
Quality and Outcomes

Beyond Our Walls: Impact of Patient and Provider Coordination across the Continuum on Outcomes for Surgical Patients

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Objectives. To investigate patients' experience with coordination of their postsurgical care across multiple settings and the effects on key outcomes.

Data Sources. Primary data collected over 18 months from 222 unilateral knee-replacement patients at Brigham and Women's Hospital in Boston, MA.

Study Design. Patients were surveyed about the coordination of their postdischarge care during the 6-week period postdischarge when they received care from rehabilitation facilities and/or home care agencies and follow-up care from the surgeon.

Data Collection. Patients were surveyed before surgery and at 6 and 12 weeks post-surgery.

Principal Findings. Patient reports highlight problems with coordination across settings and between providers and themselves. These problems, measured at 6 weeks, were associated with greater joint pain, lower functioning, and lower patient satisfaction at 6 weeks after surgery. At 12 weeks after surgery, coordination problems were associated with greater joint pain, but were not associated with functional status.

Conclusion. Coordination across settings affects patients' clinical outcomes and satisfaction with their care. Although accountable for transfer to the next care setting, providers are neither accountable for nor supported to coordinate across the continuum. Addressing this system problem requires both introducing coordinating mechanisms and also supporting their use through changes in providers' incentives, resources, and time.

Key Words. Care coordination, coordination across settings, continuity of care, patient satisfaction, clinical outcomes

Coordination of care factors critically in patient safety and care quality across services and settings (Institute of Medicine 2001). The existing research focuses on coordination of care within a single institution, usually a hospital

(Argote 1982; Baggs et al. 1992; Young et al. 1998; Gittell et al. 2000), or alternatively in an outpatient setting either by a single provider (usually a nurse, case manager, or primary care physician [PCPs]) or jointly between PCPs and specialists (Starfield 1998; Stille et al. 2005). This study expands research on care coordination through examination of postsurgical care involving multiple settings and multiple types of care providers. We examine surgical patients' experience of postdischarge coordination as they move from the hospital, often to a rehabilitation facility (RF), and then home. We hypothesize that patients' experiences of coordination problems are significantly associated with clinical outcomes and satisfaction.

Increasingly there is an interest in extending coordination beyond the individual organization or care provider to encompass the whole episode of care for a given patient (Provan and Milward 1995; Shortell, Gillies, and Devers 1995; Gittell 2002). Having some form of external coordination between organizations has become an official mandate. Standards from Joint Commission for Accreditation of Healthcare Organizations (JCAHO) and Condition of Participation from the Department of Health and Human Services hold organizations in which a patient receives care responsible for ensuring safe and effective transfers to the next setting (Centers for Medicare and Medicaid Services 2001; Joint Commission on Accreditation of Healthcare Organizations 2005). Despite these mandates, the process of coordination between institutions remains problematic. In a recent study between 15 and 72 percent of physicians reported problems with coordination across settings—lack of treatment follow-up, conflicting information from other care providers, delayed transfer of information following hospital discharge, and unavailability of relevant information during patients' scheduled visits (Audet et al. 2005). Starfield's review of research on coordination in primary care suggests that such communication breakdowns are not new (Starfield 1998).

Starfield defines coordination as "the availability of information about prior problems and services and the recognition of that information as it bears on needs for current care" (Starfield 1998, p. 226), thereby distinguishing information transfer and information processing as separate components of

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coordination. This definition may be extended to specialty care and also to patients and caregivers, who, often serving as the primary conduits of information about their care, require information and must recognize important developments in order to seek and manage their care (Ellers and Walker 1993; Starfield 1998; Coleman, Maloney, and Parry 2005). For patients, coordination breakdowns, between providers or between themselves and providers, threaten continuity.

For patients, continuity involves perceptions that providers have enough information about patients and their medical histories to make decisions about care (informational continuity); that providers, whether single or multiple, have a consistent care management plan (management continuity); and that providers who know them will provide care in the future (relational continuity) (Haggerty et al. 2003). Poor care coordination may result in conflicting information to patients and caregivers and lead to a loss of confidence in providers (Gerteis 1993). It may also produce confused, underinformed, or noncompliant patients, a particularly troublesome outcome when successful recovery depends upon patient cooperation (Ellers and Walker 1993). Additionally, coordination failures may produce patient dissatisfaction (Cleary 2003), which may have negative consequences for health care organizations in a competitive environment by reducing repeat business, generating negative word of mouth, or producing low patient care quality ratings.

