CHAPTER 5

Payment for post-acute care

In this chapter

- Comparing outcomes and spending for beneficiaries who have had a hip or knee replaced
- Comparing the patient assessment tools used in post-acute care settings
- Assessing the skilled nursing facility PPS
- Assessing the home health PPS

Providers should base their decisions about where beneficiaries receive post-acute care services on patient characteristics and resource needs, not on Medicare payments. Given the potential overlap in services and lack of criteria delineating the appropriate treatment setting, post-acute care decisions are sensitive to payment system incentives. Where overlap exists, the tradeoffs between cost and quality often are unknown. In this chapter, we report on the results of one study comparing patient characteristics, outcomes, and spending in different post-acute settings for beneficiaries who had a hip or knee replaced. Next, to examine how well policymakers and researchers could compare patients across settings, we report on the various patient assessment tools currently required in three post-acute settings. Finally, we discuss the reasons that the payment systems for skilled nursing facilities and home health services may not be paying appropriately for all types of patients. We discuss ways to correct problems with payments in these settings to ensure that payments better track the resource needs of different patients.

Comparing outcomes and spending for beneficiaries who have had a hip or knee replaced

One criterion that distinguishes IRFs from acute hospitals is the so-called 75 percent rule. This rule requires that an IRF admit 75 percent of patients for one or more conditions from a list of conditions that CMS specifies, such as stroke or hip fracture. In 2004, after several years of not enforcing the rule, CMS revised the list of conditions for the first time since 1983. Specifically, CMS eliminated "polyarthritis"—the most frequent diagnosis for beneficiaries who used IRFs in 2002—from the list and replaced it with four arthritis-related conditions. These conditions include (a) patients with polyarthritis who have bilateral joints replaced, are aged 85+, or have a body mass index (BMI) of 50+; (b) patients who have two major weight-bearing joints with severe osteoarthritis (not counting replaced joints); (c) rheumatoid arthritis; and (d) systemic vasculidities with joint inflammation. The last three conditions must not have improved after an appropriate, aggressive, and sustained course of outpatient therapy services (or services in less intensive rehabilitation settings) immediately preceding the IRF admission or must result from a systemic disease activation immediately before admission. CMS is phasing in the changes in the 75 percent rule, beginning in July 2005, over a period of four years—50 percent the first year, 60 percent the second year, 65 percent the third year, and 75 percent in successive years. CMS maintains that polyarthritis—the diagnosis for hip and knee replacement patients—does not require the intense rehabilitation provided by IRFs, except in select cases.

In effect, the change in the 75 percent rule means that fewer beneficiaries with a single hip or knee replacement will likely use IRF care. IRFs that previously have admitted a substantial proportion of joint replacement patients are expected to change their behavior in order to comply with the new rule as it phases in. As a result, under the new 75 percent rule, some beneficiaries with a hip or knee replacement who need rehabilitation but do not meet the new criteria will not go to an IRF but instead will have a longer acute hospital stay, be referred to SNFs, or be sent home with home health or outpatient therapy. Other such beneficiaries may continue to use IRFs; the rule provides for 25 percent of IRF patients to have conditions not on the list. The research we discuss in this section is the first study comparing outcomes and spending for joint replacement patients across settings.

To determine the potential effect of the change in the 75 percent rule, we convened a physician panel of orthopedic surgeons and specialists in physical medicine and rehabilitation in which they could discuss their views of differences among patients that influence the setting beneficiaries use. We also contracted with RAND to compare outcomes and Medicare spending across settings for beneficiaries who have had a hip or knee replaced. This information can help policymakers better understand the impact of the new 75 percent rule on beneficiaries and Medicare's costs.

Physician panel

We convened a panel of six orthopedic surgeons who perform many hip and knee replacements and five specialists in physical medicine and rehabilitation who are familiar with the rehabilitation of these types of patients. Generally our panelists were affiliated with large academically oriented health care institutions located in various parts of the nation. We asked this panel to discuss where beneficiaries who have had a hip or knee replaced should be rehabilitated after surgery. We also asked the panel to discuss whether they had observed any change in practice or referral patterns since the publication of the new 75 percent rule.

