD patients, whereas the diagnosis of peritonitis, which is more specific for peritoneal dialysis, was 28.5% in PD patients.

When the 224 patients admitted to the emergency department were evaluated in terms of deaths, there were 38 deaths according to clinical observations and treatment. Three of the 38 patients who died had been undergoing PD. The first cause of death in these 3 PD patients was pneumonia after pulmonary embolism, the second was pulmonary edema-hypervolemia, and the third patient's cause of death was not clear.

Of the 224 patients who applied to the emergency department, 99 patients (that is, 66 of 224 patients) (25.5% of all patients) had indications of HD in the emergency department, and the patients were admitted to emergency HD, except for those with routine dialysis programs. As a result of the examination and necessary consultations, 24 (24.4% of HD patients and 6.1% of all admissions) of these 99 admissions were discharged with the consent of the clinician or voluntarily after the HD application was completed.

While 22.7% of the 224 patients admitted to the emergency department did not receive any treatment, 19 (8.5%) underwent blood transfusion for various reasons, 21.4% received antihypertensive treatment, and 13.4% received potassium-lowering fluid. Antibiotic treatment was commenced for 85 patients (37.9%) on the same day. Twenty seven of these patients (27 patients) (31% of those receiving AB) died. Antibiotic use was present in 84.4% of the patients who died after follow-up. A total of 16 examined patients (7.1%) were intubated and ventilated in the emergency department and 13 (81.2%) of them died.

No statistically significant difference was found between HD and PD in terms of mortality ($p > 0.05$).

DM was found in 37.5% of patients, HT in 48.5%, CAD in 20%, CVE in 11.4%, COPD in 2.8% and HF in 8.5%. There were no comorbid diseases in 32.2% (10 patients) who died and 31.7 (60 patients) of the patients who were discharged.

In the above analysis which has been conducted in the light of all these evaluations, mortality-related factors were also examined. The mortality rate was found to be significantly higher in patients with a history of cerebrovascular events ($p: 0.02$), who needed a ventilator, who underwent invasive mechanical ventilation ($p < 0.001$), and for those who had commenced antibiotic therapy ($p < 0.001$).

As a result;

1. Of the 224 patients admitted to the emergency department, 84.4% were undergoing HD and 15.6% were going into PD.
2. A total of 83 patients admitted to the emergency department more than once for various reasons.

3. Thirty five of the 224 patients admitted to the emergency department died. Fifteen point three percent of HD patients (15.3%) and 8.6% of PD patients died. The mortality rate in HD patients was higher than in PD patients.
4. Fourty seven point six percent of HD (47.6%) and 51.4% of PD patients admitted to the emergency department were hospitalized for the continuation of their treatment.
5. Nineteen percent of the patients (19%) (39 patients) were transferred to the emergency observation or intensive care unit.
6. Thirty one point seven percent 31.7% of all patients had DM, 55.8% had HT, and 19.2% had CAD. 24% of the patients had no comorbidity.
7. Among the comorbidities, DM was higher in PD patients than in HD patients.
8. The most common presenting complaint in HD patients was dyspnoea, while the most common presenting complaint in PD patients was GIS symptoms, including abdominal pain.
9. When the consulting clinics were considered, internal medicine was the most frequently requested in both dialysis types (74.1%). The second most frequently requested consultation in HD patients was cardiology, whereas it was internal medicine in PD patients.
10. Considering the diagnoses of the patients, hyperpotassemia was found in 28 patients (14.8%) in the HD patient group and in 2 patients (5.7%) in the PD group. GIS bleeding was found only in 5 HD patients (2.6%). Fistula problems were detected in 10 (5.2%) of the 189 HD patients. Cerebrovascular disease was determined in 9 patients (4.7%) from HD patients and in 3 (8.5%) from PD patients. Hypervolemia was found in 24 (12.6%) of the HD patients. The number of patients with hypervolemia in PD patients was 3 (8.5%). The diagnosis of HT was made in 25 (13.2%) of all HD patients and in 3 (8.5%) of PD patients. Peritonitis was determined in 10 (28.5%) from all PD patients.
11. Diagnosis was not present in 32 (16.9%) of HD patients and in 9 (25.7%) of PD patients.
12. Twenty nine point five percent of all patients (29.5%) had undergone emergency dialysis. The antibiotic treatment was commenced in 37.9% of patients. Blood transfusion was performed in 8.5%, and 7.1% (n: 16) were intubated and connected to the ventilator.
13. When the effect of the number of comorbidity on mortality was examined, no significant difference was found.
14. When the cost of the patients who underwent HD due to the need of HD and were discharged (24 patients) on the same day in the emergency room were considered, the cost (examination + examination and consultation + HD and other medical care) was calculated as 945 Turkish Liras and about 175 dollar .
15. Mortality-related factors were statistically significant in terms of SVO history, ventilator requirement, and antibiotic initiation ($P < 0.001$). When mortality related factors are examined, cardiovasculer history, ventilator requirement and antibiotic initiation were found to be statistically significant ($P < 0.001$).

