# Analysis of Hospital Readmission Patterns in Medicare Fee-for-Service and Medicare Advantage Beneficiaries

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**ABSTRACT**

**Purpose of Study:** The study was conducted to examine the hospital readmission patterns of two groups of Medicare beneficiaries—those covered by traditional Medicare (Medicare fee-for-service [FFS]) and those enrolled in a Medicare risk plan (Medicare Advantage [MA])—and to determine the characteristics that significantly increase the likelihood of multiple hospital readmissions.

**Primary Practice Setting:** The study setting is the Hospital of the University of Pennsylvania (HUP) located in Philadelphia, PA.

**Methodology and Sample:** A retrospective descriptive study design was used to analyze the electronic data from the HUP information technology system for Medicare beneficiaries, 65 years and older, who had an index hospital admission at the HUP during 2012 (January 1, 2012, through December 31, 2012), and were subsequently readmitted one or more times to the HUP during the observation period.

**Results:** FFS and MA beneficiaries were hospitalized an average of 1.5 (±1.0) times; 69% were rehospitalized once and 30% were rehospitalized two or more times. Characteristics that increased the likelihood of multiple hospital readmissions included being discharged on a weekend, admitted through the emergency department with a diagnosis of injury and poisoning, being diagnosed with a new problem of the circulatory system, having an exacerbation of a circulatory system illness, and having an infection related to a previous admission. Characteristics that decreased the likelihood of multiple hospital readmissions included being discharged to a skilled nursing facility and being discharged home with home health services.

**Implications for Case Management Practice:** Identification of the risk factors and characteristics that increase the likelihood of multiple hospital readmissions will permit early interventions in discharge planning, as evidenced by decreasing the rate of hospital readmissions and the length of hospital stays, increasing in time to hospital readmission, and preventing the first readmission and a subsequent return to the hospital.

**Key words:** care management programs, hospital readmission patterns, likelihood of multiple hospital readmissions, risk factors for hospital readmission, transitional care

Readmissions themselves are potentially leading to another subsequent rehospitalization, and many readmissions are potentially avoidable (Centers for Disease Control and Prevention, 2011). The study focused on readmissions for all-cause readmissions metrics, as many Medicare beneficiaries experience difficulties in the first few days and weeks after discharge from an acute care facility. The timeframe of 30 days is a clinically meaningful period for hospitals to collaborate with their communities in an effort to reduce readmissions (Centers for Medicare & Medicaid Services [CMS], 2012b). Identifying the readmission patterns and the characteristics that increase the likelihood of readmissions is crucial as acute hospital care and postacute transitional care strongly influence the rates of readmission occurring for any reason after hospitalization.

The purpose of this study was to analyze the hospital readmission patterns in a sample of Medicare beneficiaries who had an initial (index) hospital admission during 2012 at the Hospital of the University of Pennsylvania (HUP). Another purpose was to identify the characteristics that significantly increase the likelihood of multiple hospital readmissions. Identifying the readmission patterns and significant

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characteristics that predict hospital readmission in this sample of Medicare beneficiaries can assist the HUP to develop a discharge care model that accounts for these factors and target resources that focus on preventing a subsequent return to the hospital and reducing avoidable readmissions.

## RESEARCH QUESTIONS

The study evaluates the following questions:

1. What are the hospital readmission patterns for a sample of Medicare beneficiaries who had an index hospitalization at the HUP in 2012?
2. Is there a significant difference in the hospital readmission patterns in a sample of Medicare beneficiaries who had an index hospitalization at the HUP in 2012?
3. What are the significant characteristics that increase the likelihood of multiple hospital readmissions (more than two) in a sample of Medicare beneficiaries who had an index hospitalization at the HUP in 2012?

