

Geriatric Co-Management of Proximal Femur Fractures: Total Quality Management and Protocol-Driven Care Result in Better Outcomes for a Frail Patient Population

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Hip fractures in older adults are a common event, leading to substantial morbidity and mortality. Hip fractures have been previously described as a “geriatric, rather than orthopedic disease.” Patients with this condition have a high prevalence of comorbidity and a high risk of complications from surgery, and for this reason, geriatricians may be well suited to improve outcomes of care. Co-management of hip fracture patients by orthopedic surgeons and geriatricians has led to better outcomes in other countries but has rarely been described in the United States. This article describes a co-managed Geriatric Fracture Center program that has resulted in lower-than-predicted length of stay and readmission rates, with short time to surgery, low complication rates, and low mortality. This program is based on the principles of early evaluation of patients, ongoing co-management, protocol-driven geriatric-focused care, and early discharge planning. This is a potentially replicable model of care that uses the expertise of geriatricians to optimize the management of a common and serious condition. *J Am Geriatr Soc* 2008.

Key words: co-management; hip fracture; geriatrician; comorbidity

Hip fractures in older adults are a common and serious event, accompanied by a high incidence of morbidity and mortality. Because the growth in the population aged

85 and older continues to outpace the growth of other segments of the population, the number of individuals at highest risk for osteoporotic hip fractures is increasing.¹ It is therefore imperative to optimize the care of these patients.

There are 350,000 hip fractures per year in the United States.² More than 90% occur in individuals aged 65 and older,² and fracture risk doubles for each decade after the age of 50.³ It is estimated that, by 2040, hip fractures in the United States may exceed 500,000 annually.⁴

Almost all hip fractures require surgical correction, predominantly for preservation of function. The surgery itself carries a 4% mortality risk.² Within 1 year, 20% or more of patients with hip fractures die,^{5,6} and approximately one-fourth of individuals who were living independently before the fracture require long-term nursing home care.⁷ Only half regain their prefracture mobility.² It is estimated that the cost attributable to hip fracture care was more than \$20 billion in 1997, including long-term care and indirect costs.⁵

Because hip fractures are predominantly a condition of older adults, most patients have comorbid conditions that must be managed concomitantly with their fracture. They are at risk for adverse outcomes, such as delirium, infection, and iatrogenic complications, and these complications, in turn, contribute to the risk of functional decline, nursing home admission, and death. Geriatricians are trained to address comorbidity and to identify and manage individuals at high risk for adverse outcomes of hospitalization and therefore may help improve outcomes for older adults undergoing hip fracture repair; hip fractures have been described as a “geriatric, rather than orthopedic disease.”⁸

The model of co-management by orthopedics and geriatrics was developed in England in the late 1950s.⁹ This approach has been shown to be successful in other countries in reducing in-hospital complications,^{10,11} length of stay,^{9,12–14} readmission rate,¹¹ and mortality,^{10,11,15–18} as well as lowering costs¹² and leading to lower levels of care at discharge,^{12,16} better function,¹⁹ and higher levels of patient and provider satisfaction.¹⁵ However, few examples of this model exist in this country.^{20–22} The United States has a substantially different healthcare system, with shorter lengths of stay for hip fracture patients,²³ higher costs of

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care, multiple sources of financing, and a different balance of acute and rehabilitative care. These differences, in turn, may result in a different effect of co-managed care in this country than with other healthcare systems.

This article describes a hip fracture center co-managed by orthopedics and geriatrics in a community-based teaching hospital in upstate New York. This service has resulted in low mortality and readmission rates, with short times to surgery and success in minimizing length of stay, despite a frail population. It reports in detail on the principles of the program, the intervention, and the patients seen and compares outcomes with previously reported co-managed services as well as expected outcomes based on a national comparative database.

HISTORY OF THE DEVELOPMENT OF THE PROGRAM

Highland Hospital has had a programmatic commitment to caring for older adults for longer than 20 years. In 1995, in recognition of the special needs of elderly people experiencing fragility fractures, an orthopedic surgeon (SLK) began interacting with nursing homes to provide care to their patients, including on-site clinics. With collaborative leadership from two of the system's geriatricians (DAM and RMM), the co-managed Geriatric Fracture Center (GFC) opened in 2004. The year before the opening, the hospital treated approximately 170 fragility fractures; it now treats twice that number.