Discussion

In this study, the complaints of the patients admitted to the emergency department who were still receiving replacement therapy due to chronic renal failure, the laboratory values and the comorbid conditions at the time of admission, the diagnosis and the treatment approaches were evaluated. A descriptive analysis was performed. In this context, this study is important as recognizing the patients and the complications that may develop together with the disease more closely. Furthermore, the treatment planned with an analytical approach will provide advantages in terms of patient and physician satisfaction and cost, and in terms of determining the parameters that emergency physicians should consider while approaching these patients. When the literature was reviewed for the presence of a similar study, few foreign sources were found[10,11,12,13,14]

We found that the dialysis patients had a wide range of complaints and more than one complaint was combined in one patient. Although it is difficult to classify the complaints because of this heterogeneity, similar results were observed in the literature when the main reasons for the admission to emergency services in dialysis patients were considered[10]. In our study, shortness of breath (19.6%) was the most common cause of emergency presentation in HD patients while gastrointestinal complaints (40%) accompanied by abdominal pain were found as the first common cause of complaints in PD patients.

All comorbidities, except diabetes mellitus, were more frequent in HD patients than PD patients, but the difference was not statistically significant. Since it is not known whether CRF or DM has occurred before in PD patients, it is not correct to comment on this issue, although further studies are required to explain this, it may be suggested that glucose dialysate fluids used in this patient group is a predisposing factor for DM.

Considering all 224 patients, 50 (22.3%) of these patients were diagnosed with respiratory system, 30 (13.3%) with cardiac, 12 (5.3%) with neurological system and 73 (32.5%) with other infective conditions including peritonitis. Sixteen

patients patients (16 patients) (7.1%) had a diagnosis of a gastrointestinal origin.

When the performed treatments are considered, although the diagnosis of pneumonia, sepsis and unknown infections were significantly higher in the HD group, the fact that 12 (34.2) of the 35 PD patients had a diagnosis of peritonitis made the PD group superior to the HD patient group[15]. Fourty two percent of PD patients (42%) and 37% of HD patients were found to have antibiotic use while they were in the emergency department.

In the light of the files reviewed in our study, 224 patients had 388 admittances to the emergency department and 96 admittances (24.6%) of 388 with various indications (hypervolemia, pulmonary edema, acidosis, hyperpostasemia, metabolic encephalopathy), were performed with the emergency HD, except for the routine dialysis. In a study by Loran et al., 14% of 351 visits to the emergency department were planned to have HD earlier than routine HD programs (9% urgent dialysis, 5% dialysis earlier than the programme)[12].

The rate of intubation in routine dialysis patients in our emergency department was 7.1%. In the data reported by Sacchetti et al., the rate of intubation in the emergency department was 13% in dialysis patients with congestive heart failure[13]. In another study run by the same person in 1999, the rate of intubation in emergency HD patients was 12% [14]. Despite the increased incidence of CRFs, it is thought that the decrease in the rate of admission to emergency services for more mortal reasons contributes due to the increase in frequency and quality of general care and treatment services. Since there is no similar study conducted in our country previously, it is not correct to make a comparison on behalf of our country but an interpretation similar to the above can be made.

