Chapter 4: Hospitalization

Introduction

Hospital admissions among end-stage renal disease (ESRD) patients represent a significant societal and financial burden, and have a major negative impact on patients' well-being and quality of life. Hence, monitoring trends in hospitalization is a key to ensuring that quality of care is maintained. Care providers can respond with appropriate strategies to prevent inappropriate admissions and reduce the incidence of rehospitalization, especially for frailer patient groups.

Hospitalization Trends and Comparisons

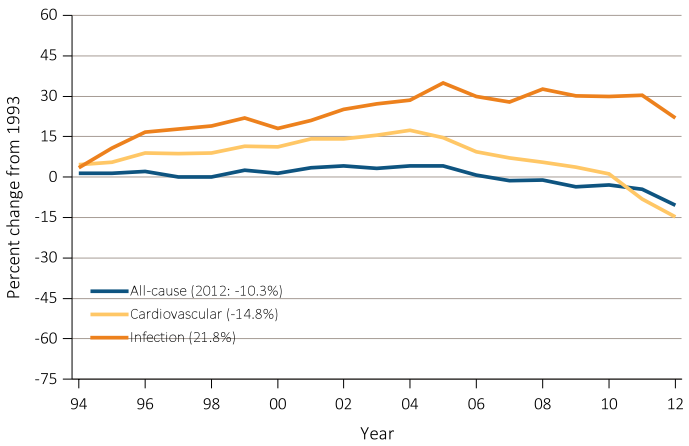
Among hemodialysis (HD) patients, the overall hospitalization rate in 2012 was 1.73 admissions per patient year—down from 1.84 in 2011, and 1.87 in 2010 (see Figure 4.1). Total hospital days per year fell to 11.0, from 11.8 in 2011. In the peritoneal dialysis (PD) population the hospitalization rate fell to 1.61, from 1.73 in 2011. Hospitalization rates in 2011 and 2012 continued to decline, as compared to prior years. Average length of stay also declined, continuing a downward trend observed since 2004.

In recent years, the Annual Data Report has increasingly focused on cause-specific hospitalization as an important morbidity surveillance issue. Between 1993 and 2012, hospitalizations due to infection rose by 21.8 percent. Among HD patients, hospitalization due to infection has increased by 34 percent since 1993, while hospital admissions resulting from other causes have decreased over the same time period (e.g., a 66.4 percent decrease in hospitalizations for vascular access procedures).

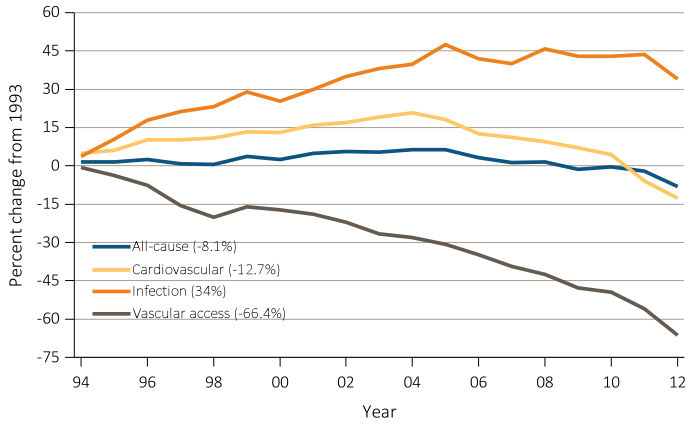
In the PD population, the overall rate of hospitalization for infection has changed little over time. Admissions for peritonitis, in contrast, have reduced, with rates now similar to those for vascular access infections in the hemodialysis population. These have shown an encouraging decline of 37.5 percent since 1999.

vol 2 Figure 4.1 Trends in adjusted all-cause & cause-specific hospitalization rates, by modality