SETTING

Highland Hospital is a 268-bed, community-based, teaching hospital of the University of Rochester School of Medicine and Dentistry in upstate New York. The hospital is affiliated with more than 3,800 assisted living facility and skilled nursing facility beds, which serve as a referral base for medical and surgical admissions. Approximately 10 geriatricians are associated with the GFC.

PRINCIPLES OF THE GERIATRIC FRACTURE CENTER

The GFC model is based on five principles (Table 1): (1) most patients benefit from surgical stabilization of their fracture; (2) the sooner patients have surgery, the less time they have to develop iatrogenic illness; (3) co-management with frequent communication avoids iatrogenesis; (4) standardized protocols decrease adverse outcomes; and (5) discharge planning begins at admission. These principles complement those of the Acute Care for Elders model,²⁴ with adaptation for fragility fractures.

Table 1. Principles of the Geriatric Fracture Center

1. Most patients benefit from surgical stabilization of their fracture
2. The sooner patients have surgery, the less time they have to develop iatrogenic illness
3. Co-management with frequent communication avoids iatrogenesis
4. Standardized protocols decrease unwarranted variability
5. Discharge planning begins at admission

Surgical Stabilization of Fracture

The primary goals of treatment of a hip fracture are restoration of function and minimization of pain. For the substantial majority of patients, this requires surgical intervention.^{3,25} Even patients who are nonambulatory, and who therefore may not require surgery for improvement in function, often benefit from the pain relief that results from surgical fracture treatment.^{25,26} For patients whose life expectancy is extremely limited, a nonoperative approach to care may be appropriate, after discussions between the care team and patient.

Minimize Time to Surgery

Delays in time to surgery may occur as a result of scheduling problems, time required to evaluate medical comorbidities, or stabilization of acute medical conditions. The greater the length of time between hospitalization and surgery, the longer the patient is exposed to the risks of bedrest, including venous thromboembolism, skin breakdown, pulmonary decompensation, and infection²⁷ and the longer the time to return to weight-bearing status and functional recovery.²⁸ Several studies have examined the role of timing of surgery with respect to multiple outcomes, but because of ethical implications, all have been observational. Although most studies have found a reduction in mortality with surgical repair within 48 hours,^{29–32} a multicenter study of more than 8,000 patients, adjusting for comorbidity, found an association with development of pressure ulcers as a result of delay in surgery but no significant mortality difference.³³ Some questions remain as to whether surgical delay is a surrogate for comorbidity and active medical problems or whether it actually causes complications. Most patients who are admitted overnight are medically evaluated by 11:00 the following morning; patients admitted during the day are evaluated by the end of the work day. Surgeries are completed as quickly as medically appropriate and as facilities allow; all cases are treated as urgent but not emergent.

Co-Management Avoids Iatrogenic Illness

The importance of co-management was demonstrated in a study of geriatric evaluation and management (GEM) units³⁴ that found that, when geriatricians were responsible for care management, outcomes were better than if they provided recommendations only.³⁵ The American Academy of Orthopedic Surgeons has identified coordination of care and communication by providers as an essential component of the care of patients with hip fracture.² Frequent communication between team members helps reinforce the rationale behind treatment decisions and provides an opportunity for bidirectional continuous education of team members. Although most patients are on the orthopedics service, both teams take "ownership" of the patient. A geriatrician attends orthopedics morbidity and mortality rounds, thereby providing additional educational opportunities.

Standardized Protocols

Studies by the Dartmouth Atlas Working Group³⁶ and others suggest that there are substantial differences in how health care is provided, nationally, regionally, and even

locally. Reducing variability by employing geriatrics principles using standardized orders and protocols allows for an evidence-based, high-level standard of care for each patient. Orthopedics and geriatrics developed standardized emergency department, admission, and postoperative order sets collaboratively to address such things as pain assessment and management, use of beta-blockers, thromboembolic prophylaxis, urinary catheter use, and rehabilitation (Figure 1).

Early Discharge Planning

The proportion of patients who return home after hip fracture surgery varies throughout the country, depending in part on differences in availability of home healthcare ser-

vices, skilled nursing facility rehabilitation beds, and local culture.³ In Highland Hospital, more than 90% of patients are discharged to a nursing facility; for many, this is a skilled admission for rehabilitation in preparation for returning to a lower level of care, but some are likely to need long-term care. Social workers are involved from the time of admission in working with patients and their families for discharge planning. The associations developed by the hospital over the past decade with outside facilities helps to facilitate this planning.

