The Care Transitions Intervention

Results of a Randomized Controlled Trial

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Background: Patients with complex care needs who require care across different health care settings are vulnerable to experiencing serious quality problems. A care transitions intervention designed to encourage patients and their caregivers to assert a more active role during care transitions may reduce rehospitalization rates.

Methods: Randomized controlled trial. Between September 1, 2002, and August 31, 2003, patients were identified at the time of hospitalization and were randomized to receive the intervention or usual care. The setting was a large integrated delivery system located in Colorado. Subjects (N=750) included community-dwelling adults 65 years or older admitted to the study hospital with 1 of 11 selected conditions. Intervention patients received (1) tools to promote cross-site communication, (2) encouragement to take a more active role in their care and to assert their preferences, and (3) continuity across settings and guidance from a "transition coach." Rates of rehospitalization were measured at 30, 90, and 180 days.

Results: Intervention patients had lower rehospitalization rates at 30 days (8.3 vs 11.9, $P=.048$) and at 90 days (16.7 vs 22.5, $P=.04$) than control subjects. Intervention patients had lower rehospitalization rates for the same condition that precipitated the index hospitalization at 90 days (5.3 vs 9.8, $P=.04$) and at 180 days (8.6 vs 13.9, $P=.046$) than controls. The mean hospital costs were lower for intervention patients ($2058) vs controls ($2546) at 180 days (log-transformed $P=.049$).

Conclusion: Coaching chronically ill older patients and their caregivers to ensure that their needs are met during care transitions may reduce the rates of subsequent rehospitalization.

Trial Registration: clinicaltrials.gov Identifier: NCT00244491

Arch Intern Med. 2006;166:1822-1828

An expanding evidence base demonstrates that serious deficiencies in quality exist for patients undergoing transitions across sites of care. Qualitative studies[1-7] produced consistent results, demonstrating that patients are often unprepared for their self-management role in the next care setting, receive conflicting advice regarding chronic illness management, are often unable to reach an appropriate health care practitioner who has access to their care plan when questions arise, and have minimal input into their care plan.

Quantitative studies[8-15] documented that quality and patient safety are compromised during the vulnerable period when patients transition between different settings because of high rates of medication errors, incomplete or inaccurate information transfer, and lack of appropriate follow-up care. During care transitions, patients receive medications from different prescribers, who rarely have access to patients' comprehensive medication lists.[16,17] Collectively, these types of problems conspire to increase rates of recidivism to high-intensity care settings when patients' care needs are not met, leading to greater health care costs.[9,12,15,18-21] National 30-day readmission rates among older Medicare beneficiaries range from 15% to 25%.[19,22]

See also pages 1802, 1829, 1836, 1842, 1848, and 1855

Because patients and their caregivers are often the only common thread moving across sites of care, together they constitute an appropriate target for an intervention designed to improve the quality of transitional care. In a prior quasi-experimental study,[23] patients nd their caregivers who

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received tools and support from a nurse "transition coach" were significantly less likely to experience rehospitalization, a finding that was sustained for at least 6 months. Using a randomized controlled trial design, the present study tests whether this same intervention, designed to encourage older patients and their caregivers to assert a more active role in their care transitions, can reduce rates of rehospitalization.

METHODS

STUDY SETTING AND DATES

The intervention was conducted in collaboration with a large not-for-profit capitated delivery system that cares for more than 60 000 patients 65 years or older in Colorado. At the time the study was initiated, the 30-day hospital readmission rate in this delivery system for this particular population was approximately 15%. The delivery system contracts with a single hospital, 8 skilled nursing facilities, and a single home health care agency. Patients received care from hospital-based physicians (ie, hospitalists) during their hospital stays and, in general, from a different team of health professionals in each posthospitalization care setting. The study began September 1, 2002, and concluded August 31, 2003. The institutional review board and the Health Insurance Portability and Accountability Act authorities of the participating health care system, contract hospital, and University of Colorado Health Sciences Center approved the study protocol.