## REVIEW OF LITERATURE

The CMS issued hospital inpatient prospective payment system final rule implementing the Hospital Readmissions Reduction Program (HRRP) required under health care reform legislation, the Patient Protection and Affordable Care Act (Cavazos, 2012, August 13) with the hospital becoming accountable for readmissions occurring during the first 30 days after discharge. Readmission rates are used for benchmarking across hospitals (Van Walraven, Bennett, Jennings, Austin, & Forster, 2011), and readmission rates may be a poor marker of hospital performance (Clark, 2012, March 29). Readmission rates are associated with poor-quality inpatient care, ineffective hospital-to-home transitions, patient characteristics, disease burden, and socioeconomic status (Garrison, Mansukhani, & Bohn, 2013). In 2010, the national average 30-day readmission rate for Medicare beneficiaries was 19.2%, and readmissions cost the Medicare program $17.5 billion in inpatient spending alone

> *Patients readmitted within 30 days had more hospitalizations, more emergency department (ED) visits, longer hospital stays, more co-morbidities, more discharge medications, and were less likely to be married.*

(CMS, 2012a). The CMS chose to measure all-cause readmissions to an acute care hospital that occurred within 30 days (CMS, 2012a) over longer periods because readmissions occurring after 30 days of discharge are more likely to be associated with the factors, such as the quality of postacute and outpatient follow-up care (Stone & Hoffman, 2010), other complicating illnesses, patients' own behavior, or the care they received after discharge (Johnson & Schroeder, 2009). Almost one fifth (19.6%) of the Medicare beneficiaries were rehospitalized within 30 days (Jencks et al.), and 76% of 30-day readmissions were flagged as potentially preventable (Medicare Payment Advisory Commission, 2007, June). The risk-adjusted 30-day readmission rate was 13%–20% lower in Medicare Advantage (MA) patients compared with fee-for-service (FFS) patients (Lemieux, Sennett, Wang, Mulligan, & Bumbaugh, 2012). Hospital readmissions among Medicare beneficiaries within 30 days of discharge are prevalent, undesirable, and costly, often related to the index hospitalization (Donze, Aujesky, Williams, & Schnipper, 2013; Friedman, Encinosa, Jiang, & Mutter, 2009; Harrison, Hara, Pope, Young, & Rula, 2011; Jencks et al.; Martin et al., 2011; Stone & Hoffman, 2010; Pennsylvania Health Care Cost Containment Council [PHC4], 2012).

Multiple readmission issues are problematic and they have come under increasing scrutiny, both as a potential indicator of the quality of care and as a significant cost driver (PHC4, 2012). According to Garrison et al. (2013), two thirds of patients readmitted within 30 days had at least one hospitalization in the past 12 months. The reasons, prevention, and specific factors leading to multiple hospital readmissions of Medicare patients should be examined. However, yet much is unknown about which patient characteristics and specific reasons result in a higher probability of a hospital readmission, and no consensus exists on how to distinguish among those readmissions that might be avoided and those that might not (Stone & Hoffman, 2010). Patients readmitted within 30 days had more hospitalizations, more emergency department (ED) visits, longer hospital stays, more comorbidities, more discharge medications, and were less likely to be married (Garrison et al., 2013). People may encounter situations in their environment in which rehospitalization may occur. A variety of adverse events causing rehospitalization might occur before a hospital admission, during a hospital stay, as a patient is being discharged, or after a patient is home or in another setting that could result in rehospitalization (Stone & Hoffman, 2010). It is therefore of great importance for these adverse events are avoided. Understanding the root causes of unplanned hospitalizations is critical for strategizing about reducing these adverse events (Greenwald &

Jack, 2009). Thus, public policies should focus on readmissions that may be avoidable—those that are unplanned and related to the initial admission (American Hospital Association, 2011).

## METHODS

### Study Setting

The study setting is the HUP, located in Philadelphia, PA. The HUP is a 782-bed general medical and surgical facility and is the teaching hospital of the University of Pennsylvania Health System. In 2012, the HUP had 37,849 adult inpatient admissions, over 1.3 million outpatient visits, and over 64,000 ED visits.

### Study Design

A retrospective descriptive design was used to analyze the research questions.

