Rates and Predictors of 30-Day Readmission Among Commercially Insured and Medicaid-Enrolled Patients Hospitalized With Systolic Heart Failure

Larry A. Allen, MD, MHS; Karen E. Smoyer Tomic, PhD; David M. Smith, PhD, CSTAT; Kathleen L. Wilson, MPH; Irene Agodoa, MD

Background—Heart failure (HF) readmission rates are primarily derived from Medicare enrollees. Given increasing public scrutiny of HF readmissions, understanding the rate and predictors in populations covered by other payers is also important, particularly among patients with systolic dysfunction, for whom most HF-specific therapies are targeted.

Methods and Results—MarketScan Commercial and Medicaid Administrative Claims Databases were used to identify all first hospitalizations with an International Classification of Diseases-9 discharge diagnosis code for HF (primary position) and systolic HF (any position) between January 1, 2005, and June 30, 2008. Among 4584 unique systolic HF index admissions (mean age 55 years), 30-day crude readmission rates were higher for Medicaid than commercially insured patients: all-cause 17.4% versus 11.8%; HF-related 6.7% versus 4.0%, respectively. In unadjusted analysis, higher comorbidity and prior healthcare utilization predicted readmission; age, sex, and plan type did not. After adjustment for case mix, the odds of all-cause and HF-related readmission were 32% and 68% higher, respectively, among Medicaid than commercially insured patients (P<0.02 for both). No significant differences in readmission rates were seen for managed care versus fee-for-service or capitated versus noncapitated plan types.

Conclusions—Compared with commonly cited Medicare HF readmission rates of 20% to 25%, Medicaid patients with systolic HF had lower 30-day readmission rates, and commercially insured patients had even lower rates. Even after adjustment for case mix, Medicaid patients were more likely to be readmitted than commercially insured patients, suggesting that more attention should be focused on readmissions among socioeconomically disadvantaged populations.

Key Words: heart failure • systolic • hospitalization • readmission • payer

Although heart failure (HF) is more common among older populations, ≈20% of HF hospitalizations occur in patients under 65 years of age. These hospitalizations contribute significant burden to patients and payers, and are commonly covered by Medicaid and commercial insurance. Data from the Agency for Healthcare Quality and Research show that cardiovascular disorders are the third most common reason for hospitalization for Medicaid claims (behind maternal and respiratory) and second most common for commercial insurance claims, with HF as a significant portion of the cardiovascular group. Medicare’s introduction of public reporting and value-based purchasing centered on 30-day risk-adjusted readmission rates after hospital discharge for HF has heightened interest among state governments and commercial payers in HF readmissions. This has placed HF readmissions at the forefront of hospital and commercial health insurance quality improvement initiatives.

Despite this attention, we know relatively little about the rates and causes of readmission across different populations. This is attributable in part to the characterization of HF readmission primarily from randomized trial populations and Medicare databases. Additionally, heterogeneous populations of patients with HF have often been lumped together, despite significant differences in patient characteristics and response to therapies between HF with reduced versus preserved left ventricular ejection fraction. Rate estimates are needed for commercially insured and Medicaid populations to provide a starting point for benchmarking. Additionally, improved risk stratification tools for readmission in non-Medicare populations—particularly among those with systolic HF for whom the majority of HF-specific therapies and HF core process measures apply—are important in appropriately tailoring inpatient care, discharge planning, and follow-up care. Finally, a better understanding of potential differences in readmission rates by payer and health plan type may help to inform hospital reimbursement policy.11

Clinical Perspective on p 679

Editorial see p 667

© 2012 American Heart Association, Inc.

Circ Heart Fail is available at http://circheartfailure.ahajournals.org

DOI: 10.1161/CIRCHEARTFAILURE.112.967356
Our objective was to use administrative claims data collected from selected state Medicaid programs and commercial insurers to (1) characterize 30-day all-cause and HF-related readmission rates for patients <65 years of age hospitalized with systolic HF, (2) compare rates for Medicaid versus commercially insured patients, (3) compare rates among different health insurance plan types, and (4) assess whether differences in readmission rates by payer and plan type are attributable to measurable differences in patient mix.

