Hospitalization Patterns in a Large Saudi Hemodialysis Population

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Introduction

- The rate of hospitalization represents an indicator of overall morbidity in patients on hemodialysis.
- The current high prevalence of diabetics and elderly patients may result in an increase in hospitalization rate and prolonged hospital stay.
- Identifying causes and factors influencing hospitalization may guide towards a more individualized and interventional approach to modify treatment features with the aim to reduce the public health burden.

Objective

- The aim of the study was to evaluate patterns of overall and cause-specific hospitalizations in a large cohort of patients treated in DaVita-KSA clinics and to identify potential factors predisposing to such events, which represent an indicator of gross morbidity

Methods

- The study included all patients admitted to DaVita-KSA clinics to continue renal replacement by hemodialysis during the period October 2014-December 2018.
- Zero time data, including demographic and clinical characteristics were recorded at admission as well as the number, duration and causes of hospitalizations during the follow-up period. Patients admitted for less than 24 hours were excluded.
- Overall and cause-specific hospitalization rates were calculated by dividing the number of hospitalizations by the cumulative period of follow-up and confidence intervals were generated according to the conventional formula.
- Comparative analyses were performed using Student's unpaired-test for quantitative variables and χ^2 test for qualitative variables.
- The level of statistical significance was set at 5%.

Results

Table 1: Baseline and Outcome Characteristics of the Study Population by Hospitalization Category

	Hospitalized Patients n=914 (26.1%)	Not Hospitalized Patients n= 2594 (73.9)	Total n=3508	P-Value
Sex, n (%)				
Male	437 (23)	1460 (77)	1897 (54.1)	<0.0001
Female	477 (29.6)	1134 (70.4)	1611 (45.9)	
Age, years, n (%)				
< 40	187 (21.5)	683 (78.5)	870 (24.8)	
[40-60[	345 (25)	1036 (75)	1381 (39.4)	<0.0001
>= 60	382 (30.5)	870 (69.5)	1252 (35.7)	
Cause of ESRD, n (%)				
Diabetes	447 (31.7)	965 (68.3)	1412 (40.2)	
Hypertension	275 (21.9)	979 (78.1)	1254 (35.7)	
Glomerulonephritis	29 (22.8)	98 (77.2)	127 (3.6)	<0.0001
Congenital/Hereditary	33 (22.9)	111 (77.1)	144 (4.1)	
Interstitial/Obstructive	22 (22)	78 (78)	100 (2.9)	
Other/Unknown	108 (22.9)	363 (77.1)	471 (13.5)	
Transfer Period				
2014-2016	499 (33)	1016 (67)	1515 (43.2)	<0.0001
2017-2018	415 (20.8)	1578 (79.2)	1993 (56.8)	
Dialysis Duration before DaVita-Clinic Admission, months, n (%)				
≤3	322 (24.8)	974 (75.2)	1296 (37)	
[3-12]	159 (30.6)	361 (69.4)	520 (14.8)	NS
[12-60]	255 (25.5)	744 (74.5)	999 (28.5)	
≥60	178 (25.9)	510 (74.1)	688 (19.7)	
Initial Vascular Access n (%)				
Autogenous	296 (22.9)	995 (77.1)	1291 (36.8)	
Prosthetic	17 (34.7)	32 (65.3)	49 (1.4)	<0.007
Tunnelled catheter	546 (28)	1406 (72)	1952 (55.7)	
Non-tunnelled catheter	55 (25.6)	160 (74.4)	215 (6.1)	
Body Mass Index, kg/m^2, n (%)				
< 18.5	111 (24.5)	342 (75.5)	453 (13.1)	
[18.5-25]	339 (24.2)	1063 (75.8)	1402 (40.7)	<0.006
[25-30]	224 (25.9)	642 (74.1)	866 (25.1)	
≥30	226 (31.1)	500 (68.9)	726 (21.1)	
Hemoglobin rate, g/dL, n (%)				
<10	499 (26.9)	1358 (73.1)	1857 (53.1)	
[10-12]	303 (25.2)	901 (74.8)	1204 (34.5)	NS
>12	109 (25.1)	325 (74.9)	434 (12.4)	
Hepatitic C Antibodies, n (%)				
HCV (+)	88 (26.7)	242 (73.3)	330 (9.4)	NS
HCV (-)	826 (26)	2351 (74)	3177 (90.6)	
Hepatitic C PCR, n (%)				
Positive	40 (4.4)	865 (95.6)	140 (4)	NS
Negative	100 (3.9)	2460 (96.1)	1969 (96)	
Hepatitis B, HbS Antigen, n (%)				
Positive	28 (22.2)	98 (77.8)	126 (3.6)	NS
Negative	886 (26.2)	2492 (73.8)	3378 (96.4)	
Overall Outcome, n (%)				
Transplantation	29 (11.8)	216 (88.2)	245 (7)	
Transfer	85 (18.4)	376 (81.6)	461 (13.2)	<0.0001
Death	204 (51.3)	194 (48.7)	398 (11.3)	
Active	596 (24.8)	1808 (75.2)	2404 (68.5)	

Table 2: Hospitalization Causes

Number of Hospitalizations	Patients (N)	%
1	928	58.14
2	354	22.2
3	145	9.08
4	68	4.26
5	38	2.4
6	29	1.8
7	14	0.88
8	10	0.63
9	3	0.19
10	2	0.12
11	1	0.06
12	1	0.06
13	1	0.06
14	1	0.06
15	1	0.06