PROGRAM

The protocol for management of the hip fracture patient on the GFC is summarized in Figure 1. Most patients are ad-

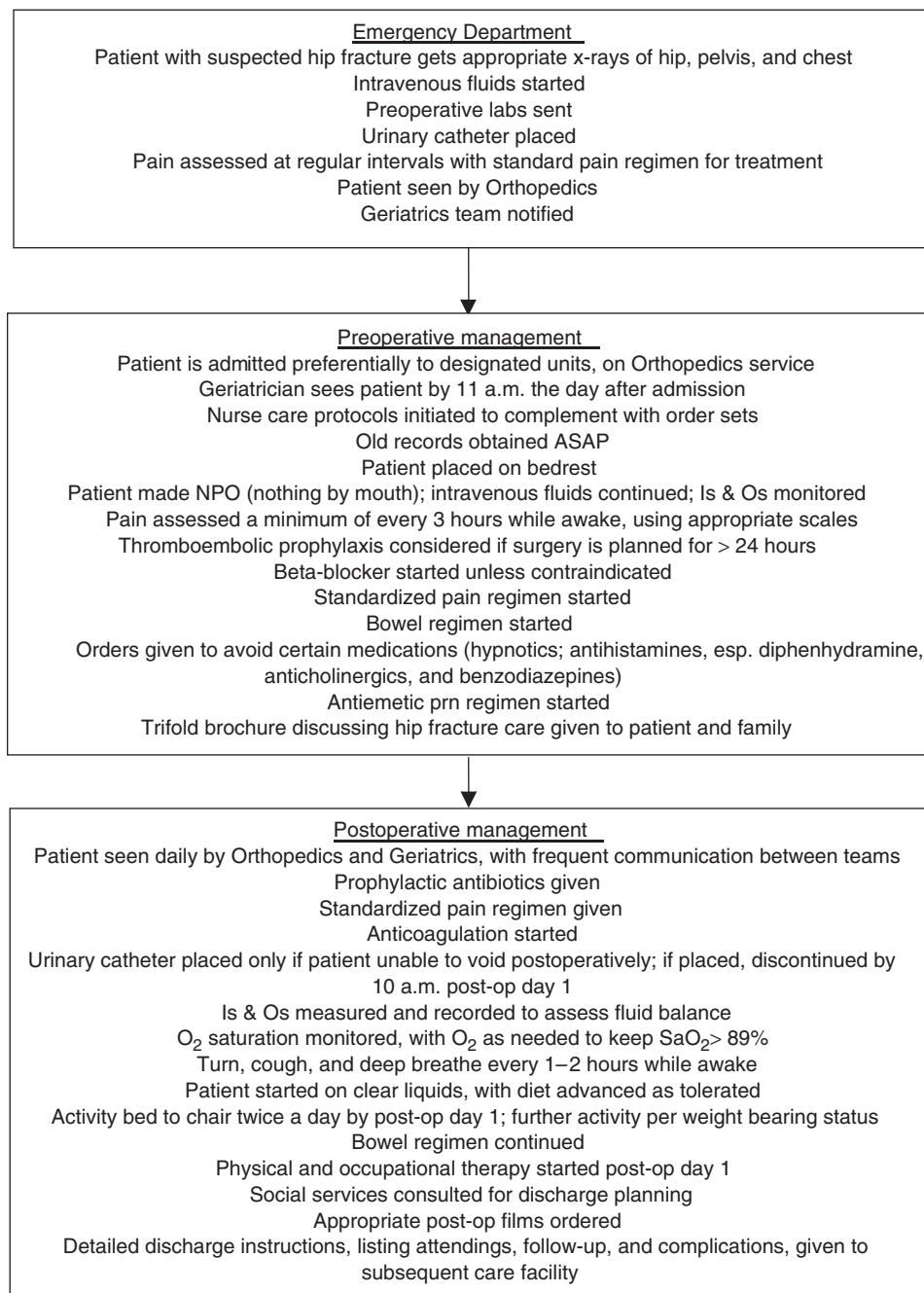


Figure 1. Standardized protocol for management of hip fracture patients in the Geriatrics Fracture Center (GFC). Is & Os = Ins and outs. ASAP = as soon as possible; PRN = as needed; labs = laboratory tests; postop = postoperative; SaO₂ = oxygen saturation.

mitted through the emergency department, but some are admitted directly from another institution (e.g., nursing home, hospital, or assisted living). The availability of direct admission for patients whose diagnosis has already been determined eliminates delays resulting from being in the emergency department and may reduce time to surgery.