The mean length of hospital stay in HD patients was 5 days. In PD patients, it was 7.1 days.

Considering the need for HD in the emergency department, the cost of the patients (examination + examination and consultation + HD and other medical care) who were discharged (24 patients) on the same day was calculated as 945 Turkish Liras and about 175 dollar . It should be considered that this figure is not a classical cost-effectiveness figure[16]. In other words, except for the examination fee, many other expenses such as personnel and nursing care services, services used to reach the hospital and loss to the workforce of the patient have been ignored.

When the mortality-oriented factors are examined; cardiovasculer history, ventilator requirement and antibiotic initiation were statistically significant ($p < 0.001$)[17].

References

1. Mosenkis A, Kirk D, Berns JS. When chronic kidney disease becomes advanced. Guidelines for care in the emergency department and hospital. Postgrad Med. 2006 Jun-Jul;119(1):83-91, 104.
2. Grassmann A, Gioberge S, Moeller S, Brown G. End-stage renal disease – Global demographics in 2005 and observed trends. Artif Organ. 2006; 308: 95-7.
3. Süleymanlar G, Altıparmak MR, Seyahi N, Trabulus S. Türkiye'de Nefroloji, Diyaliz ve Transplantasyon – Registry 2012. Türk Nefroloji Derneği Yayınları, Ankara, 2013.
4. U. S. Renal Data System, USRDS 2013 Annual Data Report: Atlas of End Stage Renal Disease in the United States. National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, Bethesda, 2013.
5. Extracellular fluid volume is associated with incident end-stage kidney disease and mortality in patients with chronic kidney disease Anne- LaureFaucon, MartinFlamant et all Nephrology Test Study Group
6. National Kidney Foundation. K/DOQI clinical practice guidelines for chronic kidney disease: evaluation, classification, and stratification. Am J Kidney Dis. 2002;39(2 Suppl 1): S1–266
7. Go AS, Chertow GM, Fan D, et al. Chronic kidney disease and the risks of death, cardiovascular events, and hospitalization. N Engl J Med. 2004; 351:1296-305
8. Long B, Kofman A, Lee CM. Emergency medicine evaluation and management oft he end stage renal disease patient. Am J Emerg Med, 2017 Dec ;35 (12):1946-1955.
9. Kutner NG, Johansen KL, Kaysen GA, et al. The comprehensive dialysis study (CDS): A USRDS special study. Clin J Am Soc Nephrol. 2009;4:645-50.
10. Chronic kidney disease in the emergency centre: A prospective observational study African Journal of Emergency Medicine
11. Sacchetti A, Harris R, Patel K, Attewell R. Emergency department presentation of renal dialysis patients: indications for EMS transport directly to dialysis centers. J Emerg Med. 1991
12. Loran MJ, McErlean M, Eisele G, Raccio-Robak N, Verdile VP. The emergency department care of hemodialysis patients. Clin Nephrol. 2002
13. Sacchetti A, McCabe J, Torres M, Harris RL. ED management of acute congestive heart failure in renal dialysis patients. Am J Emerg Med. 1993.
14. Sacchetti A, Stuccio N, Panebianco P, Torres M. ED hemodialysis for treatment of renal failure emergencies. Am J Emerg Med. 1999.
15. Heaf JG, Løkkegaard H, Madsen M. Initial survival advantage of peritoneal dialysis relative to haemodialysis. Nephrol Dial Transplant. 2002;17:112-7.
16. Peritoneal Dialysis in Renal Replacement Therapies Utaş C. Sunum http://www.tsn.org.tr/folders/file/cengiz%20 utas.pdf ,May 2014
17. Causes of Mortalty in Acute and Chronicc Renal Failure Ferdi Seyyid Taş, Kuddusi Cengiz et all. Fırat Medical Journal 2011.