Methods
A retrospective, observational study was conducted to select patients with a hospitalization for systolic HF using administrative claims from the Truven Health MarketScan Commercial Claims and Encounters Database (Commercial) and the Truven Health MarketScan Medicaid Multistate Database (Medicaid) (Truven Health Analytics, Inc., Ann Arbor, MI). The Commercial database, constructed from claims and enrollment data provided by large employer-sponsored health plans from across the US, contains the healthcare experience of more than 35 million privately insured individuals covered under a variety of fee-for-service, fully capitated, and partially capitated health plans. The Medicaid database contains the pooled healthcare experience of ≈10 million Medicaid enrollees each year from multiple geographically dispersed states.

The MarketScan Research Databases are de-identified and are fully compliant with the Health Insurance Portability and Accountability Act of 1996 (HIPAA). Because this study did not involve the collection, use, or transmittal of individually identifiable data, Institutional Review Board review or approval was not required.

Patient Selection
Patients aged 18 to 64 years were selected based on the occurrence of a hospitalization containing discharge diagnoses for both HF (primary diagnosis) and systolic HF (any diagnostic position) during the January 1, 2005, through June 30, 2008 time period. Our initial scan of International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnoses showed that the majority were coded 428.0 Heart failure, unspecified. We restricted the patient population to those with an ICD-9-CM code for systolic HF to obtain a more homogenous population in which to evaluate the role of payer and plan type in readmission. Recognizing the administrative systolic designation is relatively specific but not sensitive and thus undercounts the number of patients with left ventricular ejection fraction <40% who meet clinical heart failure criteria. HF was defined by ICD-9-CM diagnosis codes 402.01, 402.11, 402.91, 404.01, 404.03, 404.11, 404.13, 404.91, 404.93, and 428.xx, as used in the Hospital Compare method, approved by National Quality Forum, and publicly reported by the Centers for Medicare and Medicaid Services. Systolic HF was defined by ICD-9-CM diagnosis codes 428.1, 428.20, 428.21, 428.22, 428.23, 428.40, 428.41, 428.42, and 428.43. The first hospitalization meeting these diagnostic criteria (index admission) was used for the study analyses. Patients were required to have ≥12 months (preperiod) of continuous medical and pharmacy eligibility prior to the admission date (index date) of the index admission and 30 days after the discharge date of the index admission. Only the first readmission within 30 days was included in the analysis. Patients were excluded if the index admission claim had codes consistent with heart transplantation attributable to the rare and atypical nature of these admissions. Patients who had a discharge status of death (the only mortality indicator available in the data) were excluded. Patients who were dually eligible for both Medicaid and Medicare were also excluded from the analysis to restrict the cohorts to either a private or Medicaid payer.

Study Variables
Demographic variables as of index date included age, sex, insurance plan type (managed care, fee-for-service, and other/unknown), and

Descriptive and Multivariate Analysis
Patient characteristics assessed in the preperiod as well as characteristics of the index hospitalization were reported descriptively, stratified by 30-day all-cause readmission status. t tests and χ² tests were used to assess differences between those readmitted versus not readmitted. Stepwise logistic regression was used to identify significant all-cause and HF-related readmission risk factors from among payer (commercial versus Medicaid), patient demographics (excluding race because it was not available for commercially insured patients), and comorbidity conditions, as well as inpatient procedures received during the index admission and discharge status from the index admission. The variables included in the stepwise regression model are all of those described in Tables 1 and 2.

Model performance was assessed by various criteria such as adjusted R² and the c-statistic based on area under the receiver operating characteristic curve. All analyses were conducted with an a priori significance level of 0.05 and performed using SAS version 9.2 (SAS Institute Inc., version 9.2, Cary, NC).