Standardized order sets are used from the time the patient presents to the hospital until discharge. These orders provide routine guidance for treatment, although if a given order is not indicated for a particular patient (e.g., receiving nothing by mouth if it is clear that surgery will be delayed or getting beta-blockers if the patient is bradycardic), the final choice for treatment is left to the discretion of the ordering physician.

Orthopedics evaluates patients in the emergency department, and geriatrics is notified of the admission from the emergency department. Medically stable patients are admitted to orthopedics, and experienced orthopedic nursing staff preferentially care for them on designated units. Unstable patients are admitted to geriatrics, the intensive care unit, or other appropriate service. This predetermination of where a patient with a hip fracture will be admitted leads to fewer "turf battles" between services, which in turn reduces the time that the patient stays in the emergency department.

Geriatrics and orthopedics attendings share responsibility for the patients' care throughout the hospitalization. Orthopedics housestaff, including residents and physician assistants, provide most immediate care. Geriatrics writes daily notes and medically indicated orders and coordinates any additional medical consultations that are required, although these are infrequent. A geriatrician is available by pager 24 hours a day, 7 days a week, for urgent situations. Co-developed nursing care plans are used throughout hospitalization. Key elements including early weight bearing and ambulation, minimizing of "tethers," (e.g., urinary and intravenous catheters), continual medical optimization, comprehensive discharge planning, honoring of advanced directives, pain control, thromboembolism prophylaxis, osteoporosis management, fluid management, nutritional support, and cardiovascular risk management. Palliative care and other appropriate services are available as needed. On discharge, in addition to the dictated discharge summary, discharge instructions that give information on items such as the orthopedic and geriatric attending, follow-up, weight-bearing status, anticoagulation, needed laboratory tests, wound care, timing of suture removal, presence of complications, and considerations for further osteoporosis management are given to the subsequent care facility.

DATA COLLECTION

As part of a quality management program, data on patients and their outcomes were collected, starting 6 months after the initiation of the GFC program. This allowed for a learning curve in developing and optimizing the clinical model.³⁷ Clinicians caring for the patient, including physician assistants and surgeons, collected data. The University of Rochester School of Medicine and Dentistry research subject review board approved the presentation of these data for publication. Data were collected from May 1, 2005, through April 30, 2006. During that time, all but two

(1.0%) patients were surgically managed. Data on all patients aged 60 and older admitted to Highland Hospital with a proximal, native, low-impact, nonpathological femur fracture that received surgical repair are presented. Patients with periprosthetic fractures were excluded.

Demographic and medical data were collected, including the presence and severity of the 17 diseases used to determine the Charlson comorbidity score.³⁸ These were weighted according to the Charlson protocol, and an index score for each patient was determined. The research team validated Charlson scores. Time to surgery was defined as time from recorded admission time to the time anesthesia started. Length of stay was defined as the number of days for which the patient was in the hospital at midnight. Hospital readmission was determined by searching the hospital's computerized records for each patient within 30 days of discharge.

The research team validated complications through chart review; complications were defined as follows. Renal failure was defined as any mention in a progress note of renal failure or insufficiency, dehydration, prerenal azotemia, or high blood urea nitrogen or serum creatinine. Delirium was defined as any mental status change documented in physician or nursing notes. Hypoxia was defined as a partial pressure of oxygen less than 60 and or oxygen saturation less than 89%. Pneumonia, congestive heart failure, and cerebrovascular events were defined according to clinical diagnosis. Surgical site infection required a positive culture from the surgical wound. Urinary tract infection required a positive urine culture plus clinical diagnosis, not present on admission. Deep venous thrombosis and pulmonary embolism were defined according to clinical diagnosis confirmed by radiological study. Hemorrhagic stroke and intracranial or retroperitoneal bleed were defined according to clinical diagnosis confirmed by computed tomography scan. Significant gastrointestinal bleed was defined according to clinical diagnosis and a 2-point drop in hematocrit. Another fracture, implant dislocation, periprosthetic fracture, and hardware fixation failure were defined according to clinical diagnosis with radiographic confirmation. Arrhythmias were defined according to clinical diagnosis and confirmed according to electrocardiogram, not present on admission.