### Study Sample

The study sample consisted of adults 65 years and older with primary health care insurance coverage through Medicare, who had an index hospital admission at the HUP in 2012 (January 1 to December 31), and were subsequently readmitted one or more times to the HUP during the observation period. A total of 1,129 beneficiaries comprised the study sample: 683 beneficiaries who were insured through traditional Medicare FFS and 446 beneficiaries who were insured through an MA risk plan. Individuals were excluded from the study if they had been hospitalized at the HUP in 2011, their index hospital admission was for hospice inpatient care, or they were enrolled in the HUP Transitional Care Model program when they experienced their index hospitalization.

### Data Collection

The data analyzed in this study consisted of claims data from the HUP information technology (IT) system for hospital admissions. All data collected were patient specific and delimited; no patient identifiers were used in the assembled electronic data set for statistical analysis.

### Study Outcomes

The study had two primary outcomes. The primary study outcome is 30-day all-cause hospital readmission. The secondary study outcome is multiple readmissions within the observation period (January 1 to December 31, 2012).

### Statistical Analysis

Comparisons were made between the FFS and MA study groups by using appropriate statistical tests for categorical (percentage) and continuous (number) variables. Student's $t$ test (two-tailed) was used for normally distributed continuous variables, $\chi^2$ tests for categorical variables, and the Wilcoxon rank sum test for nonnormally distributed continuous variables. Logistic regression models, using backward stepwise selection, were used to identify characteristics that predicted multiple hospital readmissions. In addition, interaction terms were tested between admission source and diagnosis code, or admission reason and diagnosis code. All statistical analyses were performed using the SPSS software system, version 19.0 (SPSS Inc, Chicago, IL). A $p$ value of .05 or less indicated statistical significance.

## RESULTS

### Findings/Outcomes

There were no significant differences in hospital readmission patterns between Medicare FFS and MA beneficiaries. Twenty percent of FFS beneficiaries had multiple hospital readmissions compared with 21% of MA beneficiaries. Characteristics that increased the likelihood of multiple hospital readmissions included being discharged on a weekend, admitted through the ED with an injury and poisoning, being diagnosed with a new problem of the circulatory system, having an exacerbation of a circulatory system illness, and having an infection related to a previous admission. Characteristics that decreased the likelihood of multiple readmissions included being discharged to a skilled nursing facility (SNF) and being discharged home with home health services.

### Characteristics of Index Hospitalization

The characteristics of the index hospitalization are displayed in Table 1. FFS beneficiaries were significantly older at hospital admission compared with MA beneficiaries (75 vs. 73 years), and 12% of FFS beneficiaries were 85 years or older compared with 6% of MA beneficiaries. There were no significant

| Characteristics | Medicare FFS Beneficiaries | Medicare Advantage Beneficiaries | *p* Value |
|---|---|---|---|
| Patients, n | 683 | 446 | |
| Mean age, years *(SD)* | 74.5 (7.5) | 73.4 (7.0) | .016 |
| Age categories (%) | | | |
| 65−74 years | 56.2 | 61.4 | |
| 75−84 years | 31.5 | 32.7 | |
| 85−94 years | 11.7 | 5.6 | |
| ≥95 years | 0.6 | 0.2 | |
| Admission source (%) | | | .285 |
| ED | 40.4 | 46.9 | |
| Routine admission (scheduled) | 28.8 | 26.9 | |
| Routine admission (unscheduled) | 12.4 | 10.5 | |
| Transfer from another health care facility | 17.7 | 15.0 | |
| Unknown | 0.6 | 0.7 | |
| Admission on a weekend (%) | 14.5 | 15.9 | .551 |
| LOS, days (SD) | 8.2 (8.3) | 8.3 (10.4) | .282 |
| LOS categories (%) | | | |
| 0−3 days | 30.9 | 35.7 | |
| 4−7 days | 40.8 | 46.9 | |
| 8−10 days | 10.7 | 10.8 | |
| 11−14 days | 8.8 | 6.3 | |
| ≥15 days | 15.5 | 14.3 | |
| Discharge status (%) | | | .144 |
| Home (routine) | 33.7 | 32.1 | |
| Home with home health services | 37.0 | 40.6 | |
| Transferred to SNF | 14.6 | 13.0 | |
| Transferred to rehab facility | 5.1 | 5.2 | |
| Transferred to another hospital | 4.5 | 7.2 | |
| Transferred to intermediate/LTC facility | 3.1 | 0.9 | |
| Transferred to hospice | 1.3 | 0.9 | |
| Left against medical advice | 0.4 | 0.2 | |
| Transferred to psychiatric facility | 0.1 | − | |
| Discharged on weekend (%) | 19.8 | 19.3 | |