The orthopedic surgeons told us that patients who have had a hip or knee replaced ideally should go home with either home health care or outpatient therapy services—between 50 percent and 85 percent of their Medicare patients go home from the hospital in two to four days following surgery. (These estimates are higher than the national rate [Table 5-1, p. 109].) The panel said that characteristics of patients who require rehabilitation in an institutional setting (IRF or SNF) are those who:

- are limited in weight-bearing ability or cannot walk 100 feet,
- are obese,
- have impairment of one or more joints (other than the one replaced),
- have diminished presurgery functioning,
- have comorbidities, such as congestive heart failure or post-operative dementia,

- have architectural barriers at home, or
- have no informal caregiver.

Weight-bearing ability is an important predictor of how fast patients recover after surgery, and it may even determine whether the patient makes progress. Obesity also affects a patient's ability to bear weight. The panel unanimously questioned the appropriateness of a BMI of 50 as a criterion for joint replacement patients who are obese to be counted in the 75 percent rule. The panelists thought that beneficiaries with a BMI of 50 or more would not be able to tolerate the intense rehabilitation provided in IRFs. Thus, in the panelists' opinion, the standard excluded all obese persons who might benefit from IRF care. Some panelists thought a BMI of 38 was a more appropriate standard.

Regarding the question of whether patients with the need for rehabilitation in an institutional setting should go to an IRF or a SNF, the orthopedic surgeons felt that joint replacement patients could go to SNFs, although SNFs would not rehabilitate patients as quickly as IRFs. The panelists also agreed that certain circumstances cause IRFs to be more appropriate. For example, when a patient has comorbidities, he may benefit from the extra medical attention that an IRF provides. However, if a patient cannot stand the intense therapy provided at an IRF, or if he has a weight-bearing constraint, the convalescent care of a SNF may be more appropriate.

Orthopedic surgeons in some communities decide on an IRF versus a SNF based on the characteristics of the specific facilities available. The surgeons suggested that their comfort level with facilities may reflect the level and type of staffing at the facility, whether the facility follows protocols, or even the surgeon's convenience. For example, because physicians in SNFs are usually not involved in frequent supervision of patients while physicians in IRFs are integrally involved with patients, orthopedic surgeons may prefer IRFs because they can hand off patients to an IRF's physicians with confidence that those patients would continue to receive close monitoring. One surgeon said that his practice area had neither SNFs nor IRFs. In general, surgeons said that they did not know the outcomes of patients being rehabilitated in SNFs.

The panelists maintain that the publication of the new rule defining IRFs has already affected referral patterns. They reported that some IRFs will no longer accept joint replacement patients and that acute hospital lengths of stay (LOSs) have increased slightly as a result. Panelists told us that IRFs with a large referral base would have fewer problems meeting the new criteria, but IRFs with a smaller referral base may have greater difficulty complying. Some orthopedic surgeons also reported having developed protocols for home health agencies, so that these agencies could provide more intensive rehabilitation services to patients after hip or knee replacement.

Results from the empirical study

We contracted with researchers to study outcomes and Medicare spending for all beneficiaries who had hip or knee replacements and who were discharged from an acute hospital between January 2002 and June 2003 (see text box on p. 113 for study methods) (Beeuwkes Buntin et al. 2005).[1]

The research questions in this study were:

- What are the differences among hip or knee replacement patients who use IRFs, SNFs, or go home following surgery?
- What are the differences in outcomes for these patients?
  - —What are the differences in functional status?
  - —What are the differences in patients residing in the community at 120 days?
- What are the differences in Medicare spending for these patients?

Differences in patient characteristics

The study found:

- About 30 percent of patients who had hip or knee replacements used SNF care following surgery, 35 percent used IRF care, and the remaining 35 percent returned home (with home health care, outpatient therapy, or no care) (Table 5-1).
- On average, patients who go home following surgery are younger, have fewer comorbidities and complications, and are less likely to be eligible for both Medicare and Medicaid than IRF patients. Compared with IRF patients, SNF patients are significantly older, have more comorbidities and complications, and are more likely to be eligible for both Medicare and Medicaid (Table 5-1).

