

Decreasing Length of Stay After Total Joint Arthroplasty: Effect on Referrals to Rehabilitation Units

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ABSTRACT. Forrest GP, Roque JM, Dawodu ST. Decreasing length of stay after total joint arthroplasty: effect on referrals to rehabilitation units. *Arch Phys Med Rehabil* 1999;80:192-4.

Objective: To determine how protocols designed to decrease length of stay on orthopedic services after total joint replacements affect referrals for admission to rehabilitation units. To determine if the physical status scale of the American Society of Anesthesiologists (ASA) is a useful indicator of comorbid illnesses that affect the need for rehabilitation services.

Design: Cohort study; consecutive sample.

Setting: University medical center.

Participants: All patients admitted for total joint arthroplasty between April 12 and October 14, 1997.

Main Outcome Measure: Discharge to home or to rehabilitation unit.

Results: Length of stay was reduced from 6.4 days in 1995 to 5.1 days in 1997. The percentage of patients admitted to rehabilitation units increased from 18% in 1995 to 33% in 1997. Patients who are older, live alone, and have ASA scores of 3 or 4 were most likely to require admission to a rehabilitation unit.

Conclusion: The ASA is a useful measure of comorbidity affecting the need for rehabilitation service. Efforts to decrease cost of acute care services may shift costs of care to postacute services.

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TOTAL JOINT REPLACEMENT is a safe and effective treatment for advanced arthritis of the hip and knee that has not responded to nonoperative treatment. The efficacy in reducing pain and improving function is greater than 90%.^{1,2} The length of stay of patients admitted for these procedures has been decreasing. In 1974, Coventry¹ described protocols for management of total hip arthroplasties at the Mayo Clinic that recommended a length of stay of 21 days. In 1990, Harris and Sledge² reported an average length of stay of 9 to 10 days. Current protocols call for discharge on the fifth day after surgery.³

Previous studies have looked at factors that affect the length of time that patients remain on a surgical service after total joint arthroplasty and the factors that influence the need for a patient

to be admitted to a rehabilitation unit before discharge to home. Age, comorbid illness, support at home, and insurance⁴⁻⁶ have been cited as factors that affect the need for rehabilitation after total joint arthroplasty.

The purpose of this study was to evaluate the effect of decreasing lengths of surgical unit stay on referrals to rehabilitation units. In 1995, the length of stay at the Albany (NY) Medical Center for total joint replacement was 6.4 days.⁴ Between 1995 and 1997, the assistant medical director of the hospital, the nursing service, surgeons, and therapists worked together to streamline the care of patients admitted for hip and knee replacements. Clinical pathways were written to promote consistent postoperative care. This report addresses the following questions: Did the length of stay on the orthopedic unit change between 1995 and 1997? Did the rate of referral to rehabilitation units change? Did the ages of the patients and their living situations affect their need for admission to rehabilitation units? Can the physical status scale of the American Society of Anesthesiologists (ASA) be used to indicate which patients might require referral to a rehabilitation unit?

METHODS

Clinical Protocol

The Albany Medical Center is a 620-bed hospital that serves as the main teaching hospital of the Albany (NY) Medical College. Full-time faculty of the medical college, orthopedic surgeons in private practice, and orthopedic surgeons who work for a staff model health maintenance organization have staff privileges at the Medical Center. Patients who have had hip or knee replacements are seen on the first postoperative day by physical and occupational therapists. Before discharge to home, patients are expected to be able to transfer from a supine to a sitting position and from a sitting to a standing position, to walk household distances with a walker or crutches, and to be independent in activities of daily living or perform activities of daily living with the help available at home.

Patients who have had hip replacements are expected to understand precautions to prevent hip dislocation. Patients who have had knee replacements are expected to have a range of motion of 0° to 90° or to be making progress to indicate that adequate range of motion will be achieved with in-home therapy.

The decision to discharge a patient from the surgical service to home or to refer the patient for admission to a rehabilitation unit is made by the patient's surgeon with input from the patient, patient's family, therapists, nurses, and case management.

Subjects

We followed the cases of 130 consecutive patients admitted for elective hip or knee replacement between April 12 and October 14, 1997. All patients had cemented implants; 122 had primary procedures, and 8 had revision of prior implants. One patient who had a stroke and was transferred to a nursing home was excluded from the study. The data collected included the

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patients' age, sex, ASA physical status score (table 1), type of surgery (hip or knee), the name of the surgeon, length of stay on the orthopedic unit, living situation (alone or with others), and place of discharge (home or to a rehabilitation unit). The data were analyzed to determine if age, sex, ASA score, living situation, or surgeon affected the likelihood that a patient would be referred for admission to a rehabilitation unit. The data were compared with a series of 125 patients in 1995⁴ to determine if there was a change in length of stay on the orthopedic unit and in the percentage of patients referred for rehabilitation between 1995 and 1997.

Statistical Methods

Potential predictor (independent) variables were identified as patients' age, sex, ASA score, and living situation (alone or with others). Place of discharge (home or rehabilitation) was determined to be the outcome or response variable. The data were analyzed using logistic regression to determine which, if any, of the independent variables affected the outcome. For this analysis, age was defined as a binary response, either younger than 65 years or 65 years or older. The difference between length of stay in 1995 and in 1997 was analyzed using a two-tailed *t* test. The difference between the proportion of patients admitted to rehabilitation units in 1995 and in 1997 was evaluated using Fisher's exact test. The proportion of patients sent to rehabilitation units was evaluated for possible differences among surgeons using a χ^2 statistic. The level of significance was defined as .05.