Results
Crude Readmission Rates
The study included 4548 patients (Figure 1). Mean age was 55 years. The majority of patients were male (57.3%). Arrhythmias (35.6% of patients), atherosclerosis (38%), diabetes mellitus (36.9%), and valvular and rheumatic disease (30.1%) were the most common comorbid conditions. In addition, nearly one fifth of the cohort had a history of renal failure (19.8%), chronic obstructive pulmonary disease (19.2%), pneumonia (22.7%), or fluid/electrolyte/acid-base disorders (17.2%) (Table 1).

No age or sex differences were observed in readmitted versus not readmitted patients (Table 1). Readmitted patients had a higher comorbidity burden as measured by higher Deyo-Charlson Comorbidity Index, number of unique 3-digit ICD-9-CM codes, likelihood of previous hospitalization, and total healthcare expenditures in the 12-month preperiod (P<0.05 for all) (Table 1).

During the index hospitalization, readmitted patients were more likely to have had dialysis or a stay in the intensive care unit, and were less likely to have had a pacemaker or implantable cardioverter-defibrillator procedure or to have been discharged home rather than transferred to another facility (P≤0.01 for all). Readmitted patients had a mean initial length of stay of 7.3 days (SD 8.1 days) compared with 5.8 days (SD 4.7 days) for those not readmitted (P<0.001) (Table 2).
Table 1. Patient Characteristics in 12-Month Preperiod by Readmission Status

<table>
<thead>
<tr>
<th>Patient Characteristics*</th>
<th>All Patients</th>
<th>Readmitted Patients</th>
<th>Not Readmitted Patients</th>
<th>(P)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(N=4548)</td>
<td>(N=604)</td>
<td>(N=3944)</td>
<td></td>
</tr>
<tr>
<td>Age at index (mean, SD)</td>
<td>54.8 9.2</td>
<td>55.1 9.8</td>
<td>54.8 9.1</td>
<td>0.39</td>
</tr>
<tr>
<td>Age at index (median)</td>
<td>57.0</td>
<td>57.0</td>
<td>57.0</td>
<td></td>
</tr>
<tr>
<td>Sex at index (N, %)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>2604 57.3%</td>
<td>336 55.6%</td>
<td>2268 57.5%</td>
<td>0.39</td>
</tr>
<tr>
<td>Female</td>
<td>1944 42.7%</td>
<td>268 44.4%</td>
<td>1,676 42.5%</td>
<td></td>
</tr>
<tr>
<td>Payer (N, %)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial</td>
<td>3350 73.7%</td>
<td>396 65.6%</td>
<td>2954 74.9%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Medicaid</td>
<td>1198 26.3%</td>
<td>208 34.4%</td>
<td>990 25.1%</td>
<td></td>
</tr>
<tr>
<td>Plan type at index (N, %)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Managed care</td>
<td>1182 26.0%</td>
<td>158 26.2%</td>
<td>1024 26.0%</td>
<td>0.68</td>
</tr>
<tr>
<td>Fee-for-service</td>
<td>3269 71.9%</td>
<td>436 72.2%</td>
<td>2833 71.8%</td>
<td></td>
</tr>
<tr>
<td>Other/unknown</td>
<td>97 2.1%</td>
<td>10 1.7%</td>
<td>87 2.2%</td>
<td></td>
</tr>
<tr>
<td>Plan capitation at index (N, %)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capitated</td>
<td>1182 26.0%</td>
<td>158 26.2%</td>
<td>1024 26.0%</td>
<td>0.92</td>
</tr>
<tr>
<td>Noncapitated</td>
<td>3366 74.0%</td>
<td>446 73.8%</td>
<td>2920 74.0%</td>
<td></td>
</tr>
<tr>
<td>DCI (mean, SD)</td>
<td>2.8 1.9</td>
<td>3.2 2.2</td>
<td>2.7 1.9</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Preperiod count of ICD-9 codes (mean, SD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preperiod hospitalization (N, %)</td>
<td>1034 22.7%</td>
<td>176 29.1%</td>
<td>858 21.8%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Preperiod healthcare costs (mean, SD)()</td>
<td>20.3 45.8</td>
<td>24.0 42.0</td>
<td>19.7 46.3</td>
<td>0.031</td>
</tr>
<tr>
<td>DCI indicates Deyo-Charlson Comorbidity Index; ICD-9, International Classification of Diseases-9; CABG, coronary artery bypass grafting; GI, gastrointestinal.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Measured in 12-month preperiod.

