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Discharge Setting for Patients with Hip Fracture: Trends from 2001 to 2005

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Abstract

OBJECTIVES—To examine recent trends in discharge disposition following hospitalization for hip fracture.

DESIGN—Retrospective observational study using data from the five percent Medicare sample.

SETTING—Inpatient medical rehabilitation pre- and post implementation of prospective payment (2001–2005)

PARTICIPANTS—44,684 Medicare patients

MEASURES—Post-acute discharge setting (home, inpatient rehabilitation, skilled nursing facility and long-term care nursing home/hospital/hospice)

RESULTS—Bivariate analyses showed that discharge from acute care to inpatient rehabilitation increased from 12.2% in 2001 to 23.9% in 2005. The odds of discharge to inpatient medical rehabilitation were 2.26 (CI_{95%} 2.09, 2.45) greater in 2005 relative to 2001 after adjustment for patient characteristics (age, sex, race/ethnicity), admitting diagnoses, type of treatment (internal fixation vs arthroplasty), and length of stay.

CONCLUSION—The move from fee-for-service to prospective payment for post-acute services for persons with hip fracture was associated with increased use of inpatient medical rehabilitation. Further research is necessary to confirm the trend in discharge setting and determine if it is related to changes in post-acute care reimbursement.

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Author Contributions

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J. Goodwin - Acquired data, assisted in interpretation of data, provided editing of manuscript, and approved final version.

K. Ottenbacher - Contributed to concept and design, provided substantial editing and revising of manuscript, and approved final version.

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Keywords

aged; patient discharge; hip fractures; Medicare; Prospective Payment System

INTRODUCTION

Hip fracture in the United States is associated with significant mortality, morbidity, and cost.¹ Approximately, 15% to 30% of patients die within the first year after hip fracture.² Seventy percent of survivors recover basic daily living skills and another 45% regain their pre-fracture instrumental daily living skills within one year.³ Health care costs during the first 6 months after a hip fracture are estimated to average \$27,000 (2001 U.S. dollars), and the lifetime attributable cost of a hip fracture is more than \$80,000.²

The delivery of health services to patients with hip fracture has changed since the early 1980s with the implementation of the Medicare Prospective Payment System (PPS) for acute hospitalization, the growth of managed care, and medical advances in surgery and rehabilitation.^{4–6} Following acute care hospitalization patients may be discharged to inpatient medical rehabilitation in hospitals or rehabilitation centers, skilled nursing facilities (SNFs), or long-term nursing homes/hospitals/hospice.^{7,8} Patients may also be discharged home with home health services including out-patient therapy, or they may be sent home with no follow-up therapy services.

The costs of post-acute care increased dramatically in the 1980s and early 1990s.⁴ From 1985 to 1995, Medicare payments for skilled nursing facilities increased by 33% per year; and home health and inpatient rehabilitation costs increased by 24% and 20% per year, respectively.^{7,9,10} To contain the rising costs, Congress passed the Balanced Budget Act of 1997 mandating prospective payments systems for all areas of post-acute care. From 1998 to 2002 the Centers for Medicare and Medicaid Services (CMS) developed and implemented PPS for skilled nursing facilities (1998), home health agencies (2001), and in-patient medical rehabilitation facilities (2002).⁷ Each PPS is based on a different method of accessing the patient and determining reimbursement. PPS for SNFs was implemented in 1998 and is a case-mix adjusted per diem system based on 44 resource utilization groups (RUGS). Adjustments were made in the SNF payment system in 2000 and again in 2001. Interim PPS was introduced for home health in 1997 and the final system implemented in 2000. PPS for home health is based on 60 day episodes with patients classified into one of 80 home health resource groups. The inpatient medical rehabilitation PPS was phased in during 2002 with costs determined per discharge and patients classified into case-mix groups based on their age, diagnosis, functional status and comorbidities.^{10,11} The impact of PPS on health care services and outcomes across post-acute care venues is a topic of current research interest for providers, patients and the CMS.^{7,9–11}

The purpose of this study was to examine the trend in one objectively measured outcome for a patient population likely to be impacted by changes in reimbursement for post-acute care – persons with hip fracture. We selected hip fracture for the following reasons: 1) the majority of patients are over 65 years of age and covered by Medicare, 2) hip fracture is an acute onset medical event that requires hospitalization, and 3) the majority of persons will receive some form of post-acute care. Discharge setting following acute hospitalization was chosen as the primary dependent measure because it is a distinct outcome with cost implications that can be objectively measured and information on this variable is recorded in the Medicare claims files. We hypothesized there would be a decrease in the percent of patients with hip fracture discharged to inpatient medical rehabilitation following the introduction of PPS. This hypothesis was based on the fact that existing research does not provide evidence-based support

for treatment effectiveness by post-acute service location, and decreases in service were found following the introduction of PPS for SNFs and home health agencies.