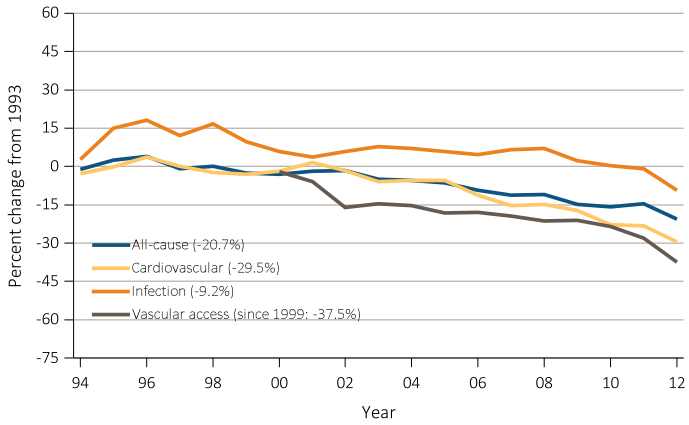
(a) All ESRD



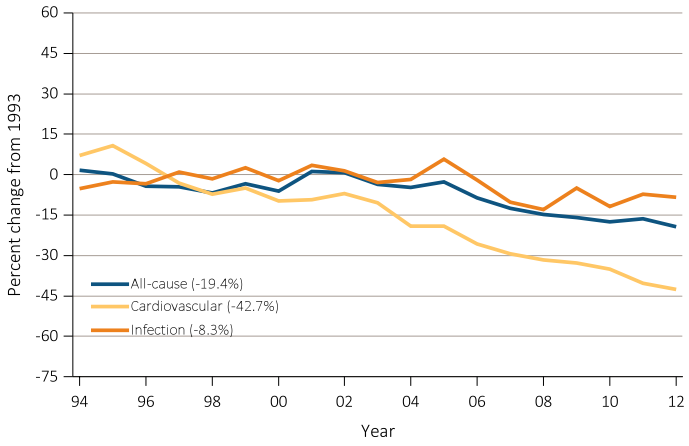
(b) Hemodialysis



(c) Peritoneal dialysis



(d) Transplant



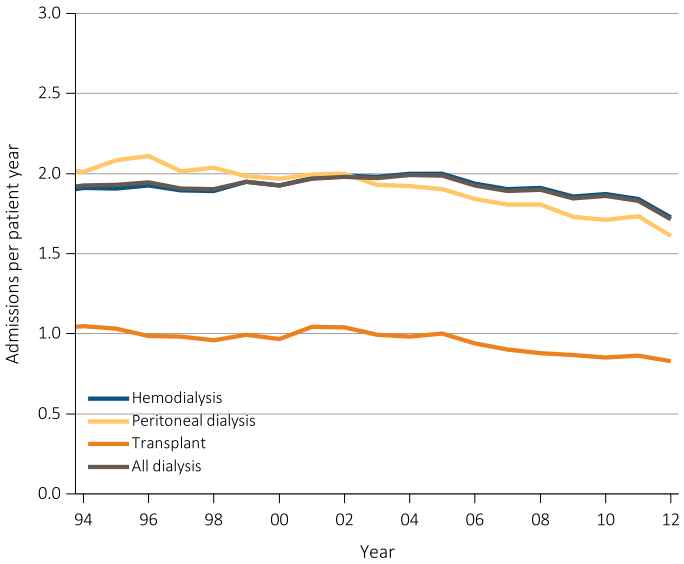
Data Source: Reference tables: G.1, G.3, G.4, G.5, and special analyses, USRDS ESRD Database. Period prevalent ESRD patients; adjusted for age, sex, race, & primary diagnosis; ref: ESRD patients, 2010. Percent changes from 1993 for the year 2012 are shown in parentheses. Abbreviations: ESRD, end-stage renal disease.

As shown in Figure 4.2, 2012 admissions for hemodialysis patients decreased to 1.73 per patient year, as compared to 1.88 in 1993. During that same period, rates for peritoneal dialysis and transplant patients have improved to a greater degree, falling by 20.7 and 19.4 percent, respectively. Hospital days per patient year have decreased to approximately 11.0 for both HD and PD patients and to 5.4 for those with a kidney transplant.

