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Outpatient Use of Intravenous Diuretic Therapy for Heart Failure in the United States

Stephen J. Greene, MD^{a,b}, Lauren E. Wilson, PhD^c, Siddique A. Abbasi, MD, MSc^d, Akeem Yusuf, PhD^d, Bradley G. Hammill, DrPH^{a,c}

^aDuke Clinical Research Institute, Durham, North Carolina

^bDivision of Cardiology, Duke University School of Medicine, Durham, North Carolina

^cDepartment of Population Health Sciences, Duke University School of Medicine, Durham, North Carolina

^dAmgen, Inc., Thousand Oaks, California

Given the public health and economic impact of hospitalizations for heart failure (HF), there has been increasing emphasis on hospitalization prevention among clinicians, researchers, health systems, and payers. Select academic centers have published local experiences with outpatient intravenous (IV) diuretic clinics designed to manage symptoms and obviate need for hospitalization or emergency department (ED) presentation.(1) HF clinical trials have increasingly recognized outpatient receipt of IV diuretics within study eligibility criteria and endpoints.(2,3) Nonetheless, the uptake of an outpatient IV diuretic care strategy and associations with HF outcomes across the United States (US) are unknown.

Inpatient and outpatient hospital visits for a primary HF diagnosis from January 1, 2006 to September 31, 2015 were identified within claims from Medicare 5% datasets. Visits were assigned to mutually exclusive categories: i) outpatient clinic visit with IV diuretic administration; ii) outpatient clinic visit without IV diuretic administration; iii) ED visit with ED discharge; iv) hospital observation without inpatient hospitalization; and v) inpatient hospitalization. For acute care hospitals with 30-day HF post-discharge outcome data within the Center for Medicare and Medicaid Service Hospital Compare program, characteristics of hospitals with 1 affiliated outpatient IV diuretic visit were compared to hospitals with no such visits. To reflect contemporary practice, the pre-specified period of interest was July 31, 2012–June 30, 2015. Hospital Compare provides hospital-specific mortality and readmission estimates adjusted for patient factors. Hospital assignment to the “better-than-national-rate” tier reflects a 95% confidence interval (CI) entirely below the national rate. We used logistic and linear regression analyses adjusted for hospital characteristics (region, ownership, emergency services offered, medical school affiliation, bed size) to evaluate associations between outpatient IV diuretic use and 1) better-than-national-rate hospital-level HF 30-day risk-standardized all-cause readmission rate (RSRR) and risk-standardized all-cause mortality rate (RSMR), and 2) absolute 30-day RSRR and RSMR.

There were 1,144,274 unique HF care visits across 11,248 hospitals and outpatient clinics. Rates of outpatient IV diuretic administration remained low over time (0.5% of total HF visits in 2006; 1.0% of total HF visits in 2015) (Figure). Following implementation of the Hospital Readmission Reduction Program in 2012, there was a slight decrease in hospitalizations and a slight increase in standard clinic visits and observation unit stays.

Among 3,630 hospitals in Hospital Compare, 682 (18.7%) administered outpatient IV diuretics. Outpatient IV diuretic visits constituted a median 1.4% (25th–75th, 0.7%–3.1%) of total HF visits at these hospitals. Hospitals with outpatient IV diuretic administration were more likely to be acute care centers (94.3% versus 76.3%, $p<0.001$), have 100 hospital beds (81.7% versus 52.8%, $p<0.001$), and have medical school affiliation (50.6% versus 25.6%, $p<0.001$). Hospitals with outpatient IV diuretic administration had modestly lower 30-day RSMR, similar RSRR, and were more likely to have better-than-national-rate RSMR and RSRR (Figure). After adjustment, outpatient IV diuretic use was associated with higher likelihood of better-than-national-rate 30-day RSMR (odds ratio 1.89, 95% CI 1.33–2.67), but not 30-day RSRR (odds ratio 1.09, 95% CI 0.67–1.78). Outpatient IV diuretic use was not associated with lower absolute 30-day RSMR (–0.10% [standard error 0.06, $p=0.10$]) or RSRR (–0.10% [standard error 0.06, $p=0.11$]) after adjustment.

To our knowledge, this is the first large real-world characterization of outpatient IV diuretic therapy for treatment of HF. We found that use of this care strategy in the US has remained low over time. Study limitations include a selected older patient cohort, potential unmeasured confounders, and inability of observational analysis to determine cause-effect relationships.

More than 90% of US hospitalized HF patients receive IV diuretics with many receiving no other IV therapy.(1) Trial data suggest similar mortality for worsening HF patients following treatment in inpatient and outpatient settings.(1) Likewise, outpatient IV diuretic administration is increasingly considered similar to hospitalization within HF trial eligibility criteria and endpoints.(2,3) These collective observations suggest outpatient IV diuretic therapy may be a patient-centered alternative to inpatient or ED care for select HF patients, potentially maximizing patient time spent outside the hospital and reducing healthcare costs. Despite this plausible utility, we found outpatient IV diuretic therapy to be rarely used. Prospective randomized studies are needed to determine the safety and effectiveness of outpatient IV diuretic therapy compared with traditional hospital-based care for worsening HF.

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Figure.

(A) Relative distribution of annual HF visits from 2006 to 2015. Inset shows the same data on an enlarged Y-axis. (B) 30-day post-discharge outcomes following hospitalization for HF.