*Note.* ED = emergency department; LOS = length of stay; LTC = long-term care; SNF = skilled nursing facility.

differences between the study groups in admission source: Approximately 41% of all beneficiaries had a routine admission, and 40% of FFS beneficiaries were admitted through the ED compared with 47% of MA beneficiaries. There were no significant differences between the two groups in the length of stay or discharge status. Both beneficiary groups were hospitalized an average of 8 days and a majority were discharged home, either routinely (approximately 33%) or with home health services (approximately 39%). Approximately 14% were discharged to an SNF. There were no significant differences when beneficiaries were hospitalized or discharged: Approximately 16% were admitted on a weekend and approximately 19% were discharged on a weekend.

*Research Question 1: What are the hospital readmission patterns for a sample of Medicare beneficiaries who had an index hospitalization at the HUP in 2012?*

The hospital readmission patterns for the two study groups are displayed in Table 2. FFS and MA beneficiaries were hospitalized an average of 1.5 (±1.0) times in 2012. Total readmissions ranged from 1 to 10 in FFS beneficiaries and 1 to 8 times for MA beneficiaries. Readmission patterns were similar for both groups: 69% were rehospitalized once and

## TABLE 2
### Hospital Readmission Patterns of the Study Population

| Readmission Patterns | Medicare FFS Beneficiaries | Medicare Advantage Beneficiaries | p Value |
|---|---|---|---|
| Total hospital readmissions | 1,020 | 681 | |
| Mean readmissions (SD) | 1.5 (1.0) | 1.5 (1.0) | .953 |
| Patient hospital readmissions, n | | | .682 |
| 2 readmissions | 205 | 141 | |
| 3 readmissions | 71 | 49 | |
| 4 readmissions | 31 | 23 | |
| 5 readmissions | 12 | 10 | |
| 6 readmissions | 7 | 7 | |
| 7 readmissions | 5 | 3 | |
| 8 readmissions | 4 | 2 | |
| 9 readmissions | 1 | | |
| 10 readmissions | 1 | | |
| Patient hospital readmission categories, n (%) | | | .984 |
| 1 readmission | 474 (69.4) | 307 (68.8) | |
| 2 readmissions | 138 (20.2) | 89 (20.0) | |
| 3 readmissions | 40 (5.9) | 27 (6.1) | |
| 4 readmissions | 19 (2.8) | 13 (2.9) | |
| ≥5 readmissions | 12 (1.8) | 10 (2.2) | |

30% had multiple readmissions. A majority (89%) of beneficiaries experienced either one or two readmissions.

*Research Question 2: Is there a significant difference in the hospital readmission patterns in a sample of Medicare beneficiaries who had an index hospitalization at the HUP in 2012?*

There were no significant differences in the average hospital readmissions between the two study groups or in the percentage of patients who had multiple readmissions during the observation period (see Table 2). Table 3 displays the hospital readmission characteristics of the two study groups. There were no significant differences between the FFS and MA beneficiaries in average time to readmission (approximately 12 days), admitting source (ED 49%; routine 29%; or transfer from another facility 21%), and being admitted on a weekend (19%). There were no significant differences between the two groups of beneficiaries in readmission reasons (complication of initial illness/treatment 27%; new problem or diagnosis 20%; planned readmission 16%; exacerbation of comorbid illness 14%; or failed outpatient treatment/management 10%), and readmission length of stay (8 days).

There were significant differences between the two groups in readmission discharge status: A higher percentage of MA beneficiaries were routinely discharged with home health care services (40.7%) com-pared with FFS beneficiaries (35.3%). There were no significant differences between study groups in diagnosis codes: The top three diagnoses were injury/poisoning (19%), circulatory system (18%), and neoplasm (13%). Approximately 19% of all study group patients were discharged on a weekend.