TABLE 5-1

Selected characteristics of patients with hip or knee replacement

Characteristics	Site of care after surgery: Home	IRF	SNF
Number of observations	149,000	149,000	128,000
Percentage	35%	35%	30%
Demographic characteristics			
Age (years)	72.7	75.0	76.3**
Female	54.3%	70.2%	72.2%**
White	94.2	89.9	93.3**
Black	3.3	6.8**	4.1
Medicaid coverage	5.2	9.2	10.1**
Complications			
Postoperative pulmonary compromise	0.3	0.5	0.8**
Postoperative GI hemorrhage or ulceration	0.2	0.2	0.3**
Cellulitis or decubitis ulcer	0.3	0.5	0.8**
Septicemia	0.0	0.0	0.1**
Mechanical complications due to device or implant	0.9	1.2	1.7**
Shock or cardiorespiratory arrest	0.1	0.1	0.2**
Postoperative heart attack	0.3	0.4	0.6**
Venous thrombosis or pulmonary embolism	0.5	0.7**	0.6
Iatrogenic complications	3.4	4.0	4.7**
Comorbidities			
Acute renal failure	0.3	0.7	0.8**
Delirium	0.7	1.4	2.0**
Chronic pulmonary disease	9.1	11.2	11.8**
Congestive heart failure	3.4	5.8	7.1**
Chronic renal failure	0.1	0.2	0.2**
Nutritional deficiencies	0.1	0.2	0.4**
Dementia	0.5	0.9	2.3**
Pneumonia	0.6	0.8	1.2**
Type of joint replacement			
Hip replacement	31.2	36.1	40.0**
Total	25.8	30.1	31.0**
Partial	0.6	1.3	2.7**
Hip revision	4.8	4.8	6.3**
Knee replacement	68.5	63.9**	60.0
Total	62.5	60.0**	55.8
Bilateral procedure	1.8	6.2**	4.0

Note: IRF (inpatient rehabilitation facility), SNF (skilled nursing facility), GI (gastrointestinal). Patients who were in a custodial nursing home before or after their acute stay, who used acute rehabilitation (DRG 462), used long-term care hospitals, or died in the first 30 days after their acute discharge are excluded from this analysis. This excludes < 3% of the sample. Patients in the sample were hospitalized from January 2002 through June 2003.
** Indicates significant t-test for differences between IRF and SNF values at the 0.0001 level.
Asterisks are placed next to the higher of the values for SNF and IRF.

Source: Beeuwkes Buntin et al. 2005.

- Of beneficiaries who use institutional settings, those who have had hip replacements are more likely to go to a SNF, while beneficiaries who have had knee replacements are more likely to go to an IRF (Table 5-1, p. 109).

TABLE 5-2

Characteristics of discharging hospitals and proximity to facilities for patients with hip or knee replacement

	Site of care after surgery		
	Home	**IRF**	**SNF**
Number of observations	149,000	149,000	128,000
Percentage	35%	35%	30%
Discharging hospital's characteristics			
Nonprofit hospital	78%	76%	79% **
Government hospital	10	9	10 **
Percentage of:			
Low-income patients	12	13 **	12
Medicare days	47	47	49 **
Hospital's ADC	204	235 **	191
Resident–to–ADC ratio	0.118	0.144 **	0.110
Case-mix index	1.532	1.548 **	1.469
Patient's proximity to facility			
Average number of			
IRFs within travel radius	11	13 **	11
SNFs within travel radius	39	43	46 **
No SNFs within travel radius	0.001	0.001 **	0.001
Distance to nearest SNF in miles	3	2	2 **
Distance to nearest IRF in miles	18	11	18 **

Note: IRF (inpatient rehabilitation facility), SNF (skilled nursing facility), ADC (average daily census). Patients who were in a custodial nursing home before or after their acute stay, used acute rehab (DRG 462), used long-term care hospitals, or died in the first 30 days after their acute discharge are excluded from this analysis. This excludes < 3% of the sample. Patients in the sample were hospitalized from January 2002 through June 2003.
** Indicates significant t-test for differences between IRF and SNF values at the 0.0001 level.
Asterisks are placed next to the higher of the values for SNF and IRF.
Travel radius is defined as the 90th percentile of the distance traveled to a type of provider by beneficiaries living in that type of area.