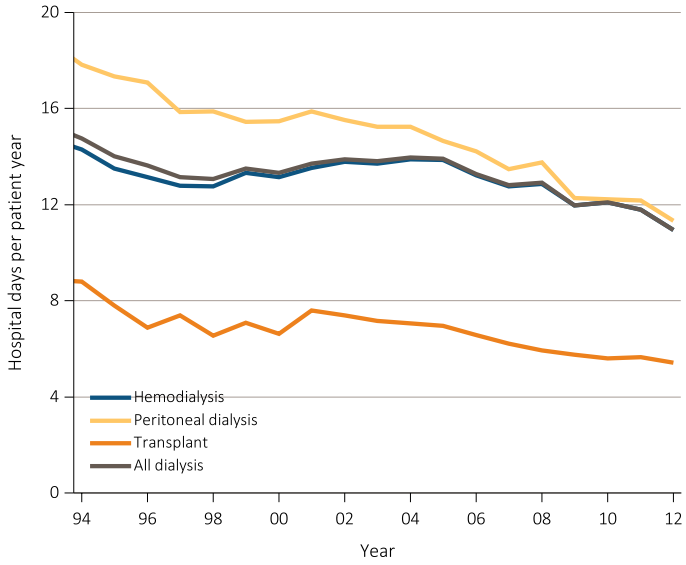
When adjusted for demographic and diagnostic characteristics, all-cause hospitalization rates among hemodialysis patients exhibited little change from 2001-2002 to 2005-2006, but decreased by 10 percent in the following six years. Rates related to cardiovascular admissions and those for vascular access infection fell 22.4 and 43.0 percent, respectively, during the same time period; rates for infection overall, however, increased by 4.5 percent. Patient groups shown to have a higher risk of hospitalization (both overall and for most cause-specific diagnoses) include those aged 20–44 or 75 and older, females, Whites, Blacks/African Americans, and patients who have diabetes as their primary cause of renal failure.

vol 2 Figure 4.2 Trends in adjusted hospitalization rates and hospital days, by modality

(a) Admissions



(b) Hospital days



Data Source: Reference tables: G.1, G.3, G.4, G.5, G.6, G.8, G.9, G.10, and special analyses, USRDS ESRD Database. Period prevalent ESRD patients; adjusted for age, sex, race, & primary diagnosis; ref: ESRD patients, 2010. Abbreviations: ESRD, end-stage renal disease.

vol 2 **Table 4.1 Adult hemodialysis patients: Unadjusted & adjusted all-cause & cause-specific hospitalization rates (per patient year)**

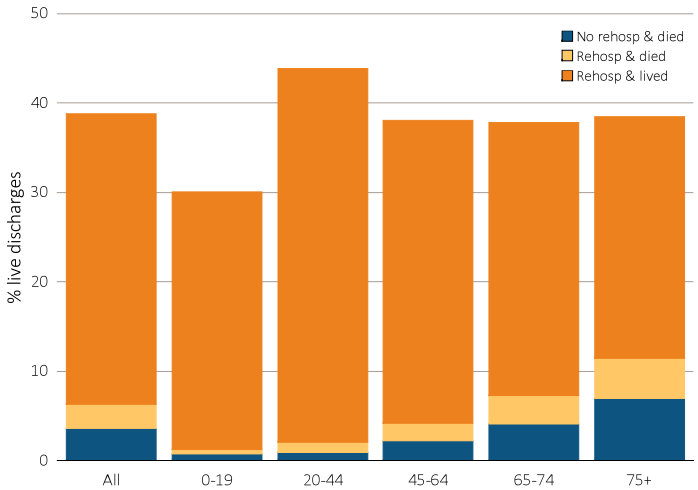
	All		Cardiovascular		Infection (any)		Vascular access infection	
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
2001-2002	1.99	2.00	0.59	0.59	0.43	0.43	0.12	0.12
2003-2004	2.00	2.01	0.61	0.61	0.45	0.45	0.13	0.13
2005-2006	1.98	1.99	0.58	0.58	0.47	0.47	0.13	0.13
2007-2008	1.92	1.92	0.56	0.56	0.47	0.47	0.12	0.12
2009-2010	1.88	1.88	0.53	0.53	0.47	0.47	0.11	0.11
2011-2012	1.79	1.79	0.46	0.46	0.45	0.45	0.07	0.07
2011-2012								
20-44	1.80	1.98	0.36	0.39	0.43	0.47	0.10	0.10
45-64	1.74	1.74	0.43	0.43	0.43	0.43	0.07	0.07
65-74	1.83	1.79	0.50	0.49	0.46	0.45	0.06	0.06
75+	1.85	1.85	0.52	0.51	0.50	0.49	0.06	0.06
Male	1.66	1.66	0.43	0.44	0.42	0.42	0.06	0.06
Female	1.96	1.96	0.49	0.49	0.49	0.49	0.08	0.08
White	1.83	1.83	0.47	0.46	0.49	0.48	0.07	0.07
Black/African American	1.79	1.82	0.47	0.47	0.41	0.43	0.08	0.08
Other race	1.45	1.42	0.36	0.36	0.39	0.38	0.06	0.06
Hispanic	1.68	1.68	0.42	0.42	0.44	0.44	0.07	0.07
Diabetes	1.98	2.01	0.50	0.50	0.50	0.50	0.07	0.07
Hypertension	1.67	1.67	0.47	0.47	0.40	0.40	0.07	0.07
Glomerulonephritis	1.54	1.55	0.36	0.39	0.39	0.39	0.07	0.06
Other	1.67	1.70	0.37	0.38	0.46	0.46	0.07	0.07