*Research Question 3: What are the significant characteristics that increase the likelihood of multiple hospital readmissions (more than two) in a sample of Medicare beneficiaries who had an index hospitalization at the HUP in 2012?*

Results of the logistic regression model predicting significant characteristics of multiple hospital readmissions are shown in Table 4. Patients who experienced an exacerbation of the circulatory system were twice as likely to be hospitalized multiple times (odds ratio [OR], 2.14; 95% confidence interval [CI] [1.94, 4.88]; $p < .001$). Patients who contracted an infection related to a previous admission were 52% more likely to be hospitalized multiple times (OR, 1.52; 95% CI [1.04, 2.23]; $p = .030$); patients who were diagnosed with a new problem of the circulatory system were 43% more likely to have multiple hospitalizations (OR, 1.43; 95% CI [1.32, 1.58]; $p = .003$); patients who went to the ED with an injury and poisoning were 36% more likely to have multiple hospitalizations (OR, 1.36; 95% CI [1.03, 1.79]; $p = .028$); and patients who were discharged on a weekend were 31% more likely to have

**Hospital Readmission Characteristics of the Study Population**

| Characteristics | Medicare FFS Beneficiaries | Medicare Advantage Beneficiaries | *p* Value |
|---|---|---|---|
| Mean days to readmission *(SD)* | 12.3 (9.1) | 12.2 (9.3) | .671 |
| Days to readmission categories (%) | | | |
| 0−7 days | 37.4 | 39.5 | |
| 8−14 days | 23.6 | 22.2 | |
| 15−21 days | 18.2 | 17.5 | |
| 22−30 days | 19.4 | 19.7 | |
| 31 days | 1.4 | 1.2 | |
| Readmission source (%) | | | .304 |
| ED | 47.1 | 50.7 | |
| Routine admission (scheduled) | 16.6 | 13.7 | |
| Routine admission (unscheduled) | 15.4 | 14.4 | |
| Transfer from another health care facility | 21.0 | 21.3 | |
| Readmission on a weekend (%) | 18.5 | 18.8 | .890 |
| Readmission reason (%) | | | .308 |
| Complication of initial illness/treatment | 24.6 | 28.5 | |
| New problem or diagnosis | 19.8 | 19.1 | |
| Planned readmission | 18.4 | 15.1 | |
| Exacerbation of comorbid illness | 13.5 | 14.8 | |
| Failed outpatient treatment/management | 10.1 | 9.7 | |
| Unknown/missing | 6.2 | 7.2 | |
| Infection related to previous admission | 4.4 | 3.1 | |
| End-of-life care | 2.3 | 1.6 | |
| Medication management | 0.5 | .03 | |
| Left against medical advice | | 0.1 | |
| Readmission LOS, days *(SD)* | 8.2 (10.0) | 7.7 (8.2) | .321 |
| Readmission LOS categories (%) | | | |
| 0−3 days | 33.1 | 32.6 | |
| 4−7 days | 31.7 | 36.0 | |
| 8−10 days | 12.6 | 11.3 | |
| 11−14 days | 9.3 | 7.5 | |
| ≥15 days | 13.2 | 12.6 | |
| Readmission related to previous admission (%) | 57.8 | 58.3 | .853 |
| Readmission avoidable (%) | 3.4 | 4.1 | .513 |
| Readmission discharge status (%) | | | .023 |
| Home (routine) | 23.4 | 21.6 | |
| Home with home health services | 35.3 | 40.7 | |
| Transferred to SNF | 14.2 | 16.0 | |
| Transferred to rehab facility | 4.6 | 5.1 | |
| Transferred to another hospital | 0.8 | 0.6 | |
| Transferred to intermediate/LTC facility | 4.3 | 1.3 | |
| Transferred to hospice | 7.7 | 6.8 | |
| Left against medical advice | 0.2 | 0.1 | |
| Transferred to psychiatric facility | 0.1 | | |
| Inpatient mortality | 9.3 | 7.8 | |
| Diagnosis codes (%) | | | .148 |