PARTICIPANTS AND INCLUSION CRITERIA

To be eligible for this study, patients from the participating delivery system had to meet the following criteria: (1) be 65 years or older, (2) be admitted to the participating delivery system's contract hospital during the study period for a nonpsychiatric condition, (3) be community dwelling (ie, not from a long-term care facility), (4) reside within a predefined geographic radius of the hospital (thereby making a home visit feasible), (5) have a working telephone, (6) be English speaking, (7) show no documentation of dementia in the medical record, (8) have no plans to enter hospice, (9) not be participating in another research protocol, and (10) have documented in their medical record at least 1 of 11 diagnoses, including stroke, congestive heart failure, coronary artery disease, cardiac arrhythmias, chronic obstructive pulmonary disease, diabetes mellitus, spinal stenosis, hip fracture, peripheral vascular disease, deep venous thrombosis, and pulmonary embolism. These conditions were selected because of the high likelihood that patients would require a stay in a posthospital skilled nursing facility or require home health care services (and experience additional care transitions) or because of the need for intensive anticoagulation management.[24]

Trained study nurses identified eligible patients at the time of hospital admission and approached them to obtain informed consent. At this time, they also administered a 4-item cognitive screening test that included the patient's age and telephone number, the current date, and the name of the facility. Patients who answered fewer than 3 questions correctly could participate in the study if they had an able and willing proxy. The study nurses used a random number generator to produce a random allocation sequence. Although blinding of observers was not possible during the study protocol, the research assistant who performed the follow-up telephone survey at 30 days after discharge was blinded to the participants' allocation status.

ESSENTIAL FEATURES OF THE CARE TRANSITIONS INTERVENTION

The care transitions intervention was designed to address potential threats to quality and safety during care transitions by providing patients and their caregivers with tools and support to encourage them to more actively participate in their care transitions. The essential features of the intervention are described herein and are summarized in **Table 1**. The care transitions intervention is in the public domain. A more comprehensive description of the intervention and tools and a training video and manual are available free of charge on the Internet (http://www.caretransitions.org) and in prior publications.[23,25]

The intervention was built on 4 pillars, or conceptual domains, that were derived from patient and caregiver feedback obtained from earlier qualitative investigations regarding those factors that would be most valuable to them during care transitions.[1] The 4 pillars included (1) assistance with medication self-management, (2) a patient-centered record owned and maintained by the patient to facilitate cross-site information transfer, (3) timely follow-up with primary or specialty care, and (4) a list of "red flags" indicative of a worsening condition and instructions on how to respond to them. The 4 pillars were operationalized through the following 2 mechanisms designed to encourage older patients and their caregivers to assert a more active role during care transitions and to foster care coordination and continuity across settings: (1) a personal health record and (2) a series of visits and telephone calls with a transition coach.

The personal health record is a patient-centered document that consists of the core data elements needed to facilitate continuity of the care plan across settings. The core data elements included an active problem list, medications and allergies, whether advance care directives had been completed, and a list of red flags, or warning symptoms or signs, that corresponded to the patient's chronic illnesses. Finally, the personal health record included space for the patient to record questions and concerns in preparation for his or her next encounter. The patient and caregiver were encouraged to maintain and to continually update the personal health record and to share this document with practitioners across health care settings.

The primary roles of the transition coach were to encourage the patient and caregiver to assert a more active role during care transitions, to provide continuity across settings, and to ensure that the patient's needs were being met irrespective of the care setting. Transition coaches were advanced practice nurses; however, rather than functioning as another care provider, the transition coaches facilitated the patient's and the caregiver's roles in self-care. Therefore, key attributes of transition coaches included competence in medication review and reconciliation, experience in helping patients communicate their needs to different health care professionals, and the ability to shift from doing things for the patient to encouraging him or her to do as much as possible independently.

The transition coach first met with the patient in the hospital before discharge to establish initial rapport, to introduce the personal health record, and to arrange a home visit, ideally within 48 to 72 hours after hospital discharge. For those patients transferred to a skilled nursing facility, the transition coach telephoned or visited at least weekly to maintain continuity, to facilitate preparation for discharge (with attention to self-care), and to arrange for a home visit. The home visit involved the transition coach, the patient, and the caregiver (where applicable). A primary goal of the home visit was to reconcile all of the patient's medication regimens (eg, prehospitalization and posthospitalization medications, over-the-

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Table 1. Care Transitions Intervention Activities by Pillar and by Stage of Intervention