Data Source: Reference tables: G.3, G.13, and special analyses, USRDS ESRD Database. Period prevalent hemodialysis patients aged 20 & older; adjusted for age, sex, race, & primary diagnosis; rates by one factor adjusted for the remaining three; ref: hemodialysis patients, 2010. See Vol. 2, ESRD Analytical Methods for principal ICD-9-CM diagnosis codes included in each cause of hospitalization category. Abbreviations: ESRD, end-stage renal disease.

Rehospitalization

Rehospitalization is an important indicator of both morbidity and quality of life. It is also often costly, particularly among the ESRD patients being treated in dialysis facilities. Among hemodialysis patients prevalent in 2012, 35.2 percent of discharges from an all-cause hospitalization were followed by a rehospitalization within 30 days (see Figure 4.3). Rehospitalization rates commonly decrease as mortality increases in the older age groups, illustrating these competing risks, as death precludes the opportunity for readmission. Rates of death without rehospitalization, for example, are highest in patients age 75 and older, at 6.9 percent, while these patients have the lowest rehospitalization rates, at 31.6 percent.

vol 2 **Figure 4.3 Rehospitalization or death within 30 days from live hospital discharge, by age, 2012**

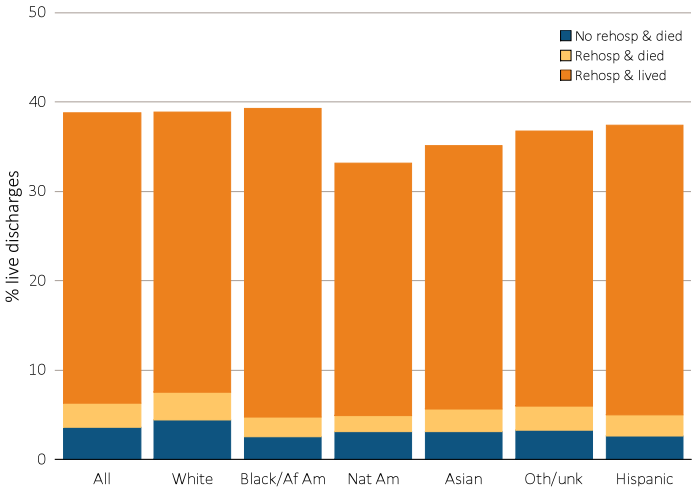


Data Source: Special analyses, USRDS ESRD Database. Period prevalent hemodialysis patients, all ages, 2012; unadjusted. Includes live hospital discharges from January 1 to December 1, 2012. Cause-specific hospitalizations are defined by principal ICD-9-CM codes. See Vol. 2, ESRD Analytical Methods for principal ICD-9-CM diagnosis codes included in each cause of hospitalization category. Abbreviations: ESRD, end-stage renal disease; rehosp, rehospitalization.

The highest rates of rehospitalization occur for adults age 20–44—42.9 percent of their discharges are followed by a readmission within 30 days. For the combined endpoint of rehospitalization and/or death, the highest rates are again seen among patients age 20–44, at 43.8 percent. The rehospitalization rate exceeds the rate of the combined endpoint even in patients age 75 and older, at 38.5 percent. These data suggest that the observed, elevated rehospitalization rates among younger versus older groups may not be entirely attributable to the competing risk of mortality.