Causes	Hospitalizations N (%)
Cardiovascular & Cerebrovascular	299 (18.7)
Infectious Complications	376 (23.6)
Vascular Access, All causes	281 (17.6)
Gastrointestinal & Hepatobiliary	112 (7.1)
Other Known Causes	500 (31.3)
Unknown causes	28 (1.7)
Total	1596 (100)
Vascular access, Infections	166 (10.4)
Vascular access, Other	115 (7.2)
Malignancies	16 (0.1)

Figure 1 : Annual Hospitalization Rate, Quarterly Evaluation (100 patient-years)

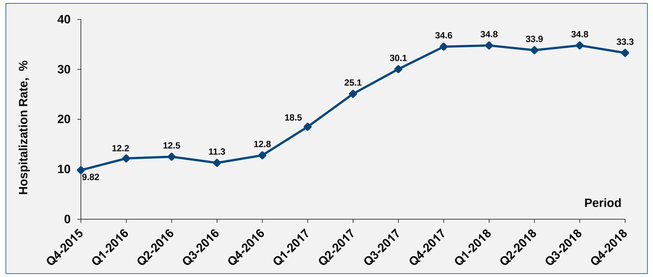

Table 3: Overall and Specific Hospitalization Rates

Causes	Hospitalization Rate, Number, % patient-Years [95%, Confidence Interval]	Hospitalization Duration Days, % Patient-Years [95% , Confidence Interval]
Cardiovascular & Cerebrovascular	5.3 [4.7-5.9]	70 [68-72]
Infectious Complications	6.7 [6.05-7.4]	81 [79-84]
Vascular Access, all causes	4.8 [4.3-5.4]	49 [47-51]
Gastrointestinal & Hepatobiliary	1.7 [1.4-2.1]	17 [16-18]
Other Known Causes	9 [8.2-9.8]	109 [107-113]
Unknown Causes	0.55 [0.36-0.75]	12 [11-13]
Total	28.2 [26.8-29.6]	345 [334-344]
Vascular access, Infections	2.9 [2.4-3.3]	34 [33-36]
Vascular access, Other	1.9 [1.6-2.3]	14 [13-15]
Malignancies	0.27 [0.13-0.4]	3 [2.5-3.55]

Table 4 : Independent Factors influencing Hospitalization

	Relative Risk (RR)	95% Confidence Interval (RR)	P-Value
Gender			
Male	1	Reference	-
Female	1.34	[1.15-1.56]	0.0002
Age Category, Years			
<60	1	Reference	-
≥60	1.32	[1.11-1.58]	0.0022
Dialysis Duration, /Year	1.44	[1.34-1.55]	<0.0001
Cause of ESRD			
Others	1	Reference	-
Diabetes	1.61	[1.38-1.89]	<0.0001
Initial Vascular Access			
Autogenous/Prosthetic	1	Reference	-
Catheter	1.38	[1.17-1.63]	0.0002

Conclusions

- Female gender, age ≥65 years, diabetic nephropathy, catheter as vascular access, and time on dialysis were identified as predisposing to hospitalization, but only diabetic nephropathy was associated with a prolonged hospitalization.
- There is a major selection bias related to the fact that patients included in our study, conducted in outpatient dialysis clinics, are not representative of the overall Saudi hemodialysis population. Effectively, patients with high comorbidity score do not fulfill the conditions to be transferred to continue hemodialysis therapy in such facilities and were thus excluded.
- This fact may explain some of the differences we found in comparison with other studies regarding hospitalization indicators.
- Infectious complications were the leading cause of hospitalization among our hemodialysis patients and resulted in the longest hospital stay. There is a need for a preventive strategy to reduce such complications, especially those related to vascular access.

References

1. US Renal Data System 2018 Annual Data Report: Epidemiology of Kidney Disease in the United States. Chapter 4: Hospitalizations, Readmissions, Emergency Department Visits, and Observation Stays. Am J Kidney Dis 2019; 73(3), Supplement 1: S387-S410.
2. Molnar AO, Moist L, Klarenbach S, Lafrance JP, Kim SJ, Tennankore K, Perl J, Kappel J, Terner M, Gill J, Sood MM. Hospitalizations in Dialysis Patients in Canada: A National Cohort Study. Can J Kidney Health Dis. 2018;5:2054358118780372- eCollection 2018.
3. Raymond M. Hakim and Allan J. Collins. Reducing Avoidable Rehospitalization in ESRD: A Shared Accountability. J Am Soc Nephrol. 2014 Sep; 25(9): 1891–1893.
4. Adams SV, Rivara M, Streja E, Cheung AK, Arah OA, Kalantar-Zadeh K, Mehrotra R. Sex Differences in Hospitalizations with Maintenance Hemodialysis. J Am Soc Nephrol. 2017;28(9):2721-2728.
5. Pedrini LA, Winter AC, Cerino F, Zawada AM, Garbelli M, Feuersenger A, Feliciani A, Ruggiero P, Civardi S, Amato C, Canaud B, Stuard S, Karch A, Gauly A. Clinical outcomes of hemodialysis patients in a public-private partnership care framework in Italy: a retrospective cohort study. BMC Nephrol. 2019;20(1):35.

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