	Four Pillars			
Stage of Intervention	Medication Self-management	Patient-Centered Record	Follow-up	Red Flags
Goal	Patient is knowledgeable about medications and has medication management system	Patient understands and uses PHR to facilitate communication and to ensure continuity of care plan across providers and settings; patient manages PHR	Patient schedules and completes follow-up visit with primary care provider or specialist and is prepared to be an active participant in interactions	Patient is knowledgeable about indications that condition is worsening and how to respond
Hospital visit	Discuss importance of knowing medications and having a system in place to ensure adherence to regimen	Explain PHR	Recommend primary care provider follow-up visit	Discuss symptoms and drug reactions
Home visit	Reconcile prehospitalization and posthospitalization medication lists Identify and correct discrepancies	Review and update PHR Review discharge summary Encourage patient to update and share PHR with primary care provider or specialist at follow-up visits	Emphasize importance of follow-up visit and need to provide primary care provider with recent hospitalization information Practice and role-play questions for primary care provider	Assess condition Discuss symptoms and adverse effects of medications
Follow-up telephone calls	Answer remaining medication questions	Remind patient to share PHR with primary care provider or specialist Discuss outcome of visit with primary care provider or specialist	Provide advocacy in getting appointment, if necessary	Reinforce when primary care provider should be telephoned

*Abbreviation: PHR, personal health record.

counter medications, and medications prescribed to someone else that the patient was taking) using the Medication Discrepancy Tool.[26] The transition coach and patient reviewed each medication to ensure that the patient understood its purpose, instructions, and potential adverse effects. When a medication discrepancy was identified, the transition coach and the patient made a plan for how to resolve the problem, such as having the patient telephone the appropriate health care professional for urgent matters or write a question on the personal health record as a reminder to raise the concern with the health care professional at the appropriate follow-up appointment. In addition, the transition coach imparted skills for effectively communicating care needs during subsequent encounters with health care professionals. The patient and transition coach rehearsed or role-played effective communication strategies so that the patient would be prepared to clearly articulate his or her needs. The transition coach also reviewed with the patient any red flags that indicated a condition was worsening and provided education about the initial steps to take to manage the red flags and when to contact the appropriate health care professional.

Following the home visit, the transition coach maintained continuity with the patient and caregiver by telephoning 3 times during a 28-day posthospitalization discharge period. The first telephone call generally focused on determining whether the patient had received appropriate services (eg, whether new medications had been obtained or durable medical equipment had been delivered). In the 2 subsequent telephone calls, the transition coach reviewed the patient's progress toward goals established during the home visit, discussed any encounters that took place with other health care professionals, reinforced the importance of maintaining and sharing the personal health record, and supported the patient's role in chronic illness self-management. Table 1 summarizes the relationship between the 4 pillars on which the intervention was based and the specific goals and tasks for each stage of the intervention.

MAIN OUTCOME MEASURES

Data on patient demographics and diagnoses were abstracted at the time of initial recruitment. Pharmacy data were used to derive a comorbidity index, the chronic disease score. Chronic disease scores have been associated with physician-rated patient disease severity, patient-rated health status, hospitalization, and mortality.[27,28]

The primary outcome measure was the rate of nonelective rehospitalization (including the contracted hospital and any noncontracted hospitals) at 30, 90, and 180 days after discharge from the index hospitalization. An a priori established secondary outcome measure was the rate of rehospitalization for the same condition that prompted the index hospitalization. Rehospitalization data were abstracted from the study delivery system's administrative records.

STATISTICAL ANALYSIS

Initial 2-sample comparisons of the intervention and control groups were conducted using appropriate statistical tests (eg, Wilcoxon rank sum test for nonnormally distributed continuous variables and Fisher exact test for dichotomous variables). The χ^2 test was used for dichotomous outcomes testing statistical significance between the intervention and control groups. All patients were analyzed as originally assigned during randomization (ie, intent to treat) and were included in all of the analyses provided that data were available. Logistic re-