As illustrated in Figure 4.4, when considering patient race, the highest rates of rehospitalization or rehospitalization/death are seen among Blacks /African Americans, at 36.7 and 39.3 percent, respectively. The lowest rates occur among Native Americans, at 30.1 and 33.2 percent. However, the highest rate of post-discharge death is found among White hemodialysis patients.

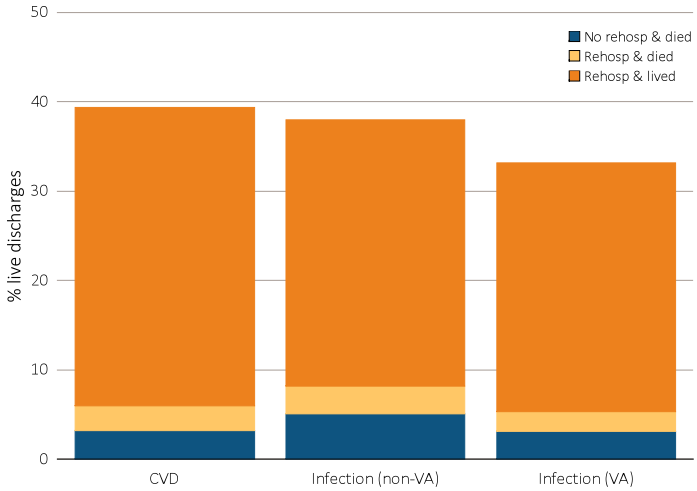
vol 2 Figure 4.4 Rehospitalization or death within 30 days from live hospital discharge, by race & ethnicity, 2012



Data Source: Special analyses, USRDS ESRD Database. Period prevalent hemodialysis patients, all ages, 2012; unadjusted. Includes live hospital discharges from January 1 to December 1, 2012. Cause-specific hospitalizations are defined by principal ICD-9-CM codes. See Vol. 2, ESRD Analytical Methods for principal ICD-9-CM diagnosis codes included in each cause of hospitalization category. Abbreviations: Af Am, African American; ESRD, end-stage renal disease; Nat Am, Native American; Oth/unk, other or unidentified race; rehosp, rehospitalization.

For hemodialysis patients, specific cause of hospital admission also contributes to the outcome. The overall all-cause rehospitalization rate in 2012 was 35.2 percent (Figure 4.3). For cardiovascular, infection, and vascular access infection hospitalizations the rates were 36.2, 32.9, and 30.1 percent, respectively (see Figure 4.5).

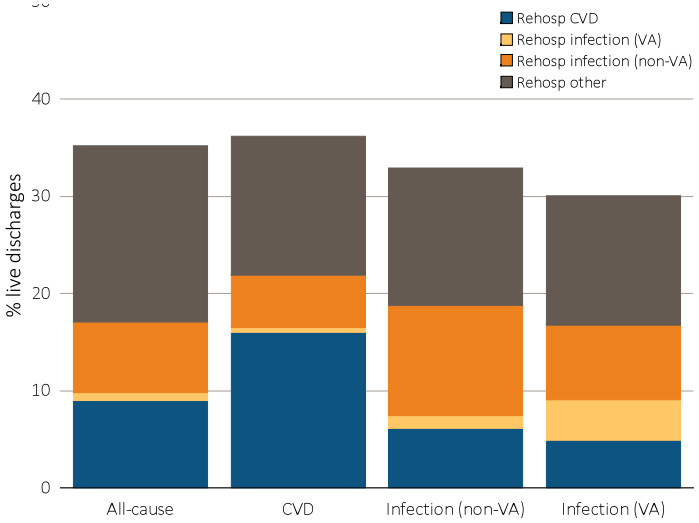
vol 2 Figure 4.5 Rehospitalization or death within 30 days from live hospital discharge, by cause of index hospitalization, 2012



Data Source: Special analyses, USRDS ESRD Database. Period prevalent hemodialysis patients, all ages, 2012, unadjusted. Includes live hospital discharges from January 1 to December 1, 2012. Cause-specific hospitalizations are defined by principal ICD-9-CM codes. See Vol. 2, ESRD Analytical Methods for principal ICD-9-CM diagnosis codes included in each cause of hospitalization category. Abbreviations: CVD, cardiovascular disease; ESRD, end-stage renal disease; rehosp, rehospitalization; VA, vascular access.