\(\)\(\)Comparison of readmitted to not readmitted patients.

\(\)\(\)In $1000s USD.
Medicaid Versus Commercially Insured

In total, 1198 patients were covered through Medicaid and 3350 were commercially insured. Overall 30-day unadjusted all-cause readmission rates were 17.4% (95% CI: 15.2%–19.6%) for Medicaid-enrolled beneficiaries and 11.8% (95% CI: 10.7%–12.9%) for commercially insured patients. HF-related unadjusted 30-day readmission rates were 6.7% (95% CI: 5.2%–8.1%) for those with Medicaid and 4.0% (95% CI: 3.3%–4.6%) for those with commercial insurance (Figure 2).

Insurance Plan Type and Capitation Status Comparisons

Across both Medicaid and commercial plans, 1182 patients were under a managed care structure and 3269 were fee-for-service (2% had unknown or other plan type). A similar breakdown was seen in capitation status, with 1182 insured under a capitation plan and the other 3366 without capitation. No significant differences were seen in all-cause readmission rates between plan types (Table 1).

Adjusted Rates and Independent Predictors of Readmission

Patients with renal failure had 34% higher odds of all-cause readmission and 45% higher odds of HF-related readmission. Patients discharged home had 24% lower odds of all-cause readmission and 28% lower odds of HF-related readmission (Tables 3 and 4).

Patients with a greater number of comorbidities, including valvular or rheumatic heart disease, decubitus/chronic skin ulcer, electrolyte disorder, and major psychiatric disorder, had higher odds of all-cause readmission than those without these conditions (Table 3). Patients with longer length of stay or who received a percutaneous coronary intervention or stent at index admission also had higher odds of all-cause readmission (Table 3). These variables were not significant predictors of HF-related readmission.

Medicaid Versus Commercially Insured

After multivariate adjustment including the patient factors listed in Table 1, the odds of all-cause (Table 3) and HF-related (Table 4) readmission were 32% and 68% higher, respectively, among Medicaid patients than for those with commercial insurance ($P<0.02$ for both).

Insurance Plan Type and Capitation Status Comparisons

Neither insurance plan type (managed care versus fee-for-service) nor capitation status was significantly associated with all-cause readmission or HF-related readmission in adjusted analysis.

The performance of the claims-based 30-day systolic HF readmission models was modest, with an adjusted $R^2$ of 0.051 and c-statistic of 0.64 for all-cause readmission and $R^2$ of 0.016 and c-statistic of 0.59 for HF-related readmission.

Discussion

Our analysis extends the previous work on HF readmissions among Medicare beneficiaries into a population of patients with
readmission among commercially insured and Medicaid-enrolled patients discharged alive after hospitalization for systolic HF. Overall, we found that unadjusted 30-day all-cause readmission rates for the Medicaid population (17.4%) were significantly higher than for commercially insured population (11.8%). After adjustment for a wide range of patient factors, Medicaid patients were 1.32 times more likely to be readmitted for any reason than their commercially insured counterparts, and 1.68 times more likely to be readmitted for a HF-related diagnosis.

From a policy as well as a quality perspective, the results of this study suggest that more attention should be focused on readmissions among Medicaid populations. The reasons for this significantly worse readmission rate among the Medicaid population, even after confining the analysis to a specific (systolic) population with HF and adjustment for a wide range of patient-level characteristics, are not explained by our analysis. Certainly, they could be the result of the inability of claims-based data to adjust for a host of unmeasured risk factors that are higher in the Medicaid population than in the commercially insured. These are likely to include low income and other social instability factors; factors which are not currently adjusted for in publicly reported institutional risk-standardized readmission rates.3,13,15 Whether lower quality of care for Medicaid patients contributes to higher readmission rates remains to be determined. Disparities in care related to income or race have been widely reported. A recent study by Jha et al16 showed that the highest percentage of Medicaid patients was found in the worst hospitals (low quality, high cost), whereas the lowest percentage was found in the best hospitals (high quality, low cost). An analysis of national Medicare data showed 30-day readmission rates for Medicare beneficiaries were higher among black patients than white patients for congestive heart failure, and patients from minority serving hospitals had higher readmission rates than those from nonminority serving hospitals.17 With the focus on HF readmissions as a quality measure, these inequities have significant implications for patients, providers, and policy makers. Under certain circumstances, incentive programs can lead to the avoidance of patients seen as high risk.18 As CMS begins to implement performance-based payments and other insurers follow suit, our results and the other HF studies mentioned highlight the potential influence of socioeconomic factors on outcomes as