*(continued)*

| Characteristics | Medicare FFS Beneficiaries | Medicare Advantage Beneficiaries | *p* Value |
|---|---|---|---|
| Injury/poisoning | 21.3 | 18.2 | |
| Circulatory system | 18.2 | 18.5 | |
| Neoplasm | 9.8 | 12.5 | |
| Infectious disease | 8.6 | 7.8 | |
| Digestive system | 6.2 | 7.6 | |
| Respiratory system | 5.1 | 6.8 | |
| Unknown/missing | 4.6 | 5.1 | |
| Ill-defined conditions | 4.5 | 4.4 | |
| Genitourinary system | 4.1 | 4.4 | |
| Endocrine/immune system | 3.4 | 3.7 | |
| Blood diseases | 1.5 | 2.3 | |
| Nervous system | 2.1 | 0.9 | |
| Musculoskeletal disease | 1.6 | 1.0 | |
| Skin disease | 0.9 | 0.7 | |
| Mental disorders | 0.3 | 0.7 | |
| Congenital anomalies | 0.1 | 0.1 | |
| Readmission discharged on weekend (%) | 18.8 | 18.5 | .899 |

*Note.* ED = emergency department; LOS = length of stay; LTC = long-term care; SNF = skilled nursing facility.

multiple hospitalizations (OR, 1.31; 95% CI [1.10, 1.74]; $p$ = .049). Patients who were discharged with home health care services had a 21% reduction in the likelihood of multiple hospital readmissions (OR, 0.79; 95% CI [0.63, 0.99]; $p$ = .045); and patients who were discharged to an SNF had a 44% reduction in the likelihood of multiple hospital readmissions (OR, 0.56; 95% CI [0.40, 0.78]; $p$ = .001).

## DISCUSSION

The study obtained the results of the logistic regression model predicting significant characteristics of

multiple hospital readmissions. The findings of this study are supportive and extend or contrast with the findings of other recent studies. The diagnoses of the study population were identified on the basis of the presence of International Classification of Diseases, 9th Revision (ICD-9-CM) codes ( Centers for Disease Control and Prevention, 2011), which were grouped into medical diagnostic categories. In the majority of this study group, the primary medical diagnosis of readmission was identical with the primary diagnosis of index hospitalization.

This research examined the readmission rate, in the context of any reason. The readmission rate

► **TABLE 4**
Logistic Regression Results of Characteristics Predictive of Multiple Hospital Admissions of the Study Population

| Characteristics | Odds Ratio [95% Confidence Interval] | *p* Value |
|---|---|---|
| Exacerbation of circulatory system | 2.14 [1.94, 4.88] | <.001 |
| Infection related to previous admission | 1.52 [1.04, 2.23] | .030 |
| New problem or diagnosis of the circulatory system | 1.43 [1.32, 1.58] | .003 |
| Admission through ED with injury | 1.36 [1.03, 1.79] | .028 |
| Discharged on a weekend | 1.31 [1.10, 1.74] | .049 |
| Discharged home with home health services | 0.79 [0.63, 0.99] | .045 |
| Discharged to an SNF | 0.56 [0.40, 0.78] | .001 |

*Note.* ED = emergency department; SNF = skilled nursing facility.

for any reason increased consistently with the number of patient comorbidities. The findings of this study lent some support for the characteristics that increased the likelihood of multiple hospital readmissions: being diagnosed with a new problem of the circulatory system and having an exacerbation of a circulatory system illness. The study finding toward readmissions for the circulatory system category fits with the HRRP that provides incentives for hospitals to reduce preventable Medicare readmissions. The results of other studies provided that patients hospitalized for heart failure had the highest rate of repeat hospitalizations (Garrison et al., 2013; PHC4, 2012; Silverstein, Qin, Mercer, Fong, & Haydar, 2008), and the most common conditions that require rehospitalization within 30 days of discharge were congestive heart failure, pneumonia, and chronic obstructive pulmonary disease (Jencks et al.). In response to the HRRP, hospitals should make approaches to reduce readmissions by improving inpatient intervention, discharge management, and outpatient management for improving patient outcomes because more severe coexisting conditions and lower performance on discharge planning may be associated with higher rates of readmission for circulatory system illness. The other studies exhibited that medical patients are more likely to require readmission than surgical patients (Annema, Luttik, & Jaarsma, 2009; Jencks et al.). This study lent the characteristics that increased the likelihood of multiple hospital readmissions included having an infection related to a previous admission. Reducing readmissions has proved to be difficult, and hospitals should employ strategies to reduce preventable readmissions by improving the quality of patient care during the inpatient stay, such as reducing the risk of infection. In the present study, the characteristics that increased the likelihood of multiple hospital readmissions included patients admitted through the ED with an injury and poisoning. This result is consistent with a recent study that indicated that the most common category of reasons for readmissions was an injury/poisoning (Wang et al., 2012).