Figure 4.6 illustrates that rehospitalization in the 30 days following a live hospital discharge frequently results from a similar diagnostic cause, possibly indicating an incomplete resolution of the initial complaint. During 2012, following a discharge from a cardiovascular index hospitalization, 16.0 percent of patients experienced a rehospitalization for a similar condition. Specific rehospitalization for overall infection and vascular access infection followed 11.4 and 4.2 percent of discharges, respectively, from index hospitalizations of the same categories. This compares to the lower rates of 7.2 percent (overall infection) and 0.8 percent (vascular access infection) following discharges from all-cause index hospitalizations. Much of these differences can be attributed to the difference between chronic (i.e. CVD) and acute (i.e. infection) conditions. Chronic conditions do not resolve whereas acute conditions are expected to get better.

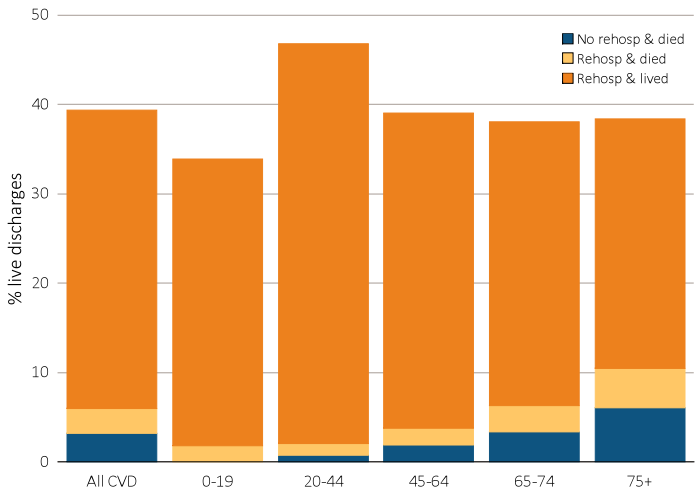
vol 2 Figure 4.6 Cause-specific rehospitalization within 30 days from live hospital discharge, by cause of index hospitalization, 2012



Data Source: Special analyses, USRDS ESRD Database. Period prevalent hemodialysis patients, all ages, 2012, unadjusted. Includes live hospital discharges from January 1 to December 1, 2012. Cause-specific hospitalizations are defined by principal ICD-9-CM codes. See Vol. 2, ESRD Analytical Methods for principal ICD-9-CM diagnosis codes included in each cause of hospitalization category. Abbreviations: CVD, cardiovascular disease; ESRD, end-stage renal disease; rehosp, rehospitalization; VA, vascular access.

Rehospitalization rates following discharge from a cardiovascular index hospitalization are highest among younger adults. In those aged 20–44, for example, 46.1 percent of discharges are followed by a rehospitalization within 30 days (Figure 4.7). These rates mirror those for all-cause index hospitalizations (Figure 4.3), but their values are somewhat greater. As with the all-cause rates, rehospitalization following a cardiovascular index hospitalization was more common for all patients than were the rates of the combined endpoint of rehospitalization and/or mortality, among even the oldest patients, at 38.4 percent.

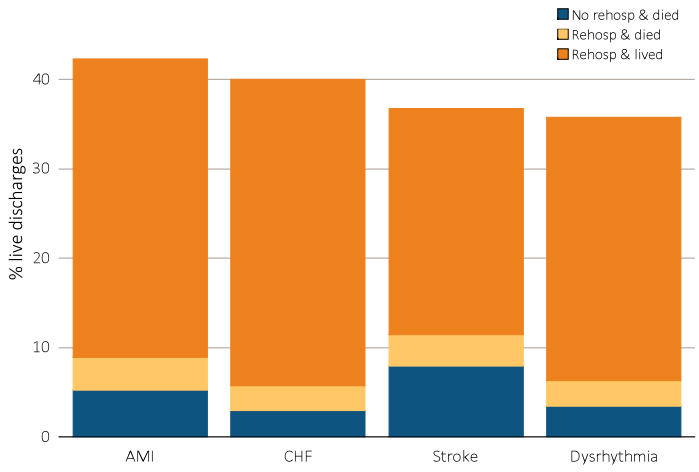
vol 2 Figure 4.7 Rehospitalization or death within 30 days from live hospital discharge for cardiovascular index hospitalization, by age, 2012