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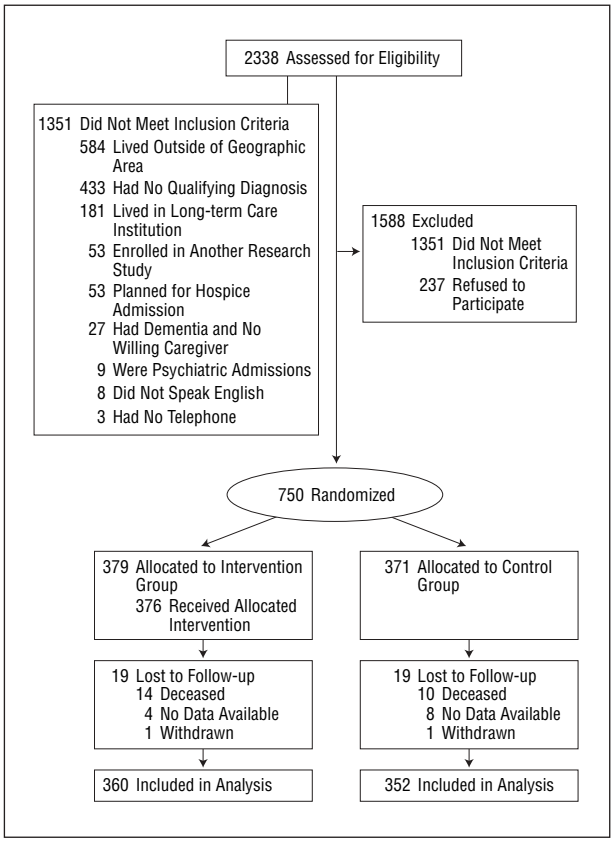

Figure. Participant flow.

gression analysis was used to adjust for possible imbalances in the randomization in the evaluation of primary and secondary outcomes. Cost data were analyzed using the median test. All analyses were completed using SAS for Windows version 8.02 software (SAS Institute Inc, Cary, NC).

RESULTS

The participant flow is illustrated in the **Figure**. Among those patients approached to participate in the study, 57.8% did not meet the study eligibility criteria, 10.1% refused to participate, and 32.1% consented. In all, 95.0% of the intervention patients and 94.9% of the control subjects were included in the analyses. Mortality did not differ by study group ($P=.54$). Among intervention patients, 67.0% received all of the intervention components (ie, the hospital visit, home visit, and 3 follow-up telephone calls), while only 0.8% received none of the intervention components. Overall, 86.0% of the intervention patients received at least a home visit and a telephone call.

Table 2 compares the demographic, diagnostic, and hospital utilization characteristics of the study subjects. Overall, the random allocation produced highly comparable intervention and control study groups, with few significant differences. In general, advanced age, a high level of education, a large burden of chronic illness, and a high rate of prior hospital and emergency department use characterized the study population. More than 40% of the study population rated their health as fair or poor.

Table 2. Description of Study Sample*

Variable	Intervention Group (n = 379)	Control Group (n = 371)	2-Sided *P* Value†
Age, mean (SD), y	76.0 (7.1)	76.4 (6.8)	.54
Female sex	48.3	52.3	.27
Married	58.1	53.8	.24
Lives alone	31.0	30.8	.97
Education			.77
<High school	13.2	11.9	
High school diploma	42.9	44.2	
Some college	14.5	13.2	
College degree	29.4	30.7	
Self-identified race/ethnicity			.91
White	88.1	89.2	
Black	4.8	4.3	
Hispanic	7.1	6.5	
Self-reported health status			.19
Poor	16.1	20.2	
Fair	24.4	24.5	
Good	36.2	34.0	
Very good	17.7	16.2	
Excellent	5.6	5.1	
Selected hospital discharge diagnoses			
Stroke	2.4	4.7	.09
Congestive heart failure	16.5	13.0	.17
Coronary artery disease	14.1	13.5	.80
Cardiac arrhythmia	12.8	19.0	.02
Chronic obstructive pulmonary disease	16.8	18.5	.55
Diabetes mellitus	2.7	2.8	.94
Hip fracture	4.0	3.6	.77
Dehydration	4.5	3.6	.51
Pneumonia	8.0	8.8	.69
Chronic disease score, mean (SD)	6.8 (3.5)	7.1 (3.8)	.31
Utilization in the 6 mo before enrollment			
Hospitalization	29.1	26.1	.39
Emergency department visit	40.2	38.9	.73
Index hospitalization			
Length of stay, mean (SD), d	6.9 (5.0)	6.2 (3.9)	.05
Discharge on a Friday	14.7	16.5	.49
Index hospitalization initial discharge destination			.72
Home	50.9	52.9	
Home with skilled home care	24.8	25.9	
Skilled nursing facility	20.8	19.3	
Other	3.5	1.9	

*Data are given as percentages unless otherwise indicated.
†To test statistical significance between the intervention and control groups, χ^2 test was used for categorical variables, and *t* test was used for continuous variables.