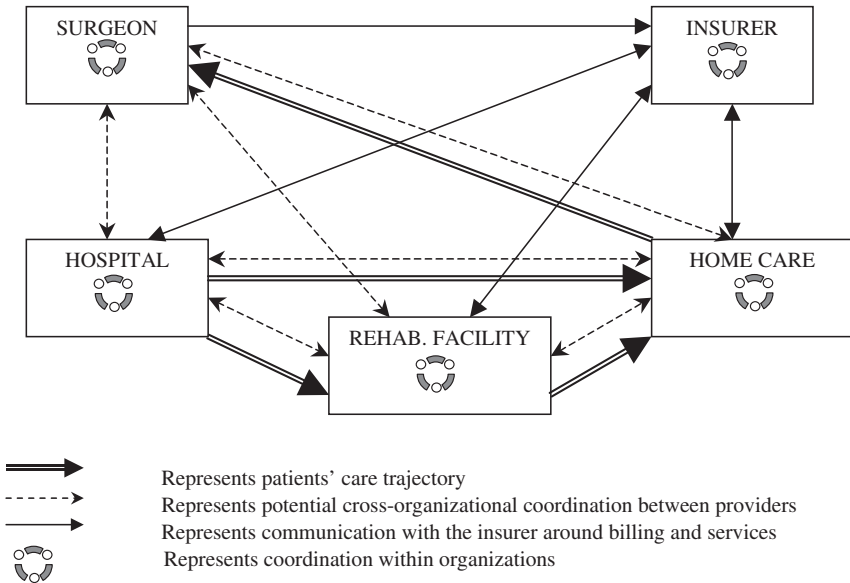
METHODS

The Setting and the Coordination Problem

The study was performed with the participation of four orthopedic surgeons from Brigham and Women's Hospital in Boston who conduct high volumes of knee replacement surgery. We interviewed two of the surgeons involved in the study at the beginning and end of the study. In both sets of interviews, they identified problems with coordination of postdischarge care and barriers to fixing these problems. Below, we summarize the common themes. Figure 1 depicts the care trajectory and the potential, though sometimes problematic, coordination between providers.

Surgeons discharged patients to rehabilitation facilities (RFs) or home care with medication and physical therapy orders and care summaries outlining information about the surgery, nursing care, medications, and in-hospital physical therapy. The hospital contacted the RFs after a patient's surgery was performed. RFs then evaluated a patient's suitability for placement.

Figure 1: Patient 6-Week Care Trajectory and Potential Coordination between Settings



Acceptance and transfer could occur within the space of a few hours, leaving little time to ensure proper coordination. The rehabilitation physiatrists took charge of patients admitted to their facilities, coordinated discharge to the next setting, and transferred any of the surgeons' orders still in effect. Following the patient's stint at the RF, which ranged from a few days to a couple of weeks, patients often received home care or outpatient care, and these providers contacted the surgeon for new orders. Because both the physical therapists (PTs) and visiting nurses requested the surgeons' orders to provide care and also new ones when changes were needed, surgeons felt more apprised of the patient's care at home than at the RFs. Between 4 and 6 weeks after surgery, patients returned to the surgeons for a follow-up visit.

Other than the transmission of orders and discharge notes, little communication occurred between the various providers. Patients and providers called the surgeon with questions or order requests, but most calls were triaged by the surgeons' experienced administrative assistants and did not result in direct communication with the surgeon. PCPs might become involved if patients required additional referrals or care after discharge, but the clinicians seldom interacted directly. As a result, surgeons were poorly informed about

what happened to their patients between discharge and follow-up when patients returned with their own accounts and the outpatient PTs' progress reports: "The patients expect that their surgeons will know exactly what's going on with them, and the reality is that we actually know very little of what's gone on with them" (Surgeon).