Source: Beeuwkes Buntin et al. 2005.

- On average, IRF patients come from acute hospitals that are larger, have a higher case-mix index, and are more likely to be teaching hospitals (Table 5-2).
- Distance to a facility may be a factor in determining site of care. On average, patients who use an IRF have one that is relatively close to their residence (Table 5-2).

Differences in outcomes

In this section, we discuss differences in functional status for SNF and IRF patients, mortality, and residence in the community. IRFs and SNFs measure functional status close to or at admission for their patients. Patients who go home with outpatient therapy or with no care do not have their functional status assessed.

The preferred outcome—improvement in functional status—is not assessed for most SNF patients. Because SNFs do not assess patients' functional status at discharge, researchers compared functional status at admission and discharge (or at 14 days) for patients who stayed in the IRF or the SNF at least 14 days.[2] Researchers created a measure of functional status similar to the Barthel Index (Mahoney and Barthel 1965) and mapped from the SNFs and IRFs assessment tools to the index. As discussed in the section on patient assessment instruments, clinicians use these tools to ask different questions and assess patients at different times during their post-acute stay, so the quasi-Barthel Index may not be comparable. As a result, researchers also examined patients' independence in walking and in transfer (for example, from a bed to a chair).

Descriptive analysis Based on descriptive statistics that do not control for differences in patient characteristics and potentially measure IRF and SNF patients at different points in their stay, SNF patients have a higher functional status score at admission than IRF patients. But SNF patients with a 14-day or longer stay have lower functional status scores than IRF patients discharged from the facility at 14+ days (Table 5-3).

Walking—Of patients who were discharged at 14+ days after admission, 1 percent of IRF patients were walking independently at admission but 76 percent were walking independently at discharge. For SNF patients in the facility at 14+ days after admission, 9 percent were walking independently at admission but 31 percent were walking independently at 14 days (Table 5-3).

TABLE 5-3

Functional status outcomes for patients with hip or knee replacement

	Site of care after surgery	
	IRF	**SNF**
Functional status for all patients		
Mean score on Barthel Index at admission (0–90)	46	55 **
Percentage of patients:		
Walking independently at admission	10 %	20 %**
Transferring independently at admission	11	16 **
Functional status for patients with 14+ day stay†		
Mean score on Barthel Index (0–90):		
at admission	35	47 **
at discharge	65 **	58
Percentage of patients:		
Walking independently at admission	1 %	9%**
Walking independently at discharge/14+ days	76 **	31
Transferring independently at admission	2	8 **
Transferring independently at discharge/14+ days	79 **	30

Note: IRF (inpatient rehabilitation facility), SNF (skilled nursing facility). Patients who were in a custodial nursing home before or after their acute stay, used acute rehabilitation (DRG 462), used long-term care hospitals, or died in the first 30 days after their acute discharge are excluded from this analysis. This excludes < 3% of the sample. Patients in the sample were hospitalized from January 2002 through June 2003.
** Indicates significant t-test for differences between IRF and SNF values at the 0.0001 level. Asterisks are placed next to the higher of the two values. Barthel Index (Mahoney and Barthel 1965) created by mapping functional status items from assessment instruments used in SNFs and IRFs. Higher scores on Barthel Index mean greater independence in functional status.
† Indicates discharge from IRFs; 14+ days means SNF patients assessed at 14 days.

Source: Beeuwkes Buntin et al. 2005.