Table 3 gives unadjusted and adjusted rates of rehospitalization among the intervention and control subjects at 30, 90, and 180 days. Intervention patients had lower hospital readmission rates than control subjects at each time interval. The adjusted differences were statistically significant at 30 days ($P=.048$) and at 90 days ($P=.04$). Intervention patients were significantly less likely to be rehospitalized at 90 days ($P=.04$) and at 180 days ($P=.046$) for the same condition that precipitated the index hospitalization.

Table 4 compares the mean hospital costs (including the contract facility and noncontract facilities) across

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Table 3. Utilization Outcomes*

Variable	Intervention Group (n = 379)	Control Group (n = 371)	2-Sided *P* Value† Unadjusted	2-Sided *P* Value† Adjusted‡	OR (95% CI)
Rehospitalization					
Within 30 d	8.3	11.9	.11	.048	0.59 (0.35-1.00)
Within 90 d	16.7	22.5	.05	.04	0.64 (0.42-0.99)
Within 180 d	25.6	30.7	.15	.28	0.80 (0.54-1.19)
Rehospitalization for same diagnosis as index hospitalization					
Within 30 d	2.8	4.6	.21	.18	0.56 (0.24-1.31)
Within 90 d	5.3	9.8	.03	.04	0.50 (0.26-0.96)
Within 180 d	8.6	13.9	.045	.046	0.55 (0.30-0.99)

Abbreviations: CI, confidence interval; OR, odds ratio.
*Data are given as percentages unless otherwise indicated.
†To test statistical significance between the intervention and control groups, χ^2 test was used for unadjusted utilization outcomes, and logistic regression analysis was used for adjusted use outcomes.
‡Adjusted for age, sex, education, race/ethnicity, self-reported health status, chronic disease score, prior hospitalization and emergency department utilization, and discharge diagnosis.

Table 4. Nonelective Hospital Cost Outcomes*

Nonelective Hospital Costs	Intervention Group (n = 379)	Control Group (n = 371)	2-Sided *P* Value† Unadjusted	2-Sided *P* Value† Log Transformed
At 30 d	784 (3916)	918 (2971)	.048	.06
At 90 d	1519 (4914)	2016 (4872)	.02	.02
At 180 d	2058 (5452)	2546 (5466)	.04	.049

*Data are given as mean (SD) US dollars unless otherwise indicated.
†To test statistical significance between the intervention and control groups, median test was used for unadjusted cost outcomes and *t* test (or Behrens-Fisher test for unequal variances) was used for unadjusted log-transformed cost outcomes.

the 2 study populations. Log-transformed analysis showed that intervention patients had significantly lower hospital costs at 90 days and at 180 days.

COMMENT

SUMMARY OF KEY FINDINGS

The care transitions intervention was designed to be an effective and low-cost intervention that could be implemented in various delivery systems under different financing structures. Because the intervention was devised to provide patients and caregivers with tools and skills that would encourage them to take a more active role in their care, it was also intended to influence not only the impending transition but also any subsequent transitions.

As the results show, recognizing and supporting the key roles that patients and their caregivers play in improving care transitions appear to significantly reduce the rates of rehospitalization, even in a heavily penetrated Medicare Advantage market in which the reduction of hospital use has been an explicit focus for many years. The utilization findings were strongest at 30 and 90 days, suggesting that patients were able to achieve a sustained benefit from the new skills and tools they had learned while recovering from acute illness. Furthermore, the transition coach and patient developed a care plan that specifically addressed the reason for the index hospitalization. Consequently, rehospitalization for the condition that precipitated the index hospitalization was significantly reduced at 90 and 180 days.

