

Readmissions, Other Healthcare Encounters, and Death After Admission for Cardiovascular Events in Hemodialysis Patients

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Introduction

- Patients receiving maintenance hemodialysis (HD) have high rates of cardiovascular disease (CVD).
- As a result, CVD-related hospital readmissions are common.
- However, events following an admission for a CVD are not fully understood.
- In HD patients admitted for a CVD indication, we examined outcomes at 10 and 30 days for:
 - All-cause readmissions
 - CVD readmissions
 - Death
 - Emergency Department (ED) and Observation stay (OBS) encounters

Methods

- Using CMS ESRD data from 2012-13, we created a cohort of prevalent HD patients who were admitted and discharged alive for a CVD event.
- Index events were
 - acute coronary syndrome
 - arrhythmia
 - cardiomyopathy/CHF
 - stroke
 - other CVD events
- For the outcomes listed above, percentages for each were calculated at 10 and 30 days
- Cause of death was ascertained from the ESRD Death Notification Form (CMS-2746).

Results

Table 1

- Of 142,201 total CVD-related index admissions, 34.2% resulted in a readmission within 30 days, and 15.6 within 10 days.
- Death within 30 days occurred in 4.5% of hospitalizations
- Rates of ED and OBS encounters following index admission were also high.

Table 2. Causes of 30-day readmission

Causes of Readmission	n	%
All readmissions*	48,604	100.0
CVD-related readmissions	20,960	43.1
Cardiomyopathy and CHF	8305	17.1 (39.6 [†])
Other cardiovascular disease	8291	17.1 (39.6 [†])
Hypertensive CKD, unspecified, with CKD stage 5 or ESRD	1877	3.9 (9.0 [‡])
Hypertensive CKD, malignant, with CKD stage 5 or ESRD	1262	2.6 (6.0 [‡])
Coronary atherosclerosis of native coronary artery	1067	2.2 (5.1 [‡])
Hypertensive heart and CKD, unspecified, with CHF and CKD stage 5 or ESRD	635	1.3 (3.0 [‡])
Atherosclerosis of native arteries of extremities with gangrene	632	1.2 (3.0 [‡])
Arrhythmia	2037	4.2 (9.7 [‡])
Acute coronary syndrome	1672	3.4 (8.0 [‡])
Stroke	655	1.3 (3.1 [‡])
Other readmissions	27,644	56.9
Septicemia, unspecified	1790	3.7 (6.5 [‡])
Pneumonia, organism unspecified	1624	3.3 (5.9 [‡])
Hyperkalemia	1054	2.2 (3.8 [‡])
Acute respiratory failure	1024	2.1 (3.7 [‡])
Other complications due to renal dialysis device, implant, and graft	959	2.0 (3.5 [‡])

*Index hospitalizations with all-cause readmission as first outcome event within 30 days.

[†]Percentage of CVD-related readmissions.

[‡]Percentage of non-CVD-related readmissions.

CHF, congestive heart failure; CKD, chronic kidney disease; CVD, cardiovascular disease; ESRD, end-stage renal disease.

Table 1. Outcome events following discharge from index hospitalization, within 10 or 30 days

Hospitalizations, n = 142,210	Events					ED visit/ Obs. Stay
	All-Cause Readmission	Cardiovascular Readmission	Death, no Readmission	Death and Readmission	Death*	
30-day outcomes, %						
All cardiovascular hospitalizations	34.2	14.7	1.8	2.6	4.5	24.6
Acute coronary syndrome	37.0	16.8	2.6	3.8	6.4	24.4
Arrhythmia	31.2	13.3	1.9	2.9	4.8	22.9
Cardiomyopathy, CHF	34.6	16.1	1.8	2.8	4.6	23.7
Stroke	29.1	9.8	3.0	3.3	6.3	23.0
Other cardiovascular disease	34.5	14.0	1.5	2.1	3.6	26.1
10-day outcomes, %						
All cardiovascular hospitalizations	15.6	6.6	0.9	0.6	1.5	11.6
Acute coronary syndrome	19.0	8.7	1.3	1.0	2.3	12.0
Arrhythmia	15.1	6.6	0.9	0.6	1.5	10.8
Cardiomyopathy, CHF	15.1	6.9	0.9	0.6	1.5	10.6
Stroke	14.5	4.8	1.8	0.7	2.4	11.4
Other cardiovascular disease	15.5	6.2	0.8	0.5	1.2	12.5

*Regardless of readmission.

CHF, congestive heart failure; ED, emergency department; Obs., observation.

Table 3

- Slightly over half of 30-day deaths were attributed to cardiac causes
- Withdrawal was the cause of death in more than 1 in 8 cases.
- In fully 1 in 5 cases, cause of death was unknown.

Table 3. Cause of death (without readmission) within 30 days of discharge from index hospitalization

Cause of Death	Death Without Readmission		Death Regardless of Readmission	
	n	%	n	%
All	2593	100.0	6352	100.0
Cardiac	1342	51.8	3251	51.2
Withdrawal from dialysis	410	15.8	822	12.9
Infection	47	1.8	349	5.5
Liver disease/gastrointestinal	19	0.7	101	1.6
Vascular	13	0.5	38	0.6
Metabolic/endocrine	5	0.2	22	0.4
Other	210	8.1	525	8.3
Unknown	547	21.1	1244	19.6

Conclusions

- Reducing 30-day readmissions is a major focus of Medicare (CMS).
- CVD-related admissions are subject to special scrutiny, since two of the three initially targeted conditions were CVD-related (heart failure and myocardial infarction).
- We found high rates of readmissions after CVD events: roughly 1 in 3 hospitalizations resulted in a 30-day readmission, with nearly half occurring in the first 10 days.
- The phenomenon of the “post-hospitalization syndrome” was evident, given that a large proportion of readmissions were for non-CVD indications.
- Death rates at 30 days were high overall; CVD admissions seemed to be a frequent cause of elective dialysis withdrawal.
- These findings are remarkable given that HD patients typically have close follow-up in the form thrice-weekly contact with the healthcare system.
- Interventions to reduce readmissions after CVD events are urgently needed.