HF not yet evaluated in an administrative claims data analysis. This study provided a comprehensive assessment of the overall rates and individual predictors of 30-day all-cause and HF-related

Figure 1. Patient attrition. HF indicates heart failure.

Figure 2. Unadjusted 30-day all-cause and HF-related readmission rates and 95% CI by payer. HF indicates heart failure.
an important consideration to ensure that hospital payment penalties do not further exacerbate disparities in care.

The national claims data used in this study also allowed for characterization of 30-day readmissions by the type of insurance plan. Although there has been discussion regarding patient preference for fee-for-service over managed care and regarding capitation plans, these plan types were not associated with systolic HF readmission in this analysis.

Perhaps not surprisingly, the absolute readmission rates for both of the Medicaid and commercially insured populations were lower than most previously published 30-day readmission rates for Medicare patients with a HF hospitalization. Although age was not predictive of readmission in our models, which were confined to patients <65 years of age, we suspect the lower rates found in this study were attributable in part to the younger population; age has been shown to be a weak independent predictor of HF readmission in studies without age restrictions and which included Medicare beneficiaries.10-11 In comparison to our data, crude all-cause 30-day readmission rates have been reported as 26.9% for Medicare fee-for-service enrollees with unspecified systolic function aged 65 years and older hospitalized from 2003 to 2004,7 24.4% for similar Medicare patients hospitalized from 2005 to 2008,20 and 21.9% among US patients over 65 enrolled in a general HF registry linked to Medicare claims.21 For studies not limited to Medicare and that include a mix of payers, 30-day readmission rates were reported as 24.1% among patients discharged with a primary HF diagnosis from a large urban teaching hospital in Dallas,22 and 16.5% in the Veterans Affairs Health Care System.23 Our results apply to a population with an administrative code for systolic HF to provide a more homogenous population for comparing readmission rates by payer and plan type, whereas most studies have looked across the HF population irrespective of left ventricular ejection fraction; however, left ventricular ejection fraction has not been a particularly strong predictor of readmission.10 The differences in 30-day all-cause readmission rates seen above highlight the importance of understanding the population from which a HF readmission rate is derived.

Despite differences in this study population compared with the more frequently analyzed Medicare population with a broader range of HF diagnoses, we observed similarities in predictors of readmission. Similar to previous studies, higher levels of comorbidities, including renal failure and mental health disorders, and increased index admission length of stay, were associated with increased all-cause readmission. Receipt of coronary interventions at index admission, even after adjustment for comorbidities, had the highest odds of all-cause readmission among the factors included in the models. Of all other cardiovascular history and HF-related procedures, only valvular or rheumatic heart disease in the preperiod was a significant predictor of all-cause readmission. But even after adjustment for case mix and inpatient procedures, Medicaid patients were still more likely than commercially insured patients to be readmitted. As institutions and policy makers grapple with changes in reimbursement policy and implementation of transitional care programs, recognizing these differences in readmission rates between various populations will be important.