These findings suggest that encouraging patients and their caregivers to assert a more active role in their care transitions results in reduced rehospitalization rates. A possible explanation for this finding is that the transition coach and personal health record enabled patients and caregivers to ensure that greater proportions of their needs were being met during this vulnerable time. To better understand which of the different components of the model were regarded as most helpful by the intervention patients, an adjunctive qualitative descriptive study[29] was conducted. The primary findings of that study suggest that the intervention led to improved self-management knowledge and skills for many patients, primarily in the areas of medication management, condition management, and patient confidence about what was required of them during the transition and beyond. The findings suggest that the continuity of the coaching relationship fostered a sense of caring, safety, and predictability about the transition, which contributed to greater patient investment in the program.[29]

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COMPARISON WITH PUBLISHED STUDIES

The findings of the present study need to be considered within the context of the existing published literature. Previous studies[30-33] demonstrated reductions in rehospitalization rates for older chronically ill adults and for patients with specific conditions, such as congestive heart failure, through advanced practice nurse– and pharmacist-led interventions. In a recent Cochrane review[34] of 8 controlled trials of discharge planning involving 4837 patients, 4 trials recruited patients with a particular medical condition and 4 trials recruited patients with a mix of medical and surgical conditions. There was a reduction in hospital length of stay for older patients allocated to discharge planning, but overall the results of the trials were mixed.

The reduced rehospitalization rates reported herein are comparable to those in previous investigations. However, our study differs in 2 key areas. The first distinction is in the level of intensity. In previous published studies,[30-33] the health care professionals assumed a primary role in managing the care plan during the posthospitalization transition period. In our study, the transition coach assumed a supportive role and did not function as a health care provider per se. In this less intense role, the transition coach could manage more patients and there was less potential for redundancy with existing health care practitioners such as discharge planners, home health care nurses, and case managers. The second distinction concerns the duration of the intervention and its potential to be sustained over time. The care transitions intervention was designed not only to improve the immediate transitions that patients and their caregivers faced but also to provide them with skills and tools that could be applied to future care transitions.

COSTS OF INTERVENTION AND PRODUCTIVITY

The annual cost for the care transitions intervention was $74 310 and included the following itemized annual costs: salary and benefits for the transition coach ($70 980), cell phone and pager ($650), mileage reimbursement for the transition coach ($2500), and photocopying of the personal health records and other supplies ($180). The cost of the care transitions intervention must be interpreted in light of the productivity of the transition coach and the potential reduction in rehospitalization rates and accompanying cost savings. The transition coach managed a panel of 24 to 28 patients at any given time.

Although a formal cost-effectiveness analysis is beyond the scope of the study reported herein, the 180-day hospital cost data suggest a semi-annual cost savings of approximately $147 797: ([mean 180-day hospital costs in the control group minus mean 180-day hospital costs in the intervention group] multiplied by the number of patients in the intervention group) minus the 180-day costs for the intervention of $37 155. When these costs are extrapolated to an entire year, the annual cost savings are projected to be $295 594. However, this comparison is probably conservative for several reasons. The health delivery system that participated in this trial had already made great progress in reducing hospital readmission. Thus, there would be greater potential for additional reductions in health delivery system that had not reached this level of achievement. In addition, there may be unmeasured costs of reducing hospitalization that are not accounted for in this calculation.

We explored various mechanisms by which the care transitions intervention could be implemented under existing financing within the US health delivery system. Under Medicare Advantage payment structure, the financial incentives for reducing hospital readmission are closely aligned with the goals of the intervention. A Medicare Advantage program may choose to implement the intervention based on estimates that the cost savings associated with the reduction in hospital readmissions exceed the costs associated with conducting the intervention. Under traditional fee-for-service Medicare, a hospital that operates at high capacity may choose to invest in this intervention to reduce hospital readmissions among complex older patients who would otherwise occupy beds that could be used to support patient care services generating higher revenue. In addition, in certain states, advanced practice nurse transition coaches can bill for the home visits associated with this model, providing another financing mechanism. Finally, a large ambulatory clinic may choose to reassign a current registered or advanced practice nurse to the transition coach role in an attempt to improve overall clinic efficiency for posthospitalization follow-up visits. Typically, these visits are inefficient, with practitioners having to spend considerable time attempting to understand what transpired in the hospital, reconciling medications, and helping the patient understand his or her role in self-care. Having a transition coach to better prepare patients for their ambulatory follow-up visits could enhance overall clinic productivity.

CONCLUSIONS

As a result of publicized efforts to improve patient safety during transfers (eg, the Joint Commission on Accreditation of Healthcare Organizations' increased focus on medication reconciliation and discharge planning and the National Quality Forum's examination of performance measures for posthospitalization care coordination), national attention to transitional care is increasing.[21,35-41] Strategies are needed to determine how best to incorporate the patient and the family caregiver into efforts to improve quality during care transitions. With its patient-centered focus on ensuring that care needs are met, explicit attention to reconciling disparate medication regimens, and enhanced continuity across health care settings, the care transitions intervention appears to hold promise for addressing the serious quality deficiencies that occur during care transitions and may reduce the rate of subsequent hospital readmissions.