METHODS

Research Design

Data Sources—Our study used the 5% sample of Medicare claims data from 2001 to 2005. The 5% random sample of Medicare Claims data is made available by CMS for research purposes. We chose data from 2001 through 2005 because the sample included the period immediately prior to and following the implementation of PPS for inpatient medical rehabilitation.

The 5% sample contains information from the following CMS files: the Medicare Enrollment file (EDB), which includes demographic data (age, gender and race/ethnicity); the Medicare Provider Analysis and Review (MEDPAR) file, which includes Medicare hospital claims information on admission types (acute, post acute and long term), up to ten diagnoses (ICD-9s), procedure, date of procedure, length of hospital stay and discharge disposition; and the Medicare Carrier files, which contain outpatient Medicare claims from service providers and information on dates of service, service provided (current procedural terminology [CPT] or health care common procedures coding system [HCPCS]), performing and referring physician, and up to five diagnosis codes (ICD-9-CM) per claim. Existing diagnoses were used to obtain the Klabunde's comorbidity index, adapted from the Charlson's comorbidity index for administrative database.¹² We included only patients with a first admission for hip fracture from 2001 to 2005 and with a valid discharge disposition.

Study Variables

The independent variable was year of admission and the primary dependent variable was discharge setting classified as: patient's home, inpatient rehabilitation facility, SNF, or long-term care nursing home/hospital/hospice.

Covariates included patient characteristics (age, gender, race/ethnicity), admitting diagnoses (type of fracture), procedure performed in the hospital, acute hospitalization length of stay, and residing in a nursing home prior to admission. Residing in a nursing home was defined as having claims for provider visits in a nursing home within 3 months of admission.

Data Analyses

Descriptive and bivariate analyses were performed using chi-squared test and standard descriptive statistics to examine the relationship among discharge setting and covariates from 2001 through 2005. Multivariable logistic regression analysis was used to examine discharge setting over time (2001–2005) adjusting for the covariates listed above. Standard regression diagnostics were performed and all assumptions for logistic regression were met. A p-value of < 0.05 was considered significant. All analyses were conducted using SAS version 9.0.(SAS Institute 2004)

RESULTS

We studied 44,684 persons admitted to acute care hospitals between 2001 and 2005 for first hip fracture. The categories of hip fracture included transcervical fractures, closed (N=8,985; ICD-9 CM 820.00, 820.02, 820.03, 820.09), pertrochanteric fractures, closed (N=15,654; ICD-9 CM 820.20-.22), and fracture of unspecified part of the neck closed (N=20,045, ICD-9 CM 820.8).

Table 1 presents patient demographics by year. The average age for all patients was 83.50 years (SD = 7.30), 93% were non-Hispanic white and 75.6% were women. Approximately 35% were admitted for transcervical fracture and 20% for pertrochanteric fractures; the site of fracture was not specified for the remaining patients (45%). The majority of patients (57%) received internal fixation of the fracture during acute hospitalization. Collapsed across the five year time frame, 10% of the patients were discharged home following acute hospitalization, 19% were discharged to inpatient rehabilitation, 63% were discharged to SNF, 4% to long-term nursing home/hospitals/hospice, and 3% died in the hospital. Following a period of approximately 40 days, 69% of patients originally discharged to inpatient medical rehabilitation were at home compared to 45% of patients from SNFs.

Bivariate analyses revealed that the demographic characteristics and procedures performed among persons with hip fracture were not statistically different from 2001 to 2005. The number of patients with no comorbidity changed from 46% in 2002 to 44% in 2005 and although small, the difference in number of comorbidities is statistically significant ($\chi^2 = 22.28$, $p < .05$). The pattern of discharge setting showed significant variation from 2001 to 2005. The percentage of patients discharged to inpatient medical rehabilitation increased while the percentage of patients discharged to other post-acute care settings remained stable or decreased. Discharge to an inpatient rehabilitation facility doubled from 12.2% in 2001 to 23.9% in 2005 (see Table 1). The Figure shows the absolute percentage change for each post-acute setting from 2001 through 2005. The largest change for inpatient medical rehabilitation facilities occurred in 2001 – the year prior to the implementation of PPS.