The surgeons identified barriers to improve coordination. Reduced reimbursement from insurers, whose policies help shape the extent and intensity of services in each of the care settings, represented a critical factor. One surgeon explained, "I get paid a third of what I used to get paid ten years ago for each total knee. None of my expenses changed. . . . I have to do more work [to earn the same income]." The increased volume of surgeries resulted in more patients needing coordination, while reducing the time available for surgeons to contact other providers, who faced similar productivity and cost pressures. Surgeons had busy clinic and surgery schedules: "Many days, I'm in the operating room all day and just not accessible." In addition, the surgeons themselves encountered problems contacting other providers: "You don't even know who to get ahold of, and it takes a little while to figure out where the patient actually went. . . . and get the telephone number, and then I have to negotiate the system . . . to find a person who was looking after them that actually has some authority or responsibility. . . . and they may be busy or not there."

Despite the lack of coordination from the surgeons' perspective, knee replacements were typically successful surgeries: "Almost always, patients just get better. . . . We're rather fortunate in that patients do really well [even] if you neglect them. . . . So that's one of the reasons why this is not a glaring problem." This study examines the extent to which coordination of postsurgical care is a problem from the patients' perspective. We map breakdowns in coordination that patients experience as they move to each setting involved in their postdischarge care. We then examine whether these coordination problems impact patient outcomes.

Data Sources

The study followed 222 knee-replacement patients across the continuum of care, from before their surgeries until 12 weeks after surgery. The study was conducted under the auspices of Institutional Review Boards at Brigham and Women's Hospital and the team's academic institutions. Patients admitted for primary, unilateral total joint replacement with a diagnosis of osteoarthritis between November 2003 and May 2004 were eligible. Researchers contacted

357 patients before their surgeries to invite participation, and 222 (62 percent) enrolled. Patients were surveyed before their surgeries and at 6 and 12 weeks postsurgery. One hundred eighty-four patients (82 percent) responded at 6 weeks and 154 (70 percent) of those responded at 12 weeks.

Outcome Variables

Postoperative freedom from pain and functional status were derived from five items related to pain and 17 items related to physical functioning, respectively, from the Western Ontario and McMaster University Osteoarthritis Index (WOMAC), a validated and self-administered questionnaire which assesses patient-relevant clinical outcomes for patients with knee or hip osteoarthritis (Bellamy et al. 1988). To minimize missing values, we calculated scores for all patients who completed at least 80 percent of the items in each of the indices. The values for the resulting indices range from 1 to 100, with higher scores representing greater freedom from pain or better function. A single item on the 6-week survey measured satisfaction with overall care during the post-discharge period studied: "Overall, how would you rate your care in the past 6 weeks?" Response categories ranged from poor to excellent on a five-point scale.

Coordination Problems

Few existing measures focus either on coordination between providers or on patients' experience of coordination as they transition between settings (Ellers and Walker 1993; Coleman, Maloney, and Parry 2005). We used items from the Picker Post-Acute Care Survey for joint patients, which includes a set of patient-centered measures of coordination across settings (The Picker Institute 2006). The items address two aspects of continuity: informational continuity—providers and patients having the information they need or request—and management continuity—providers showing agreement about care and patients knowing next steps (Haggerty et al. 2003). Items concern specific experiences with the RF, home care, and follow-up visit with the surgeon. More general items concern overall care provided in the 6 weeks after surgery and preparation for discharge home, whether from the hospital or a RF. The resulting problems with Coordination Index contains five different subscales: Coordination for Discharge (three items), Coordination at the RF (six items), Coordination with Home Health Care (six items), Coordination with the Surgeon at Follow-up Visit (four items), and Global Care Coordination (eight items).

Following Cleary (Cleary et al. 1991), we created a score for each subscale by calculating the percentage of a patient's answers that indicated a problem. Particular subscale scores were not created if respondents had not responded to at least 60 percent of the items in the subscale. Scores range from 0 (no problems reported) to 100 (a problem indicated in every included response). Table 2 presents items in each subscale and their problem scores.

The individual items for the subscales were averaged and multiplied by 100 to create the Patient-Perceived Coordination Index ($\alpha = 0.76$), which represents the percentage of problems patients reported with their care. Not all patients received home care or went to RFs, whereas some patients received both types of services; thus the number of subscales used to calculate the index varies depending upon the services a patient received. Patients without scores on the two general subscales—Coordination for Discharge and Global Care Coordination—did not receive an index score. Of 184 6-week respondents, 147 (79.89 percent) provided enough information to calculate the Patient-Perceived Coordination Index. Multivariate analyses confirmed that neither overall index scores nor outcomes were affected by differences in the services received or the subscales included in a patient's index score.