Accepted for Publication: May 8, 2006.
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Author Contributions: Dr Coleman had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.
Financial Disclosure: None reported.
Funding/Support: This study was supported by the John A. Hartford Foundation of New York and by the Paul Beeson Faculty Scholars in Aging Program.

REFERENCES

1. Coleman EA, Smith JD, Frank JC, et al. Development and testing of a measure designed to assess the quality of care transitions. *Int J Integrated Care*. 2002; 2(2). http://www.ijic.org. Accessed June 28, 2006.
2. Grimmer KA, Moss JR, Gill TK. Discharge planning quality from the carer perspective. *Qual Life Res*. 2000;9:1005-1013.
3. Harrison A, Verhoef M. Understanding coordination of care from the consumer's perspective in a regional health system. *Health Serv Res*. 2002;37: 1031-1054.
4. Levine C. *Rough Crossings: Family Caregivers' Odysseys Through the Health Care System*. New York: United Hospital Fund of New York; 1998.
5. vom Eigen KA, Walker JD, Edgman-Levitan S, Cleary PD, Delbanco TL. Carepartner experiences with hospital care. *Med Care*. 1999;37:33-38.
6. Weaver FM, Perloff L, Waters T. Patients' and caregivers' transition from hospital to home: needs and recommendations. *Home Health Care Serv Q*. 1998; 17:27-48.
7. California Healthcare Foundation. 2004 California Hospital Experience Survey executive summary. 2004. http://www.chcf.org/documents/hospitals/CAHospitalExpSurvey04ExecSum.pdf. Accessed October 14, 2005.
8. Forster AJ, Murff HJ, Peterson JF, Gandhi TK, Bates DW. The incidence and severity of adverse events affecting patients after discharge from the hospital. *Ann Intern Med*. 2003;138:161-167.
9. Beers MH, Sliwkowski J, Brooks J. Compliance with medication orders among the elderly after hospital discharge. *Hosp Formul*. 1992;27:720-724.
10. Dudas V, Bookwalter T, Kerr KM, Pantilat SZ. The impact of follow-up telephone calls to patients after hospitalization. *Am J Med*. 2001;111(9B):26S-30S.
11. van Walraven C, Seth R, Austin PC, Laupacis A. Effect of discharge summary availability during post-discharge visits on hospital readmission. *J Gen Intern Med*. 2002;17:186-192.
12. Moore C, Wisnevesky J, Williams S, McGinn T. Medical errors related to discontinuity of care from an inpatient to an outpatient setting. *J Gen Intern Med*. 2003; 18:646-651.
13. Cornish PL, Knowles SR, Marchesano R, et al. Unintended medication discrepancies at the time of hospital admission. *Arch Intern Med*. 2005;165:424-429.
14. Coleman EA, Smith JD, Raha D, Min S. Post-hospital medication discrepancies: prevalence, types, and contributing system-level and patient-level factors. *Arch Intern Med*. 2005;165:1842-1847.
15. van Walraven C, Mamdani M, Fang J, Austin PC. Continuity of care and patient outcomes after hospital discharge. *J Gen Intern Med*. 2004;19:624-631.
16. Coleman EA. Falling through the cracks: challenges and opportunities for improving transitional care for persons with continuous complex care needs. *J Am Geriatr Soc*. 2003;51:549-555.
17. Partnership for Solutions. *Chronic Conditions: Making the Case for Ongoing Care*. Baltimore, Md: Johns Hopkins University; 2002.
18. Boockvar K, Fishman E, Kyriacou CK, Monias A, Gavi S, Cortes T. Adverse events due to discontinuations in drug use and dose changes in patients transferred between acute and long-term care facilities. *Arch Intern Med*. 2004; 164:545-550.
19. Coleman EA, Min S, Chomiak A, Kramer AM. Post-hospital care transitions: patterns, complications, and risk identification. *Health Serv Res*. 2004;39: 1449-1465.
20. Coleman EA, Mahoney E, Parry C. Assessing the quality of preparation for posthospital care from the patient's perspective: the Care Transitions Measure. *Med Care*. 2005;43:246-255.
21. Coleman EA, Berenson RA. Lost in transition: challenges and opportunities for improving the quality of transitional care. *Ann Intern Med*. 2004;141:533-536.