There is a scarcity of evidence regarding the relationship between timing of discharge and patient outcomes. The results of this study lent the characteristics that increased the likelihood of multiple hospital readmissions included being discharged on a weekend. The other studies indicated that the largest volume of discharges occurred on Fridays (Graham, Leff, & Arbaje, 2013; Van Walraven & Bell, 2002) and patients discharged on Fridays had higher rates of readmission and mortality (Van Walraven & Bell, 2002). The timing of patient care can affect the outcomes of patient care. Weekend is the common

hospital discharge day, and weekend discharges are associated with worse outcomes than discharges on other days. This may have been because the discharge preparation was incomplete or because these patients left hospital before they were fully stable or because patients failed to receive any ambulatory care before readmission or because new home health and social support services for weekend discharges were not initiated until the following Monday. Many transitions are unplanned, result from unanticipated medical problems, occur in "real time" during nights and on weekends, involve clinicians who may not have an ongoing relationship with the patient, and happen so quickly that formal and informal support mechanisms cannot respond in a timely manner (Coleman & Berenson, 2004).

The results of this study lent the characteristics that decreased the likelihood of multiple readmissions included being discharged to an SNF and being discharged home with home health services. The findings of this study are contrast with the findings of the other recent study. A study indicated that 30-day medical and surgical readmission rates for any reason were highest for patients who were discharged to an SNF: Patients discharged to an SNF were 67.1% more likely to be readmitted compared with patients discharged to home (PHC4, 2012). The result of this present study is a very significant finding. Being discharged to an SNF and being discharged home with home health services had a protective value of preventing rehospitalizations, especially with the relationships of hospitals/health care systems and long-term care facilities. SNF or long-term care facility can help to prevent potentially avoidable hospital readmission if they can have opportunities to identify, evaluate, and manage changes in the patient's conditions, and to prevent conditions from becoming severe enough to require hospitalization. The high rate of rehospitalization is due to numerous factors, including the services received after discharge such as postacute care delivered by inpatient rehabilitation facility, SNF, or home health care agency. Unnecessary rehospitalizations are correctly reduced by ensuring that patients are not prematurely discharged from acute care hospitals and that patients receive necessary postacute care services properly, with evidence-based interventions supporting transitions between hospitals and nursing facilities.

The results suggested that evidences were significant with the risk factors of multiple hospital readmissions such as patient age, prior hospitalization, comorbidity, the length of stay, discharge time, discharge destination, and care after discharge might contribute to all-cause readmissions. Patients with multiple readmissions may have a unique risk factor profile, and may be a group that may particularly

*The findings of this study suggest that transitional care in care management programs aimed at increasing the use of evidence in practice will improve the effectiveness of the discharge process as the patient's care is transitioned from hospital and will reduce the rate of rehospitalization in Medicare beneficiaries. Comprehensive geriatric assessment during the index admission and rapid follow-up may reduce readmission rates.*