The performance of the multivariate models in predicting all-cause 30-day readmission among systolic HF patients was low (adjusted $R^2<0.06$) and the ability of the model to

### Table 3. Predictors of 30-Day All-Cause Readmission

<table>
<thead>
<tr>
<th>Variables</th>
<th>Odds Ratio</th>
<th>95% Wald CI</th>
<th>Probability &gt;$\chi^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicaid vs commercial</td>
<td>1.32</td>
<td>1.09 1.60</td>
<td>0.005</td>
</tr>
<tr>
<td>Number of unique 3-digit ICD-9-CM codes</td>
<td>1.01</td>
<td>1.00 1.02</td>
<td>0.005</td>
</tr>
<tr>
<td>Valvular or rheumatic heart disease in preperiod</td>
<td>1.27</td>
<td>1.05 1.53</td>
<td>0.012</td>
</tr>
<tr>
<td>Renal failure in preperiod</td>
<td>1.34</td>
<td>1.08 1.66</td>
<td>0.008</td>
</tr>
<tr>
<td>Major psychiatric disorder in preperiod</td>
<td>1.70</td>
<td>1.19 2.44</td>
<td>0.004</td>
</tr>
<tr>
<td>Decubitus or chronic skin ulcer in preperiod</td>
<td>1.58</td>
<td>1.06 2.36</td>
<td>0.025</td>
</tr>
<tr>
<td>Electrolyte disorder in preperiod</td>
<td>1.27</td>
<td>1.02 1.59</td>
<td>0.036</td>
</tr>
<tr>
<td>PCI or stent at index admission</td>
<td>1.66</td>
<td>1.03 2.69</td>
<td>0.039</td>
</tr>
<tr>
<td>Index LOS</td>
<td>1.02</td>
<td>1.00 1.03</td>
<td>0.021</td>
</tr>
<tr>
<td>Discharged home</td>
<td>0.76</td>
<td>0.61 0.93</td>
<td>0.008</td>
</tr>
</tbody>
</table>

*ICD-9-CM indicates International Classification of Diseases, Ninth Revision, Clinical Modification; PCI, ; LOS, length of stay. Adjusted $R^2=0.051$; c-statistic=0.64

### Table 4. Predictors of 30-Day HF Readmission

<table>
<thead>
<tr>
<th>Variables</th>
<th>Odds Ratio</th>
<th>95% Wald CI</th>
<th>Probability &gt;$\chi^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicaid vs commercial</td>
<td>1.68</td>
<td>1.26 2.24</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Renal failure in preperiod</td>
<td>1.45</td>
<td>1.06 1.98</td>
<td>0.021</td>
</tr>
<tr>
<td>Discharged home</td>
<td>0.72</td>
<td>0.52 0.99</td>
<td>0.040</td>
</tr>
</tbody>
</table>

Adjusted $R^2=0.016$; c-statistic=0.59.
discriminate between those readmitted and not readmitted was poor (c=0.64). The identification of in-hospital blood pressure, renal indices, and natriuretic peptide levels as leading predictors of mortality from clinical databases illustrates potential limitations of administrative claims models to optimally capture risk. However, at least at the hospital level, such clinical information has not been as helpful at predicting readmission.21 And, for the near term, public reporting and pay-for-performance policies will be based on claims-based data, such that the findings presented here from the MarketScan Research databases reflect currently used methodology. On a population level even moderate risk model performance can risk-standardize institutional readmission rates and provide insights into some of the drivers of readmissions within these populations. However, administrative readmission models are unlikely to be of significant utility on a case-by-case basis to help triage patients, both because of the relatively poor model performance as well as logistical issues with using claims data in real-time care decisions.

Limitations
This retrospective, observational study was based on administrative claims data and therefore selection of patients with systolic HF is limited by completeness and accuracy of medical coding. However, selection of patients was based on primary hospital discharge diagnosis codes, which have been shown to have good specificity and positive predictive value for HF.12 Further, readmission rates did not differentiate by primary diagnosis, and therefore are likely to have included some scheduled hospitalizations occurring 30 days within discharge of the index admission (eg, planned procedures). Of note, Hospital Compare methods also do not distinguish elective from urgent readmission.24 As with any administrative claims analysis, many clinical and socioeconomic variables, which are likely to be predictive of readmission, were not available for inclusion. Specifically, MarketScan commercial data do not include race or ethnicity. Finally, this study purposely focused on systolic HF in the US and thus is not generalizable to patients with diastolic or unspecified HF or to international populations.