The Solucient database was used to determine expected outcomes for the GFC and expected outcomes for hip fracture patients in other hospitals in the city. Solucient is an information products company that maintains the largest healthcare database in the country, consisting of more than 26 million discharges per year from 2,900 hospitals, representing 77.5% of all discharges.³⁹ The company determines expected outcomes, such as mortality and length of stay, by adjusting for patient characteristics such as age, sex, principal diagnosis, procedures performed, and comorbid conditions. Outcomes for previously published co-managed services are also presented, including data from geriatrics and hospitalist co-managed services, from the United States and other countries.

PATIENT POPULATION AND OUTCOMES

Patient characteristics are described in Table 2. The patients' average age was 85.2, and the population was predominantly female and Caucasian, reflecting the population

Table 2. Characteristics of Patients in the Geriatric Fracture Center

Characteristic	Value
N	195
Age, mean \pm SD	85.2 \pm 7.8
Female, %	78.5
Race, %	
African American	2.1
Asian	0.5
Caucasian	97.0
Hispanic	0.5
Marital status, %	
Married	28.7
Widowed	47.7
Divorced	3.1
Single	10.8
Unknown	9.7
Site admitted from, %	
Home	39.5
Assisted living	17.9
Nursing home	36.9
Hospital transfer	4.1
Other institution	1.5
Charlson Comorbidity Index, mean \pm SD	3.4 \pm 2.2

SD = standard deviation.

at highest risk for hip fractures.⁴⁰ More than half of patients were admitted from somewhere other than their own home, including 36.9% from a nursing home and 17.9% from assisted living.

Outcomes are presented in Table 3. Average time from admission to surgery was 24.1 hours, with 93% receiving surgery within 48 hours. Mean length of stay was 4.6 days, compared with the expected rate of 5.2 days after adjusting for patient characteristics and 5.7 to 23.2 in other co-managed programs. In other hospitals in the city, mean length of stay was 8 days, compared with the expected rate of 5.6 days after adjusting for patient characteristics (data not shown in Table 3). When length of stay was evaluated according to site of residence before admission, it was found that length of stay for individuals from home, assisted living, and nursing homes was not significantly different, with stays of 5.0 ± 4.7 , 4.5 ± 2.1 , and 4.1 ± 1.7 , respectively ($P = .35$).

Overall, 9.7% of patients were readmitted within 30 days, including 5.1% of patients who were readmitted because of problems related to the fracture. This is substantially lower than the expected readmission rate of 19.4%. Mortality rates were 1.5%, compared with 0.6% to 5.8% in other co-managed services and an expected rate of 3.2%, adjusting for patient characteristics. By comparison, in other hospitals in the city, average mortality was 2.6%, compared with the expected rate of 3.6% after adjustment for patient characteristics. Total complication rate was 30.3%, with 24.1% developing postoperative delirium, 2.6% acquiring infections, and 1.0% developing cardiac complications.

DISCUSSION

Total quality management of geriatric proximal femur fractures with co-management by geriatricians and orthopedic surgeons results in shorter length of hospital stay, lower readmission rates, lower complication rates, and a mortality rate that is less than half the expected rate for this patient population. It is likely that the shorter length of stay is attributable to appropriate reductions of time to surgical repair and avoiding common adverse outcomes of acute hospitalization, in addition to discharge planning that begins early in hospitalization. Analysis of length of stay according to site of origin shows that there is no difference based on type of residence before hospitalization. In other words, the short length of stay is not an artifact of nursing home residents having a skilled bed to return to after surgery.