benefit from complex interventions aimed at improving delivery of complicated health care services and improving unfavorable health and social conditions influencing the rate of readmissions. During an episode of illness, growing old populations may receive care in multiple settings, often resulting in fragmented care and poorly executed care transitions, such as duplication of services and inappropriate or conflicting care recommendations from multiple providers. The coordination of care among multiple independent providers becomes an enormous challenge, and the quality of transitional care is in need of substantial improvement (Bodenheimer, 2008). Repeat hospitalization for the treatment of chronic conditions has become a topic of significant interest and of great importance, especially as many such readmissions might be preventable. Some readmissions are unavoidable and result from inevitable progression of disease or worsening of chronic conditions. However, readmissions may also result from poor quality of care or inadequate transitional care. Many elderly patients fail to receive any ambulatory care before readmission (Jencks et al.). Evidence of suboptimal care at hospital discharge and shortly thereafter (Bodenheimer, 2008; Coleman & Berenson, 2004) increased attention to transitional care and prompted clinical interventions to improve discharge planning, ensure timely follow-up, and improve transitional care.

The findings of this study suggest that transitional care in care management programs aimed at increasing the use of evidence in practice will improve the effectiveness of the discharge process as the patient's care is transitioned from hospital and will reduce the rate of rehospitalization in Medicare beneficiaries. Comprehensive geriatric assessment during the index admission and rapid follow-up may reduce readmission rates (Conroy, Dowsing, Reid, & Hsu, 2013). DeWalt (2013, August 6) reported the transitional care participants were less likely than others to experience multiple readmissions, and readmission was averted for one of every six patients with complex chronic illnesses who received transitional care. Transitional care includes effective discharge planning, communication and transfer of information at the time of discharge, patient assessment and education, and coordination of care and monitoring in the postdischarge period. Improvement in the quality of care during the initial admission; improvement in communication with patients, their caregivers and their clinicians; patient education; predischarge assessment; and coordination of care after discharge can reduce readmission rates.

## CONCLUSIONS

Although many variables were addressed, the variables varied widely in statistical significance and a few characteristics could be used as a predictor of multiple hospital readmissions. The findings of this study attributed to the evidence of the identifying beneficiaries at greater risk of readmission in advance would allow early interventions in discharge planning to target resources, in turn preventing these beneficiaries from returning to the hospital and decreasing the rate of hospital readmissions and the length of hospital stays. This indicates that the prediction of readmission can be utilized early during the patient's hospital admission to predict the risk of hospital readmission and identify especially high-risk patients who may benefit from comprehensive assessment and coordinated care management. It is important to note that preventive efforts with multifaceted and multidisciplinary interventions aimed at avoiding readmission and improving the quality of care can be targeted toward Medicare beneficiaries with risk factors. It demonstrates care management programs assuring efficacy in reducing health care utilization in elderly patients at high risk for hospital readmission should include transitional care as an important component of the effort to improve the effectiveness of the discharge process as the patient's care is transitioned from hospital.

Furthermore, consensus strategy should be developed to identify Medicare patients who should optimally be targeted with care management programs to mitigate risk factors for hospital readmission and to include transitional care as an integral component to improve the effectiveness of the discharge process. More extensive research should be conducted to identify risk factors associated with multiple readmissions and to examine the long-term cost effects of lower readmission rates and quality of care after discharge. Further study of the most

common reasons for readmissions may help hospitals design coordinated care models to provide interdisciplinary care coordination to high-risk patients as their needs change across settings and target high-risk patients for preventative interventions and modifications in care pathways with the development of provider accountability for patient outcomes to reduce readmissions, especially those that are unplanned and related to the initial admission, and to improve management of chronic disease and health outcomes.

## LIMITATIONS

The research was limited by its reliance on readily available hospital administrative data.

Some important factors affecting risk such as health behavior and social support; or patient characteristics such as sex, marriage, living arrangement, and socioeconomic status were not available from hospital administrative data, which was obtained from IT system. Provider care information such as the severity of illness, intensity of inpatient care, discharge planning, outpatient clinic visit, and home care was not available from the inpatient information data management system. Searching for study population was limited by hospital administrative data, which was obtained from IT system making it difficult to identify the entirety of potential population. Patients who were initially admitted to other acute hospitals at index hospitalization or patients who were readmitted to other acute hospitals for the period of 2011–2012 were not identified from hospital administrative data, which was obtained from IT system. The inpatient information management system may have the potential for errors, causing misclassification of encounters. This may create a potential selection bias and limits the generalization of results in this study.

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