Logistic regression analyses revealed that the increase over time persisted, after adjusting for age, gender, race/ethnicity, admitting diagnoses, LOS, and procedure (internal fixation versus joint replacement). The odds were 2.26 (CI_{95%} 2.09, 2.45) greater that a patient with hip fracture would be discharged to inpatient medical rehabilitation in 2005 than in 2001 (Table 2).

We conducted an additional analysis adjusting for residing in nursing homes three months prior to admission and for comorbidity. A total of 31,885 persons (71% of total sample) had complete information for the comorbidity calculation. We found no significant differences on primary variables between subjects with and without complete comorbidity data. The analysis revealed that the time trend remained statistically significant and the magnitude of increase was similar after adjusting for age, gender, race/ethnicity, admitting diagnoses, procedure, LOS, comorbidity and whether or not the person lived in a nursing home three months prior to admission (data not shown).

DISCUSSION

Discharge disposition following acute care hospitalization is a complex process influenced by a number of factors. Interpreting the change in pattern for post-acute discharge settings requires carefully considering the broader continuum of health care services¹³ in addition to PPS.

PPS for acute hospital health care was introduced in 1983 as a method to contain costs for Medicare patients by linking reimbursement to the expected cost based on medical diagnosis.^{7,14} Post-acute care settings were excluded from the original diagnostic related group (DRG) PPS introduced in 1983. A primary reason for the exclusion was that DRGs did not accurately predict resource use in post-acute facilities.^{9,15}

The introduction of DRG based PPS in acute care hospitals created an incentive to discharge patients earlier.¹⁶ The average acute care stay for patients with hip fracture decreased from 18.6 days in 1982 to 6.6 days in 2002.^{9,17} Consequently, increased post-acute services were needed by patients who were not prepared to function independently at home or in the community. Increased post-acute services were provided in rehabilitation hospitals and units,

skilled nursing programs, and long-term care nursing homes/hospitals.¹⁸ There was also a substantial expansion of home health based services.^{19,20} (<http://www.cms.hhs.gov/PropMedicareFeeSvcPmtGen/>).

Reports by MedPAC (Medicare Payment Advisory Commission) examining the impact of PPS on post-acute care services reveal significant fiscal and service related impacts for SNF based programs and home health services.^{7,9,10} For SNFs, the amount of therapy services, Medicare payments, and number of SNF programs all declined in the years immediately following the implementation of PPS for SNFs.^{9,21} Subsequent adjustments were made to the SNF payment system in 2000 and 2001 and the number of SNFs and Medicare spending has gradually increased in recent years.⁹

The implementation of PPS in home health also resulted in significant reductions in the number of programs, Medicare costs and services provided.^{9,10} Medicare spending for post-acute care for home health services decreased by 50% from 1997 to 1999 under the interim PPS system for home health. In recent years, home health spending has gradually increased but remains below levels seen in the late 1990s.⁹ In 2005, Medicare spending for home health totaled \$12.5 billion which was similar to spending in 1994 (\$12.9 billion). In contrast, the early results indicate that implementation of PPS for inpatient medical rehabilitation has not resulted in a decrease in service or reduction in the number of programs/units.⁹ A recent MedPAC report indicates that between 1998 and 2005 there was a 2.8% decrease in the number of SNF programs, a 12.9% decrease in the number of home health providers, and a 12.7% increase in the number of inpatient medical rehabilitation programs/facilities.⁹

The majority of older adults who experience a hip fracture will need some level of post-acute care and rehabilitation therapy to regain mobility and functional independence. However, the research evidence concerning what type, amount, and intensity of treatment is most effective is lacking.²² Currently, there is intense interest in the interaction between the effectiveness of therapy services and the location in which they are provided since there are substantial differences in the costs of rehabilitation therapy and other services across different post-acute care settings.^{17, 23, 24}

A recent investigation of approximately 30,000 Medicare patients receiving post-acute rehabilitation in either inpatient rehabilitation facilities or SNF rehabilitation programs found no significant difference in motor functional status at discharge.¹⁷ While the LOS for patients in SNF rehabilitation programs was longer than for patients receiving inpatient medical rehabilitation (mean 23.4 versus 16.2 days) there was still a statistically significant difference in mean cost per patient for inpatient rehabilitation (\$11,067, SD = \$6,497) versus for SNF-based rehabilitation (\$7,210, SD = \$5,030).¹⁷ The above studies were conducted on patients receiving services prior to the full implementation of PPS in all post-acute care settings.