Subjectively, this is a homogeneous patient population that responds well to protocol-driven care. By employing geriatric principles in standardized fashion, risk of adverse events is reduced. Other groups have effectively used evidence-based protocols to improve care of hip fracture patients.⁴⁴⁻⁴⁶ One study found fewer postoperative complications and a larger proportion returning home within 14 days as a result of medical and nursing care maps.⁴⁷ Another group found that standardized clinical pathways led to shorter length of stay and lower in-hospital and 1-year mortality.⁴³ As one of those studies found, this illustrates the principle that “the ‘best’ care should also be the ‘easiest choice.’”⁴⁵

The short length of stay of patients in the GFC has financial implications, because hospital costs account for 44% of direct costs for hip fracture patients.²³ A reduction in length of stay without an increase in readmission rate may lead to a better hospital profit margin, thereby increasing administrative support and covering expenses for development of the program’s infrastructure. An analysis of the financial consequences of this model is currently underway.

Co-management in the care of geriatric patients with hip fracture is uncommon in this country. It is likely that this is a replicable model of care in the U.S. healthcare system. Although Highland Hospital has a high level of geriatrics and orthopedics expertise, a similar model of care could be developed with one or more physicians from each of the disciplines.

LIMITATIONS

In this descriptive paper, the results are compared with previously published results found in co-managed programs internationally, as well as expected outcomes using a national comparative database that controls for patient characteristics. This does not meet a criterion standard measurement of efficacy that would result from a randomized trial. Such a trial was not possible within one institution, given the risk of “contamination” of the control group once the model was implemented. It is possible that some systematic differences existed that were not controlled for in the Solucient database. Additionally, caution must be used in comparing these findings with other study outcomes because of differences in patient populations, as well as differences in measuring outcomes, particularly complications. For example, inclusion of all patients with a docu-

Table 3. Comparison of Outcomes of the Geriatric Fracture Center (GFC) with Those of Other Co-Managed Programs

Outcome	GFC (N = 195)	Other Co-Managed Programs*	Expected†
Time to OR in hours, mean ± SD	24.1 ± 17.0	26 ± 24 ⁴¹ 25 ± 53 ⁴²	NA
To OR in <24 hours, %	66.7	63 ⁴¹	NA
To OR in <48 hours, %	93.3	86 ⁴¹	NA
Overall complication rate, %	30.3 [‡]	35.5 ⁴¹ 45.2 ¹⁰ 49.5 ¹¹	NA
Delirium, %	24.1	8.4 ⁴¹ 32.2 ⁴² 34.2 ¹⁰ 5.9 ¹¹	NA
Infection (pneumonia, urinary tract infection, surgical infection), %	2.6	11.2 ²² 12.5 ^{41§} 37.8 ⁴² 7.2 ^{11§}	NA
Cardiac (myocardial infarction, new congestive heart failure, new arrhythmia), %	1.0	4.2 ²² 4.4 ⁴¹ 21.4 ^{42#} 9.6 ¹⁰	NA
Pulmonary embolism or deep venous thrombosis, %	0.5	1.2 ²² 0.7 ^{41**} 1.3 ⁴² 0 ¹⁰ 1.3 ¹¹	NA
Acute cerebrovascular event (transient ischemic attack or cerebrovascular accident), %	0.5	0.7 ^{41††} 2.2 ⁴² 0.5 ¹¹	NA
Restraint use, %	0		NA
Length of stay, days, mean ± SD	4.6 ± 3.3	23.2 ²² 13.7 ⁴³ 5.7 ± 3.7 ⁴¹ 8.4 ± 6 ⁴² 16 ^{10‡‡} 21 ± 11 ¹⁷ 15.9 ± 14.9 ¹¹	5.2
Readmission within 30 days, %	9.7	8.7 ⁴²	19.4
Related to fracture, %	5.1		
Unrelated to fracture, %	4.6		
In-hospital mortality, % (n)	1.5 (3)	5.8 ²² 1.4 ¹⁵ 1.5 ⁴³ 3 ⁴¹ 3.4 ⁴² 0.6 ¹⁰ 4.8 ¹⁷ 4.7 ¹¹	3.2

* Data from other programs are listed in chronological order.

† Expected outcomes, using national Solucient database, adjusting for patient characteristics.

‡ Includes listed complications (delirium, infection, cardiac, pulmonary embolism and deep venous thrombosis, and acute cerebrovascular event) as well as hypoxia (6.7%), renal insufficiency (6.2%); intracranial, gastrointestinal, or retroperitoneal bleed (0%); second fracture, implant dislocation, periprosthetic fracture, or hardware fixation failure (0% for all); and other arrhythmias (0%). Some patients had more than one complication.