Control Variables

Various patient characteristics, including age, gender, race, and health status, may influence patients' ratings of their care (Cleary et al. 1991; Kane, Maciejewski, and Finch 1997; Young, Meterko, and Desai 2000; Powers and Bendall 2004). We controlled for age, sex, marital status, and variables related to health status—comorbidity, mental health, and preoperative pain and functioning. In the 12-week models, we also controlled for patients' pain or functioning reported at 6 weeks. Race was excluded due to limited variation in the sample; 91 percent of the patients reported their race as Caucasian. Comorbidity was measured as the total number of comorbid health conditions—heart disease, high blood pressure, diabetes, ulcer or stomach disease, kidney disease, anemia or other blood disease, cancer, depression, or back pain (Katz et al. 1996)—reported on the preoperative questionnaire. We used WOMAC measures of preoperative freedom from pain and preoperative functional status in the models of postsurgical pain and postsurgical function, respectively. A combined, preoperative pain and function score was used in the model of satisfaction with care. The patient's reported mental health, assessed in each survey using the mental health component of the SF-36 (Stewart, Hays, and

Ware 1987) and transformed to a 100-point scale, was included as a control for outcomes at each respective period.

Statistical Analysis

Multiple Regression. Four surgeons, each with a unique practice style and preferred postsurgical protocols (i.e., when patients could bear weight on the knee and how much), treated patients in the study. Anticipating similar outcomes for patients with the same surgeon, we estimated random-effects linear regression models to avoid underestimation of standard errors. Since the results did not vary from those of OLS, we present the OLS models for simplicity.

Models of Coordination Problems and Postsurgical Outcomes. The patient's experience of how well their care was coordinated was assessed on the 6-week patient survey. By 6 weeks, patients following a typical care trajectory completed their stint at the RF if they had been discharged to one, were receiving home care services, and had returned for a follow-up appointment with the surgeon. Thus, 6 weeks represented a time when care issues would still be fresh in a patient's mind and when patients had received most, if not all, of their intensive postsurgical care. We model the effects of patient-perceived coordination, as assessed at 6 weeks, on 6- and 12-week outcomes of freedom from pain and functional status. Additionally, we consider the effect on satisfaction with care reported at 6 weeks.

RESULTS

Patient Characteristics

As shown in Table 1, women accounted for 62 percent of our sample, and 64 percent of the sample was married. The average age was 66 and ranged from 37 to 88 years. Most patients were discharged with home care (41 percent) or discharged to a RF (54 percent) and then to home care (46 percent). Eighty-seven percent received home care services from a visiting PT and/or visiting nurse.

Clinical Outcomes

Clinical outcomes are presented in Table 1. Among respondents, 82 percent experienced improved joint pain and functioning compared with baseline by

Table 1: Patient Characteristics and Outcomes

	<i>Percent or Mean</i>	<i>SD</i>
<i>Baseline measures; enrolled (222)</i>		
% female	62	
% white	91	
% married	64	
% receiving care at a rehabilitation facility	54	
% receiving care at home	87	
% receiving both rehabilitation and home care	46	
Age	66.34	10.16
Preoperative freedom from pain (from 1 to 100)	53.42	19.51
Preoperative functioning (from 1 of 100)	51.85	19.85
Preoperative mental health (from 1 to 100)	73.66	16.94
<i>Six weeks; responders (184)</i>		
Six-week freedom from pain (from 0 to 100)	71.89	17.23
Six-week functioning (from 0 to 100)	73.87	16.45
Six-week mental health (from 0 to 100)	74.76	17.04
Perceived problems with coordination (average % problems encountered at various stages of postcare)	32.69	23.23
Satisfaction with care (from 1 to 5)	4.23	0.81
<i>Twelve weeks; responders (154)</i>		
Twelve-week freedom from pain (from 0 to 100)	81.05	16.74
Twelve-week functioning (from 0 to 100)	79.80	15.28
Twelve-week mental health (from 0 to 100)	77.99	16.55

6 weeks, and 92 percent by 12 weeks. On average, patients reported 26-point improvements in pain and 27-point improvements in function, on a 100-point scale. In general, the patients in this study were highly satisfied with the care they received. Table 1 describes the patient sample.

