Patterns of Emergency Department Visits among American Dialysis Patients

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Introduction

- Patients with end-stage kidney disease (ESKD) treated with dialysis are at risk for medical events requiring immediate intervention in settings such as the Emergency Department (ED).
- ED visits may directly precede hospital admission.
- Despite the frequency and importance of ED visits among dialysis patients, patterns of these events among the contemporary dialysis population have not been described.

Objective

To describe, for the contemporary U.S. dialysis population, patterns of ED visits and subsequent hospital admissions

Methods

- All study data were derived from the 2016 CMS 100% claims sample.
- Included patients were adults (age ≥ 18) who, in a given calendar month and for the 3 months prior, met the following criteria:
  - Were eligible for Medicare Parts A & B; had a diagnosis of ESKD; were on active dialysis; had an identifiable dialysis modality
- Modality was ascribed on a monthly basis using submitted claims; when a value was missing or when multiple values were present in a given month, an imputation algorithm that considered prior and subsequent months was used.
- Patients contributed follow-up time for each month in which they met eligibility criteria and were censored for death at the start of the month in the event that death occurred.
- Geographic regions that were part of core-based statistical areas (based on the National Bureau of Economic Research designations) were considered as urban; all other regions were considered as rural.
- All outcomes were determined from claims data.
- Causes of ED visits and hospital admissions were ascribed on the basis of the primary ICD-10 code associated with the claim and grouped using Clinical Classification Software (CCS) level 1 categories.
- Outcomes were described as rates or counts and percentages as appropriate. No statistical comparisons were performed.

Results

ED Visits by Geography and Modality

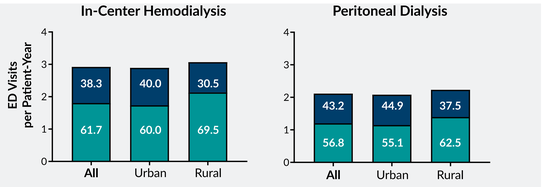
- Compared to patients with fewer ED visits per patient-year, patients with more ED visits per patient-year tended to be younger, and were more likely to be female, of black race, to reside in an rural area, and to be treated with in-center hemodialysis (ICHD) vs. peritoneal dialysis (PD, Table 1).
- Patients treated with ICHD had 2.9 ED visits/patient-year, of which 38.3% resulted in hospital admission (Figure 1).
  - The rate of ED visits was higher in rural patients (3.0 visits/year) vs. urban patients (2.8 visits/patient-year); the percent of ED visits that resulted in hospital admission was higher among urban (40.0%) vs rural patients (30.5%).
- Similar patterns were observed with respect to patients treated with PD, where the overall ED visit rate was 2.1 visits/patient-year.
  - The ED visit rate was higher among rural patients (2.3 visits/patient-year) vs urban patients (2.1 visits/patient-year); the percent of ED visits resulting in hospital admission was higher among urban (44.9%) vs rural (37.5%) patients.

Table 1: Patient Characteristics by ED Visit Rate

	ED Visits per Patient-Year			
	≤2 (N=212,828)	>2-4 (N=57,772)	>4-12 (N=70,463)	>12 (N=16,591)
Age, y, mean ± SD	62.2 ± 14.4	63.0 ± 14.4	62.6 ± 14.7	58.9 ± 15.9
Sex, %				
Male	58.7	52.8	50.4	49.5
Female	41.3	47.2	49.6	50.5
Race, %				
White	46.4	47.4	48.4	47.0
Black	35.4	37.4	38.0	41.0
Other	18.2	15.2	13.6	12.0
Region type, %				
Urban	82.3	81.9	81.9	80.0
Rural	17.7	18.1	18.1	20.0
Modality, %				
ICHD	89.1	91.2	91.4	91.8
PD	10.9	8.8	8.6	8.2

Abbreviations: ED, emergency department; ICHD, in-center hemodialysis; PD, peritoneal dialysis; SD, standard deviation