§ Includes urinary tract infection and pneumonia only.

|| Includes myocardial infarction and arrhythmia only.

Congestive heart failure, unstable angina pectoris, and atrial fibrillation.

** Deep venous thrombosis only.

†† Cerebrovascular accident only.

‡‡ Median.

OR = operating room; SD = standard deviation.

mented change in mental status in the outcome of delirium may overestimate the true incidence of this complication. Because this was a new model of care, it may have suffered from a "Hawthorne effect," in which more attention was given to early patients. This may, in turn, have led to better outcomes.

This model of care involves standardized order sets and protocols, with a goal of incorporating geriatrics principles into the care of patients with hip fracture, but the "final say" in how the patient is treated is left to the discretion of the managing teams, and information is not collected on how often the physicians caring for the patient change the orders. It is therefore impossible to determine how much of the model's success is due to the standardization of care versus the clinical expertise of the geriatric and orthopedic teams.

The patient population is different from populations previously reported for co-managed hip fracture services, with fewer than half of the patients living independently in the community before hospitalization. This is due to the relationships that the hospital has built in the past decade with area nursing homes and assisted living facilities, leading to a high proportion of admissions originating from these settings. These relationships, in turn, may assist in discharge planning, an important component of the model of care. In general, assisted living and nursing home residents have greater levels of comorbidity and are at higher risk for adverse outcomes as a result of hospitalization.⁴⁸ The mean Charlson score of 3.4 reflects the high level of comorbidity in this patient group. Because the patient population studied is frailer than that seen in a typical inpatient hip fracture service, these results may underestimate the effect that this model has on outcomes of care.

Nursing home residents are at particularly high risk of osteoporotic fractures.⁴⁹ In addition, the number of older adults living in alternatives to nursing homes has seen tremendous recent growth. The proportion of Medicare beneficiaries who reside in facility-like alternatives to nursing homes, including assisted living facilities, continuing care communities, and retirement communities, rose from 16% in 1996 to 30% in 2001.⁵⁰ The increased incidence of fractures in this population and the increase in the absolute number of individuals in this at-risk group will, in turn, lead to a rise in the number of these patients who are hospitalized for the care of hip fractures. These two trends will create demands for optimizing care for this high-risk population.

FUTURE DIRECTIONS

This article describes in detail a successful model of co-managed hip fracture care by geriatricians and orthopedic surgeons and reports on the outcomes of length of stay, 30-day readmissions, and in-hospital mortality. It will be important to address more long-term outcomes, such as preservation of function, nursing home admission rate, and 1-year mortality, to assess whether the short-term benefits persist.

Variations on this model have already been described, including co-management by hospitalists⁴² and stratified management based on preoperative risk assessment with care management by a clinical nurse specialist.⁴⁵ The lim-

ited number of geriatricians in this country relative to the growing number of patients with hip fractures will mean that the use of hospitalists in co-management may be an important variation on the model. Comparisons with such model variants will help determine whether the presence of a geriatrician adds value. Assessment of differences in process variables, such as time to physical therapy, management of pain, and optimizing nutrition, and their relationship to outcomes will be essential in determining which components of this model of care are necessary to affect outcomes.

Finally, it will be necessary to determine whether this model of care is replicable in other settings with similar results. Under the guidance of two of this manuscript's authors (DAM, SLK), several centers are beginning co-managed hip fracture services. Future evaluations of these programs will help to determine the essential components of the model and will assess whether similar benefits are seen in replicated programs.

SUMMARY

In summary, this article presents a detailed description of a model of co-managed care of older adults with hip fractures in the United States that leads to low rates of complications, mortality, and readmission; short times to surgery; and short lengths of stay, despite a frail population. This approach to care, with early evaluation of patients, ongoing co-management, protocol-driven geriatric-focused care, and early discharge planning, is a replicable model that uses the expertise of geriatricians to optimize outcomes for a common problem in older adults that is associated with high morbidity and mortality.

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Conflict of Interest: Drs. Mendelson and Kates serve as consultants for Synthes, a manufacturer of orthopedic implants and devices. Synthes has licensed the order sets, care plans, concept, and other materials for the Geriatric Fracture Center program. Drs. Mendelson and Kates do not receive ongoing royalties for these products. Dr. Friedman received support for this study from Grant 5K23AG19545 from the National Institute on Aging.

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