Coordination of Care Problems

Although patients reported high levels of satisfaction and significant improvements in pain and functioning, they also reported numerous coordination problems (Table 2), suggestive of difficulties coordinating across settings, within settings, and between patients and providers.

Coordination of Discharge. The average patient reported problems on 42 percent of the indicators related to coordination of discharge. Widespread problems included not being told what problems related to surgery to watch for (46 percent) and not being informed about medication side effects

Table 2: Patient-Perceived Coordination Index (Measured at 6 Weeks)

	<i>N</i>	<i>% Reporting Problems</i>
<i>Coordination for discharge</i>		
Staff explained the purpose of the medicine you were to take at home in a way you could understand	162	20
Staff told you about medication side effects to watch for when you went home	159	47
Staff told you what problems related to your surgery to watch for after you went home	160	46
Problems with discharge coordination ($\alpha = 0.70$)	161	Avg = 42
<i>Coordination at the rehabilitation facility</i>		
Staff were aware of the results of your surgery	93	25
Staff were aware of your medical history	91	36
Staff were aware of any special conditions or needs you had	95	43
It was easy for you to find someone to talk to about your concerns	98	39
One staff member will say one thing about your care and another will say something quite different	98	34
Staff at the rehabilitation facility worked well together	98	38
Problems with rehabilitation care coordination ($\alpha = 0.75$)	98	Avg = 44
<i>Coordination with home health care</i>		
Staff were aware of the results of your surgery	145	27
Staff were aware of your medical history	140	39
Staff were aware of any special conditions or needs you had	147	54
It was easy for you to find someone to talk to about your concerns	147	16
One staff member will say one thing about your care and another will say something quite different	145	11
Home care staff worked well together	141	23
Problems with home health care coordination ($\alpha = 0.72$)	146	Avg = 35
<i>Coordination with surgeon at follow-up visit</i>		
Surgeon was aware of your most recent medical history	164	16
Surgeon knew about your progress in physical therapy	157	26
Surgeon had all the information he or she needed, such as test results, to make decisions about your treatment	160	14
Surgeon explained what to do if problems or symptoms continued, got worse, or came back	159	17
Problems with coordination at follow-up visit with surgeon ($\alpha = 0.81$)	162	Avg = 17
<i>Global coordination (past 6 weeks)</i>		
You got the information about your medical condition and treatment you wanted from the providers who cared for you in the past 6 weeks	170	18
The health care providers who cared for you were familiar with your most recent medical history	165	24
Your providers were aware of changes in your treatment that other providers recommended	147	44

continued

Table 2. *Continued*

	<i>N</i>	<i>% Reporting Problems</i>
Your providers had all the information they needed, such as test results, to make decisions about your treatment	163	25
You were given confusing or contradictory information about your health or treatments	167	11
You knew whom to ask when you had questions about your health problems	147	22
You knew what the next step in your care would be	168	33
The health care providers you saw worked together well together	167	23
Problems with global coordination ($\alpha = 0.84$)	168	Avg = 30
<i>Patient-perceived coordination</i> ($\alpha = 0.76$)	147	Avg = 33

(47 percent). A lower percentage (20 percent) reported problems in the way the purpose of medications was explained.

Coordination at the RF. Patients reported problems on 44 percent of the indicators related to coordination at the RF. The most common problems were handoffs between the hospital and the RF: staff were not aware of the results of the patients' surgery (25 percent), the patients' history (36 percent), and any special conditions or needs (43 percent). More than a third (39 percent) said it was not easy to find someone to talk to about their concerns. In addition, 38 percent of patients reported problems with how well the rehabilitation providers worked together, and 34 percent reported that staff provided conflicting or contradictory information.

Coordination with Home Health Care. Fewer problems were reported regarding coordination with the home health care agency; the average respondent reported problems with 35 percent of the indicators. Again, patients identified problems with handoffs from the sending organizations, whether a hospital or RF, with the home care staff not aware of the results of surgery (27 percent), their medical history (39 percent), and special conditions or needs (54 percent). The quality of communication between patients and providers was better with the home care agencies than with the RFs; 16 percent of patients reported problems finding someone to talk with about concerns. Although 23 percent reported that the home care staff did not work well together, only 11 percent reported that staff gave contradictory or conflicting information.