In a review article, Cotterill and Gage⁷ note that future research should focus on the response of post-acute care providers across “potentially substitutable settings.” They observe that there are several reasons why interactions among settings are likely to be important. First, due to the different implementation dates of the various payment systems, fiscal pressure will vary across settings over time. For example, when the fiscally stringent SNF and home health payment systems were implemented, inpatient rehabilitation facilities continued to be paid on a fee for service basis. Cotterill and Gage⁷ state that even when all the post-acute care payment systems are implemented “fiscal stringency may change over time and vary across systems.”

Our study is the first to compare changes for patients with hip fracture in discharge placement from acute care to post-acute care setting since the implementation of PPS for all post-acute care venues. In contrast to our hypothesis, we found an increase in discharge from acute care hospitals to inpatient medical rehabilitation facilities. The increase in discharges to inpatient

medical rehabilitation facilities could be related to several factors. First, as noted previously, the number of inpatient rehabilitation programs/units increased at a rate substantially higher than other post-acute care venues during the study period. Availability of post-acute care settings is a determinant of whether patients select such care and which type of post-acute facility they use.¹⁹ Second, the fiscal impact of PPS on inpatient rehabilitation facilities does not appear to have been as negative as it was for SNFs or home health agencies.¹¹ Early reports indicate that inpatient rehabilitation facilities adapted quickly to PPS by lowering costs, which resulted in greater profit margins during the first year of implementation when compared to facilities temporarily remaining on the pre-PPS fee schedule.¹¹ Thus, while PPS for SNFs and home health providers resulted in reductions of programs, facilities, services, and Medicare payments; similar reductions do not appear to have occurred following the implementation of PPS for inpatient rehabilitation.⁹

Recent enforcement of CMS's 75% rule for medical rehabilitation may be encouraging referral and admittance of patients from selected impairment groups including hip fracture. The original 75% rule approved in 1984, stated that in order to be considered an inpatient medical rehabilitation facility for reimbursement purposes, 75% of the patients treated had to be from one of 10 diagnostic groups (stroke, spinal cord injury, congenital deformity, amputations, major multiple trauma, hip fracture, brain injury, polyarthritis, neurological disorders or burns).¹⁶ Prior to the implementation of PPS for inpatient rehabilitation, the 75% rule was not rigorously enforced. With the introduction of PPS, the enforcement of the 75% rule became a topic of debate and controversy.¹⁶ In May of 2004, CMS issued a final rule outlining a phase-in period for the 75% rule and increasing the number of diagnostic categories to 13.^{9,16} Patients with hip fracture are the second largest group that meet the CMS requirements for the 75% rule (patients with stroke are the largest). Thus, pressure to comply with the 75% rule may be a factor in the increased number of patients with hip fracture being admitted to inpatient medical rehabilitation facilities.

Our finding of increased inpatient medical rehabilitation services following the introduction of PPS has financial implications. The most recently published direct comparison between costs for patients with hip fracture in SNFs versus inpatient medical rehabilitation reveals that, despite longer average LOS, the cost of services in a SNF was 35% lower than the cost of inpatient medical rehabilitation and there were no significant differences in outcomes as measured by motor functional status ratings and discharge setting.¹⁷

A strength of our investigation is the use of a large representative sample of Medicare patients. The study, however, has a number of limitations. Our analyses were limited to variables included in the Medicare claims files. Variables such as social support and financial resources will impact discharge planning and we did not have access to adequate information on these factors. Another limitation is the relatively short time frame since the introduction of PPS for all post-acute care settings and the fact the PPS for inpatient rehabilitation was phased-in during 2002. It will be important to continue monitoring the pattern of discharge setting and other outcomes that may be influenced by the different PPS post-acute care plans.