Data Source: Special analyses, USRDS ESRD Database. Period prevalent hemodialysis patients, all ages, 2012, unadjusted. Includes live hospital discharges from January 1 to December 1, 2012. Cause-specific hospitalizations are defined by principal ICD-9-CM codes. See Vol. 2, ESRD Analytical Methods for principal ICD-9-CM diagnosis codes included in each cause of hospitalization category. Abbreviations: CVD, cardiovascular disease; ESRD, end-stage renal disease; rehosp, rehospitalization.

For cardiovascular index hospitalizations (Figure 4.8), rehospitalization occurs most frequently following discharge from treatment of acute myocardial infarction (AMI) and congestive heart failure (CHF), at 42.3 and 40.0 percent, respectively. The lowest rates occur following discharge after dysrhythmia, at 35.8 percent. Stroke patients have the highest post-discharge mortality rate.

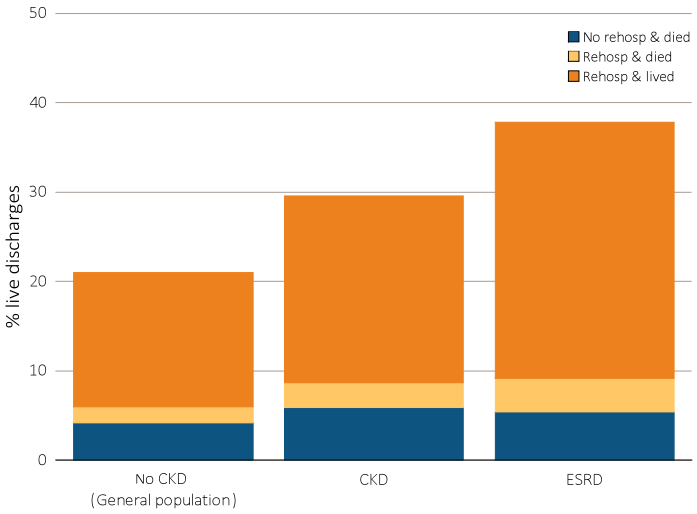
vol 2 Figure 4.8 Rehospitalization or death within 30 days from live hospital discharge, by cause-specific cardiovascular index hospitalization, 2012



Data Source: Special analyses, USRDS ESRD Database. Period prevalent hemodialysis patients, all ages, 2012, unadjusted. Includes live hospital discharges from January 1 to December 1, 2012. Cause-specific hospitalizations are defined by principal ICD-9-CM codes. See Vol. 2, ESRD Analytical Methods for principal ICD-9-CM diagnosis codes included in each cause of hospitalization category. Abbreviations: AMI, acute myocardial infarction; CHF, congestive heart failure; ESRD, end-stage renal disease; rehosp, rehospitalization.

Figure 4.9 illustrates the relatively negative 30-day post-discharge outcomes for patients diagnosed with kidney disease, as compared to the general population. Among older Medicare beneficiaries, those with chronic kidney disease (CKD) or ESRD experienced rehospitalization at rates of 23.7 and 32.4 percent, respectively, as compared to only 16.8 percent for patients without kidney conditions. This holds true for the outcomes of death and/or rehospitalization—29.6 (CKD) and 37.8 percent (ESRD), versus only 21.0 percent for patients without CKD.

vol 2 Figure 4.9 Rehospitalization or death within 30 days from live hospital discharge in patients age 66 & older, by kidney function, 2012



Data Source: Special analyses, USRDS ESRD Database. January 1, 2012 point prevalent Medicare patients age 66 & older on December 31, 2011; for the CKD & no CKD cohorts during 2011, CKD is defined & patients are continuously enrolled in Medicare Parts A & B with no HMO coverage & without ESRD. Abbreviations: CKD, chronic kidney disease; ESRD, end-stage renal disease; rehosp, reshopitalization.