RESULTS

One hundred twenty-nine patients (74 women, 55 men) were included in the study. Sixty-three (36 women, 27 men) had hip replacements and 66 (38 women, 28 men) had knee replacements. The average age of the patients was 65.6 years. Fifteen surgeons performed the operations. The average length of stay in 1995 was 6.4 days.⁴ The average length of stay in 1997 was 5.1 days. This was a significant reduction in length of stay ($p < .001$) (table 2).

In 1995, 13% of patients were admitted to rehabilitation units before returning to their homes. In 1997, 43 (33%) patients were admitted to rehabilitation units—a significant increase in referrals to a rehabilitation unit ($p < .005$) (table 2).

The 1997 data showed that age continued to influence the need for admission to rehabilitation units ($p < .001$). Seventy-seven patients were 65 years or older; 35 (45.5%) were admitted to rehabilitation units. Fifty-two patients were younger than 65 years old; only 7 (13.5%) were admitted to rehabilitation. Only 3 of 31 patients younger than 60 years old were admitted to a rehabilitation unit.

Thirty-four patients reported that upon discharge they would be living alone; 50% of these were admitted to rehabilitation units. Only 28% of the 95 patients who reported that they would be staying with friends or family at the time of discharge were admitted to rehabilitation units. This difference was significant ($p < .01$).

Six patients were ASA class 1; none went to a rehabilitation

Table 2: Comparison of Data From 1995 and 1997 Studies

	1995	1997	<i>p</i>
Patients (<i>n</i>)	125	129	
Hip surgery	63	62	
Knee surgery	62	67	
Length of stay (d)	6.4	5.1	<.001
Average age (yrs)	63.4	65.6	
% Women	56.8	57.3	
% To rehabilitation units	18.4	33.3	<.005

unit. Sixty-nine patients were ASA class 2; 27.5% were admitted to rehabilitation units. Fifty patients were ASA class 3; 42% were admitted to rehabilitation units. Four patients were ASA class 4; 75% were admitted to rehabilitation units. Increased ASA had a significant effect on the need for admission to rehabilitation units ($p < .02$).

There was no significant difference among surgeons in the rate of referrals for rehabilitation. There was no difference in rate of referral of men and women to rehabilitation units.

DISCUSSION

In 1995, Munin and associates⁶ reported that patients who are older, live alone, and have two comorbid illnesses are likely to require admission to a rehabilitation unit after total joint arthroplasty. Forrest and coworkers⁴ reported that older age and presence of diabetes increase the likelihood of admission to rehabilitation units. History of cardiac disease, chronic obstructive pulmonary disease, obesity, or arthritis (either rheumatoid or osteoarthritis) did not affect length of stay or referrals to rehabilitation units. There were no significant differences between patients admitted for primary joint replacements and those admitted for revisions. In both studies, checklists of diagnoses were used, but neither study used a measure of severity of disease or limitation on functions of patients admitted for joint replacements. In this study, the ASA scale was used as an indicator of the extent of comorbid illness. There was no scale measuring severity of joint disease *per se*. The study showed that patients with ASA class 3 or 4 were more likely than patients with ASA class 1 or 2 to require admission to a rehabilitation unit. The ASA Physical Status Scale⁷ was written in 1941 and revised in 1962. It provides an evaluation of an individual's general physical condition and level of function. It is widely used by anesthesiologists in their preoperative evaluations and is readily available in most patients' charts. An ASA class 3 or 4 may be a useful indicator to a surgeon, the rehabilitation team, or case manager that a patient may require admission to a rehabilitation unit after total joint replacement.

The data from this study support previous studies indicating that increased age and living situation affect the need for admission to rehabilitation units. Between 1995 and 1997, the hospital administration, nursing service, orthopedic surgeons, and physical therapy and occupational therapy services worked together to streamline the care of patients admitted for total joint arthroplasty. This resulted in a reduction in length of stay on the orthopedic unit from 6.4 to 5.1 days. This would represent a savings of 130 days per 100 hospital admissions. During the same period, the percentage of patients admitted to rehabilitation units increased from 18% to 33%. The average length of stay on the rehabilitation unit at the Albany Medical Center after joint replacement is 10 days (unpublished data). This would indicate that per 100 admissions in 1997, there would be an additional 150 days of care in the rehabilitation unit. The cost to the hospital of care for the fifth day after a joint replacement is \$660, and the cost of care for a day on the

Table 1: ASA Physical Status Scale

1. No systemic disease
2. Mild or moderate systemic disease that does not limit daily activity
3. Severe systemic disease that limits daily activity
4. Severe life-threatening disease that markedly limits activity
5. Patient has 50% risk of dying within 1 day

rehabilitation unit is \$535 (unpublished data provided by hospital administration); therefore, the savings in the cost of care of acute services (130 days at \$660 per day equals \$85,800) was almost equaled by the cost of additional rehabilitation days (150 days at \$535 per day equals \$80,250).

CONCLUSION

This study confirms that age, comorbidity, and family/community support affect the cost of care of an elective surgical procedure. It indicates that the ASA Physical Status Scale is a readily available indicator of comorbidity. It suggests that any study evaluating the efficiency or cost of care of patients admitted for a procedure must consider characteristics of the patients admitted as well as the admitting diagnosis. It indicates that evaluation of the cost of care and outcome must include the postacute as well as the acute care provided.

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