Conclusions
Adjusted all-cause and HF-related 30-day readmission rates for Medicaid-enrolled patients with systolic HF were significantly higher than for patients with commercial insurance. Crude all-cause readmission rates for both populations were lower than previously published readmission rates for fee-for-service Medicare patients aged 65 years or older with HF of unspecified systolic function. Not surprisingly, major comorbidity and length of stay were primary predictors of all-cause readmission in patients recently hospitalized with systolic HF. But even after adjustment for a variety of predictors of case mix, Medicaid patients were still more likely than commercially insured patients to be readmitted, suggesting that more research is needed on readmission rates within these populations as well as into understanding patient-level differences between these groups of patients.

Acknowledgments
We gratefully acknowledge the programming assistance of Kelly Oh and Chandrasekar Balakrishnan of Truven Health Analytics, and the input on the initial study concept from Matthew Gitlin of Amgen, Inc. and William Padula of University of Colorado, in addition to Michele Shaw of Naples, FL for her medical writing expertise.

Sources of Funding
Funding for this project was provided by Amgen, Inc.

Disclosures
Author I.A. is an employee and stockholder of Amgen, Inc. Author L.A.A. of University of Colorado Denver was a consultant hired by Amgen. Authors K.L.W. and D.M.S. are employees of Truven Health Analytics and author K.E.S.T. was an employee of Truven Health Analytics at the time the study was conducted, which was contract-ed by Amgen to work in collaboration on this study. MarketScan Research databases are collected and managed by Truven Health Analytics, and all analyses were performed by staff of Truven Health Analytics.

References


**CLINICAL PERSPECTIVE**

Medicare’s introduction of public reporting and value-based purchasing centered on 30-day risk-adjusted readmission rates after hospital discharge for heart failure (HF) has helped to heighten interest among state governments and commercial payers in HF readmissions. As all potentially avoidable HF readmissions represent an opportunity to improve healthcare quality and efficiency, understanding the rates and predictors in non-Medicare populations is important. This is particularly true among patients with systolic dysfunction, for whom most HF-specific therapies are targeted. Using claims-based administrative data, we evaluated 1198 Medicaid and 3350 commercially insured unique systolic HF index admissions. All patients were <65 years of age, with a mean age of 55 years. Unadjusted all-cause 30-day readmission rates were 17.4% for Medicaid enrollees and 11.8% for commercially insured patients. After adjustment for differences in case mix, the odds of all-cause readmission were 32% higher among Medicaid than commercially insured patients, and 68% higher when only HF-related readmissions were considered. No significant differences in readmission rates were seen for managed care versus fee-for-service or capitated versus noncapitated plan types. These results suggest that socioeconomically disadvantaged populations, as indicated by Medicaid insurer status, represent a high-risk population potentially warranting specific interventions.
Rates and Predictors of 30-Day Readmission Among Commercially Insured and Medicaid-Enrolled Patients Hospitalized With Systolic Heart Failure

Larry A. Allen, Karen E. Smoyer Tomic, David M. Smith, Kathleen L. Wilson and Irene Agodoa

Circ Heart Fail. 2012;5:672-679; originally published online October 16, 2012;
doi: 10.1161/CIRCHEARTFAILURE.112.967356

Circulation: Heart Failure is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
Copyright © 2012 American Heart Association, Inc. All rights reserved.
Print ISSN: 1941-3289. Online ISSN: 1941-3297

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://circheartfailure.ahajournals.org/content/5/6/672

Permissions: Requests for permissions to reproduce figures, tables, or portions of articles originally published in Circulation: Heart Failure can be obtained via RightsLink, a service of the Copyright Clearance Center, not the Editorial Office. Once the online version of the published article for which permission is being requested is located, click Request Permissions in the middle column of the Web page under Services. Further information about this process is available in the Permissions and Rights Question and Answer document.

Reprints: Information about reprints can be found online at:
http://www.lww.com/reprints

Subscriptions: Information about subscribing to Circulation: Heart Failure is online at:
http://circheartfailure.ahajournals.org//subscriptions/