Coordination with Surgeon at Follow-up Visit. Follow-up with the surgeon proved least problematic from the patient's perspective, with the average patient reporting problems on 17 percent of the indicators. Sixteen percent of patients felt that the surgeon was unaware of the patient's most recent medical history, whereas 14 percent perceived the surgeon did not have information needed to make decisions about treatment. Confirming the surgeons' concerns about not receiving information about patients' postsurgical care or recovery, however 26 percent of patients reported that the surgeons did not know about the patient's progress in physical therapy. Finally, 17 percent of patients reported that the surgeon did not explain what to do if problems or symptoms continued, got worse, or came back.

Global Coordination. The average respondent reported problems with 30 percent of the global coordination indicators. Both communication between patients and providers and between health care professionals providing care over the last 6 weeks were problematic. Almost one-fifth of patients (18 percent) did not get the information they wanted from their care providers, whereas close to one-fourth (22 percent) did not know whom to ask when they had questions, and one-third did not know what the next steps in their care would be. Patients reported that in general their providers also did not have ready access to needed information, with 24 percent not familiar with the patient's most recent medical history, and 25 percent reporting that providers lacked necessary information to make treatment decisions. While providers tended to give consistent information, 23 percent of patients reported problems with how well providers worked together, and 44 percent reported that providers were not aware of changes in treatment that other providers recommended.

Models of Coordination Problems and Outcomes at 6 Weeks

Patient-reported problems with coordination predicted both clinical and satisfaction outcomes 6 weeks postsurgery, as reported in Table 3. Improved freedom from pain, functional status, and satisfaction all showed negative, significant associations with patient perceptions of coordination problems (regression coefficient = -0.14 , $p < .05$; -0.12 , $p < .05$; and -0.02 , $p < .001$, respectively).

Models of Coordination Problems and Outcomes at 12 Weeks

Table 4 presents the models for 12-week clinical outcomes, which include both the baseline and 6-week measures for pain or functioning. In both

Table 3: Patient-Perceived Coordination of Care and 6-Week Clinical Outcomes

	<i>Freedom from Pain</i>		<i>Functional Status</i>		<i>Satisfaction with Care</i>	
	<i>Coefficient</i>	<i>(p-value)</i>	<i>Coefficient</i>	<i>(p-value)</i>	<i>Coefficient</i>	<i>(p-value)</i>
Patient-perceived coordination*	-0.14	(.027)	-0.12	(.026)	-0.02	(.000)
Age	-0.16	(.319)	-0.07	(.608)	0.00	(.895)
Female	0.41	(.892)	-1.15	(.652)	0.10	(.394)
Married	-3.12	(.334)	-3.13	(.251)	-0.03	(.859)
Number of comorbidities	-0.89	(.528)	-1.05	(.361)	-0.07	(.195)
Six-week mental health	0.09	(.298)	0.13	(.067)	0.01	(.000)
Preoperative freedom from pain	0.30	(.001)	—			
Preoperative functional status	—		0.39	(.000)		
Preoperative pain and function	—		—		0.002	(.589)
Constant	67.04	(.000)	55.37	(.000)	3.86	(.000)
Model R^2	0.16		0.32		0.44	
<i>N</i>	138		135		139	

*Patient-perceived coordination is a continuous variable, representing the percentage of problems patients reported on the various aspects of coordination related to their care postsurgical care.

equations, the main predictor of 12-week pain and functioning is the 6-week measure of the same clinical outcome. Patient-perceived coordination problems, as reported on the 6-week survey, were negatively associated with patients' freedom from joint pain (regression coefficient = -0.12, $p < .028$) but had no significant effect on functional status (-0.00, $p < .935$) at 12 weeks postsurgery. The lack of a significant effect on 12-week functional status may indicate that 6-week functional status biases patients' recall of coordination and serves as the primary explanation for the demonstrated effects of coordination at 6 weeks. Excluding the 6-week functional status measure from our 12-week models (results not shown), however, yielded a similar pattern of results for the effect of coordination on clinical outcomes. Rather than confirming biased responses (although not ruling them out), this result suggests that coordination problems experienced in the first 6 weeks after surgery have no enduring effect on functional status. The continued impact on joint pain, however, is problematic given that reduction of joint pain is a primary goal of this surgery.