Our study was limited to persons with hip fracture and the pattern of discharge to post-acute care may be different for other impairment groups, e.g., persons with stroke. This study included only Medicare beneficiaries and focused on one phase of the patients' recovery from hip fracture, that is, acute hospital care and discharge disposition. Information from medical records and administrative claims data is subject to recording and transcribing errors and the reliability of the data collection process for this sample is unknown. Finally, the data are observational and any trends suggested from 2001 through 2005 must be viewed with caution.

Prospective payment is now an established feature of the U.S. health care system at all service levels. With the expanding aging population and the increased prevalence of chronic disease and disability in the Medicare age group, it is essential that the delivery of post-acute care services be managed effectively and efficiently to ensure optimal health for all citizens.

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Conflict of interest

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SNF = Skill Nursing Facility
 IRF = Inpatient Rehabilitation Facility
 Long Term = Long Term Care Nursing Home/Hospital

Figure. Absolute change in percentage (positive or negative) in persons with hip fracture discharged to different post-acute care settings from 2001 through 2005

SNF = Skill Nursing Facility
 IRF = Inpatient Rehabilitation Facility
 Long Term = Long Term Care Nursing Home/Hospital

Table 1

Demographics and Outcomes Stratified by Year.

	2001 (n=9,791)	2002 (n=9,122)	2003 (n=8,928)	2004 (n=8,656)	2005 (n=8,187)
Age (mean ± SD)	83.6 ± 7.3	83.4 ± 7.3	83.6 ± 7.4	83.4 ± 7.3	83.3 ± 7.4
Women (%)	76.7	75.9	75.9	75.5	74.6
Race/ethnicity (%)					
Whites	93.1	92.9	93.5	93.2	93.0
Blacks	3.7	3.6	3.5	3.5	3.5
Hispanics	1.1	1.2	1.1	1.3	1.2
Others	2.1	2.4	1.9	2.0	2.3
Admitting diagnoses (%)					
Transcervical fracture	34.7	35.2	34.8	35.1	35.3
Pertrochanteric fracture	20.4	20.5	20.2	19.9	19.5
Not specified	45.0	44.3	45.0	45.0	45.1
Comorbidity (%) *					
None	--	46.0	46.7	44.6	44.2
1	--	26.4	25.5	26.5	27.6
2	--	14.4	15.2	14.7	14.9
3 or more	--	13.1	12.6	14.2	13.3
Procedure (%)					
None	7.7	7.7	7.3	7.8	7.5
Internal fixation	57.3	56.9	56.2	57.0	57.0
Arthroplasty	35.0	35.4	36.5	35.2	35.5
Hospital length of stay (mean ± SD)	6.5 ± 4.8	6.6 ± 5.7	6.5 ± 4.9	6.4 ± 5.5	6.3 ± 4.5
Discharge (%) *					
Home	12.5	11.2	9.2	9.4	8.8
IRF	12.2	17.5	21.3	22.8	23.9
SNF	65.5	63.2	62.7	62.2	61.5
NH/Long-term care/hospice	6.4	4.3	3.2	2.5	2.6
Died	3.4	3.8	3.6	3.1	3.2

The above numbers are percent unless otherwise specified.

* Indicates significant difference by chi square

† Indicates significant difference by Kruskal-Wallis

IRF = Inpatient Rehabilitation Facility

SNF = Skilled Nursing Facility

NH/Long-term = Nursing Home/Long-term Care Facility

Table 2
Time Trend in Discharge to Inpatient Rehabilitation Facilities.

	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Year (ref=2001)		
2002	1.53 (1.41, 1.66)	1.55 (1.43, 1.69)
2003	1.95 (1.80, 2.11)	1.98 (1.83, 2.15)
2004	2.12 (1.96, 2.30)	2.14 (1.97, 2.31)
2005	2.27 (2.09, 2.45)	2.26 (2.09, 2.45)
Age (continuous)	--	0.97 (0.96, 0.97)
Men vs. women	--	0.99 (0.93, 1.04)
Non-whites vs. whites	--	1.13 (1.02, 1.24)
Length of Stay (continuous)	--	0.94 (0.93, 0.94)
Admitting diagnoses (ref=not specified)		
Pertrochanteric fracture	--	0.97 (0.91, 1.03)
Transcervical fracture	--	0.86 (0.81, 0.92)
Arthroplasty Vs Internal fixation	--	1.28 (1.21, 1.36)