Figure 1: ED Visits by Modality and Geography



Numbers in white indicate the percentage of ED visits resulting in discharge and admission for each region type; urban is defined as being located within a core-based statistical area; rural represents are all other regions. Abbreviations: ED, emergency department

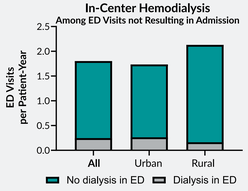
Dialysis in the Emergency Department

- Among patients treated with ICHD who had ED visits thad did not result in hospital admission, receipt of dialysis treatment in the ED was relatively rare (0.2 events/patient-year, Figure 2).
  - Dialysis in the ED was more common among urban vs. rural patients (0.3 vs 0.2 events/patient-year, respectively).

Hospital Admissions Originating in the Emergency Department

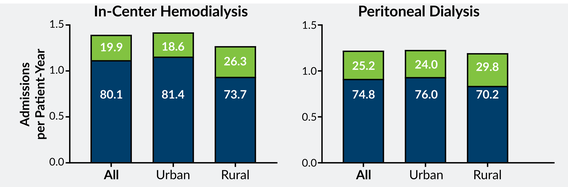
- Among patients treated with ICHD, 80.1% of hospital admissions orginated in the ED (Figure 3).
  - The proportion of admissions originating in the ED was greater among urban vs. rural patients (81.4 vs 73.7%, respectively).
- Similar patterns were observed among patients treated with PD, where 74.8% of hospital admissions originated in the ED.

Figure 2: Dialysis in the ED by Geography



Among ED visits not resulting in a hospital admission, a claim for dialysis services was taken as evidence of delivery of dialysis in the ED. Due to limitations of the data source, delivery of dialysis in the ED could not be unambiguously identifed among patients who were admitted from the ED to the hospital. This analysis considered patients treated with ICHD only.

Figure 3: Origin of Hospital Admissions by Modality and Geography

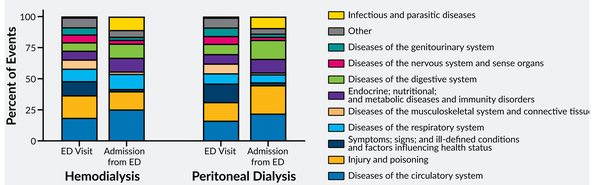


Numbers in white indicate the percentage of hospital admissions initiating in the ED vs. other admissions for each region type; urban is defined as being located within a core-based statistical area; rural represents are all other regions. Abbreviations: ED, emergency department

Causes of ED Visits and Hospital Admissions

- Across modalities, ED visits attributed to "Diseases of the Circulatory System" and "Injury and Poisoning" were common and likely to result in hospital admission (Figure 4).
  - Diseases of the circulatory system includes codes for hypertension and congestive heart failure
  - Injury and Poisoning includes codes for issues arising from devices and grafts.
- The majority of ED visits attributed to "Infectious and Parasitic Diseases" resulted in hospital admission, regardless of modality.

Figure 4: Causes of ED Visits and Hospital Admissions from the ED



Causes of ED visits and hospital admissions were ascribed on the basis of the primary ICD-10 code associated with the claim; ICD-10 codes were assigned to categories using Clinical Classification Software Level 1 groupings.

Conclusions

- ED visits occur more frequently among ICHD vs PD patients; ED visits are more likely to result in hospital admission among PD patients.
- Delivery of dialysis in the ED in the absence of a hospital admission is rare.
- ED visits are more common among rural vs. urban patients; however, ED visits are more likely to result in hospital admission among urban patients.
- The majority of hospital admissions among ESKD patients begin with an ED visit.
- ED visits arise from a range of causes, some of which are more likely to result in hospital admission vs. discharge without admission.
- Improved understanding of the patterns of ED visits among ESKD patients may inform strategies for interventions that improve health outcomes and quality of life.

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