Transferring—Of patients who were discharged at 14+ days after admission, 2 percent of IRF patients were transferring independently at admission but 79 percent were transferring independently at discharge. For SNF patients in the facility at 14+ days after admission, 8 percent were transferring independently at admission but 30 percent were transferring independently at 14 days (Table 5-3).

Multivariate analysis As noted in the descriptive analyses, there is a great deal of selection of patients into the three settings (IRF, SNF, and home). Thus it is critically important to control for both observed and unobserved selection. The importance of controlling for selection effects is demonstrated by the results from an unadjusted regression model that shows that SNF patients are 2.7 percentage points more likely to be dead or institutionalized at 120 days after discharge from an acute hospital as compared with patients going home (Table 5-4, p. 112). The difference declines to 1.2 percentage points in the model adjusted for observable patient characteristics. The difference declines further to 0.46 percentage points in an instrumental variable (IV) model that is designed to capture unobserved selection effects.

Using IV models, researchers found that compared with patients who went home after surgery, patients who used IRFs and SNFs are more likely to be dead or institutionalized 120 days after discharge from an acute hospital by 0.18 and 0.46 percentage points, respectively (Table 5-4, p. 112). It is important to note that neither IRFs nor SNFs have a significant statistical effect when mortality by itself is the outcome; therefore, the effect appears to be operating through institutionalization alone.

The IV models provide the best estimates of the causal effect of post-acute care on outcomes, but the researchers were unable to rule out the possibility that some selection remains in these estimates. Outcomes depend on many factors, including patients' physical and cognitive abilities, underlying medical conditions, sensory and emotional factors, willingness to participate in care, and supportive environments. No risk adjustment approach can control for every factor affecting outcomes of care (Iezzoni 2003). The choice of IVs was carefully considered to address this problem, but the estimates could be biased if the instruments are invalid. Another limitation of the study is that the outcomes analyzed are not the ideal outcomes for patients who have had hip or knee replacements. The preferred outcomes analysis would examine changes in patients' functional status, but the data are not available for all patients.

Differences in Medicare payments

Instrumental variable analyses show that IRF patients cost Medicare more than patients who go home and more than patients who use SNFs. Patients who use IRFs cost about $8,000 more in Part A spending than those who go home after surgery, and patients who use SNFs cost about

TABLE 5-4

Outcomes for patients with hip or knee replacement

Outcome	Unadjusted model	Adjusted for patient characteristics			Instrumental variable model		
	Marginal effect	Marginal effect	Standard error	P-value	Marginal effect	Standard error	P-value
Dead or institutionalized at 120 days after discharge							
IRF vs. home after surgery	0.0058	0.0043	0.0004	0.00**	0.0018	0.0009	0.04*
SNF vs. home after surgery	0.0267	0.0120	0.0005	0.00**	0.0046	0.0008	0.00**
Dead at 120 days after discharge							
IRF vs. home after surgery	0.0030	0.0020	0.0003	0.00**	0.0016	0.0012	0.18
SNF vs. home after surgery	0.0089	0.0038	0.0003	0.00**	0.0023	0.0012	0.06
Part A PAC payments							
IRF vs. home after surgery	$9,959	$9,050	$31	0.00**	$8,298	$68	0.00**
SNF vs. home after surgery	6,028	4,685	33	0.00**	3,704	61	0.00**
Part A payments (PAC payments + acute stay)							
IRF vs. home after surgery	$10,204	$8,871	$33	0.00**	$8,023	$70	0.00**
SNF vs. home after surgery	6,116	4,590	35	0.00**	3,578	63	0.00**

Notes: IRF (inpatient rehabilitation facility), SNF (skilled nursing facility), PAC (post-acute care). Marginal effect is the change in predicted probability associated with changes in the explanatory variables. Post-acute payments are accumulated for 120 days after discharge from the acute hospital. Patients in the sample were hospitalized from January 2002 through June 2003.
* Indicates significance at the 0.05 level. ** Indicates significance at the 0.0001 level.

Source: Beeuwkes Buntin et al. 2005.