22. Centers for Medicare and Medicaid Services. Medicare Quality Monitoring System. 2006. http://www.cms.hhs.gov/QualityInitiativesGenInfo/15_MQMS.asp. Accessed April 23, 2006.
23. Coleman EA, Smith JD, Frank JC, Min S, Parry C, Kramer AM. Preparing patients and caregivers to participate in care delivered across settings: the Care Transitions Intervention. *J Am Geriatr Soc*. 2004;52:1817-1825.
24. Gage B. Impact of the BBA on post-acute utilization. *Health Care Financ Rev*. 1999; 20:103-126.
25. Parry C, Coleman EA, Smith JD, Frank J, Kramer AM. The care transitions intervention: a patient-centered approach to ensuring effective transfers between sites of geriatric care. *Home Health Care Serv Q*. 2003;22:1-14.
26. Smith JD, Coleman EA, Min S. A new tool for identifying discrepancies in post-acute medications for community-dwelling older adults. *Am J Geriatr Pharmacother*. 2004;2:141-148.
27. Von Korff M, Wagner E, Saunders K. A chronic disease score from automated pharmacy data. *J Clin Epidemiol*. 1992;45:197-203.
28. Coleman EA, Wagner EH, Grothaus LC, Hecht JA, Savarino J, Buchner DM. Predicting hospitalization and functional decline in older health plan enrollees: are administrative data as accurate as self-report? *J Am Geriatr Soc*. 1998; 46:419-425.
29. Parry C, Kramer H, Coleman EA. A qualitative exploration of a patient-centered coaching intervention to improve care transitions in chronically ill older adults. *Home Health Care Serv Q*. In press.
30. Rich MW, Beckham V, Wittenberg C, Leven CL, Freedland KE, Carney RM. A multidisciplinary intervention to prevent the readmission of elderly patients with congestive heart failure. *N Engl J Med*. 1995;333:1190-1195.
31. Naylor MD, Brooten D, Campbell R, et al. Comprehensive discharge planning and home follow-up of hospitalized elders: a randomized clinical trial. *JAMA*. 1999; 281:613-620.
32. Townsend J, Piper M, Frank A, Dyer S, North W, Meade T. Reduction in hospital readmission stay of elderly patients by a community based hospital discharge scheme: a randomised controlled trial. *BMJ*. 1988;297:544-547.
33. Stewart S, Pearson S, Horowitz JD. Effects of a home-based intervention among patients with congestive heart failure discharged from acute hospital care. *Arch Intern Med*. 1998;158:1067-1072.
34. Shepperd S, Parkes J, McClaren J, Phillips C. Discharge planning from hospital to home. *Cochrane Database Syst Rev*. 2004;(1):CD000313.
35. Joint Commission on Accreditation of Healthcare Organizations. Shared Visions–New Pathways Q&A. 2004. http://www.jointcommission.org/AccreditationPrograms/SVNP/qa_overview.htm. Accessed June 28, 2006.
36. Joint Commission on Accreditation of Healthcare Organizations. National patient safety goals: 2006 critical access hospital and hospital national patient safety goals. http://www.jointcommission.org/AccreditationPrograms/Hospitals/NPSG/06_npsg_cah.htm. Accessed July 3, 2006.
37. National Quality Forum. National voluntary consensus standards for hospital performance: additional priority areas. 2005. http://www.qualityforum.org/txNQFprojectsummary3hospitalareas01-25-05.pdf. Accessed October 14, 2005.
38. Institute of Medicine. Redesigning health insurance performance measures, payment, and performance improvement programs: Subcommittee on Performance Measures. 2005. http://www.iom.edu/project.asp?id=22208. Accessed October 14, 2005.
39. Coleman EA, Boult C. Improving the quality of transitional care for persons with complex care needs. *J Am Geriatr Soc*. 2003;51:556-557.
40. Coleman EA, Fox PD. One patient, many places: managing health care transitions, part I: introduction, accountability, information for patients in transition. *Ann Long-term Care*. 2004;12:25-32.
41. Coleman EA. Aspen Transitional Care Conference proceedings. 2002. http://www.uchsc.edu/hcpr/documents/AspenTransitionProceedings.pdf. Accessed October 14, 2005.

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