$3,600 more in Part A spending than those who go home after surgery (Table 5-4).[3] Payment rates differ widely for patients who are rehabilitated in IRFs versus SNFs. Medicare pays IRFs on a per-case basis but pays SNFs on a per-diem basis. Because of these different payment units, it is not straightforward to compare, but in general, Medicare pays IRFs more. The costs reported here are incomplete because we do not include payments to physicians or payments for outpatient therapy in the spending comparisons. These results also highlight the importance of controlling for selection effects, although controlling for selection had a small effect in the payment models compared with the outcome models.

Discussion

We undertook this study to determine the impact the new 75 percent rule might have on beneficiaries and the Medicare program. The evidence is not definitive. Some descriptive and multivariate results suggest that marginal patients may be institutionalized more frequently when they use SNFs rather than IRFs, and more frequently in both of these settings compared with those going home. But the fact that patients going home after surgery do better than those in either SNFs or IRFs suggests that patient selection is strongly present in these data and we cannot fully discount its effects. (See text box for a description of study methods.)

In general, the results from the models show that in terms of Part A costs, episodes in an IRF or SNF are much more costly for Medicare than for episodes of care among patients going home. The results also show that payments for episodes of care involving IRF care are much higher than episodes of care involving SNF care, even after controlling for characteristics of patients and discharging acute hospitals.

Study methods for multivariate analyses

In this study sample, RAND included all elderly Medicare beneficiaries who underwent a hip or knee replacement with no preceding hip fracture and who were discharged from an acute hospital between January 2002 and June 2003 (Beeuwkes Buntin et al. 2005). Researchers defined "post-acute location" as the first Medicare-covered site in which the patient received care within 30 days of discharge from an acute hospital. Excluded from the sample were the following types of patients, who made up less than 3 percent of the total:

- patients who died in the hospital or within 30 days of discharge (<1 percent);
- patients who received custodial care in nursing homes before or after their admission to the acute hospital;
- patients discharged to long-term care hospitals from acute hospitals;
- beneficiaries who enrolled in HMOs within four months of discharge; and
- patients who had incomplete personal information or missing discharge hospital characteristics.

Independent variables

Researchers at RAND included a wide array of independent variables that they expected would affect beneficiaries' choice of post-acute care. Examples of individual predictors are age, gender, race, Medicaid enrollment, and place of residence. To capture the complexity of patients at the time of hospital discharge, researchers included a large set of comorbidities and complications tailored to joint replacement patients. To capture factors that may influence post-acute use, researchers used variables from the acute hospital, such as average daily census, teaching status, ownership, Medicare share, case-mix index, and low-income patient percentage. Researchers defined availability of post-acute care based on how close inpatient rehabilitation facilities (IRFs) and skilled nursing facilities (SNFs) were to patients' homes and how many of each type of facility were located within reasonable distances of patients' homes.

Outcomes

Researchers examined descriptive statistics on health outcomes: residency in a nursing home at 60 days and 120 days; and death within 60 days and 120 days of their acute hospital discharge. Researchers combined the institutionalization and mortality variables into composite measures to avoid the bias associated with using variables for survivors only.

Payments

Researchers adjusted payments for area wage differences. They created summary variables for total post-acute care payments and total episode payments. The total episode payments combined payments for the acute hospital stay and total post-acute payments.

Multivariate analyses

Researchers used multivariate analyses to estimate how the site of care affected outcome measures. Multivariate analysis controls for observable differences in the patient population at each site of care—differences that might confound estimates of the site's effect on outcomes. In all models, researchers control for the individual predictors, clinical predictors, and characteristics of discharging hospitals.

Instrumental variables analyses

Researchers frequently use instrumental variable (IV) methods to remove the estimates of confounding due to unobservable characteristics. RAND used measures of post-acute care availability as instruments. Because these factors are not correlated with beneficiaries' clinical needs, researchers use them to predict use of IRFs and SNFs, and thus to infer the effect on outcomes for a marginal patient. Researchers typically use IV methods to control for the effects of selection bias, but these methods do not always capture all these effects. Beeuwkes Buntin and colleagues (2005) provide more information on methods. ■