DISCUSSION

This study demonstrates the importance of coordination, as experienced by the patient, for clinical outcomes from knee-replacement surgery. Patients in

Table 4: Patient-Perceived Coordination of Care and 12-Week Clinical Outcomes

	<i>Freedom from Pain</i>		<i>Functional Status</i>	
	<i>Coefficient</i>	<i>(p-value)</i>	<i>Coefficient</i>	<i>(p-value)</i>
Patient-perceived coordination	-0.12	(.028)	-0.00	(.935)
Age	-0.15	(.244)	-0.09	(.440)
Female	1.83	(.440)	1.99	(.370)
Married	4.00	(.122)	3.73	(.130)
Number of comorbidities	0.66	(.545)	1.10	(.282)
Twelve-week mental health	0.24	(.001)	0.22	(.002)
Six-week freedom from pain	0.47	(.000)	-	
Preoperative freedom from pain	0.08	(.246)		
Six-week functional status			0.60	(.000)
Preoperative functional status			0.04	(.593)
Constant	31.64	(.009)	17.59	(.103)
Model R^2	0.54		0.55	
<i>N</i>	114		114	

this study reported on care problems experienced in the 6 weeks after knee-replacement surgery as they transitioned from the hospital, to a RF (for some), and ultimately to home and outpatient care. Patients reporting fewer coordination problems experienced greater satisfaction with care and improved freedom from pain and functional status at 6 weeks after discharge. They also experienced improved freedom from pain at 12 weeks. There was no difference in functional status at 12 weeks compared with those reporting more coordination problems. These findings are striking because they were obtained in connection with a highly routine, elective procedure with a high rate of patient satisfaction and success in improving pain and functioning. Even within this successful scenario, improvements in coordination made significant improvements in clinical outcomes.

Patients identified serious issues in coordination between providers and also between providers and patients. Coordination between patients and providers presented the most problems for patients, whether coordination for discharge or communication of information relevant to a patient's treatment. Many reported not having the information needed to manage their condition after their return home. Patients' reports also highlighted coordination breakdowns between providers. Not only did patients report problems in the way that staff worked together, but they reported problems with transitions between settings, with receiving providers not having important information about a patient's history, surgery, or special needs or conditions.

One limit of this study is its dependence on patient reports. A patient's experience of coordination, while yielding useful insights, may not accurately reflect actual coordination between providers. Based on the patients' reports, we do not know where a coordination problem occurred—between organizations, between providers within an organization, or between provider and patient. In addition, patient reports may be correlated with other information obtained using the same survey, or the patients' current levels of pain and functioning may bias recall of coordination. This study sought to reduce this potential bias by using information obtained at different points in a patient's care and with different surveys. Thus, although our findings for the association between coordination, measured at 6 weeks, and 6-week outcomes may be inflated due to same-instrument or recall bias, the problem should be less for the association with 12-week outcomes, particularly when 6-week outcomes are controlled. Finally, there is also the possibility of reverse causality regarding the association between coordination problems and postsurgical pain. Increased pain may drive patients to seek more information or care, thereby potentially creating more coordination problems. Regardless of the causal direction, these results point to serious shortcomings in care coordination.

Despite these limitations, our study results have important implications for health care providers and policy makers. Our findings suggest the need to continue and extend efforts to improve coordination across the continuum of care to ensure that health promotion in one setting is not undermined when a patient transfers to another setting and another set of providers. Our findings also highlight patients' need for information that will help them integrate and manage their own care as they move between settings.

In the case presented here, the surgeons identified time, patient volume, and the ability to access other providers as key barriers to coordination. These barriers represent consequences of market mechanisms, which have prompted surgeons and other providers to increase their caseloads and, consequently, decrease their availability for coordinating care for each patient. In this case, market mechanisms have detracted from rather than enhanced coordination. Market mechanisms, as in this case, may increase patients' need to coordinate their own care and add to the significant illness burden that patients and their caregivers already face. Patients and their caregivers, moreover, are not equally matched to the coordination task. Dumping integrating responsibilities on lay people in a system difficult even for trained practitioners to navigate does not constitute sound policy. Failing to provide professional coordination support and leaving coordination efforts solely to patients and their caregivers signals a dysfunctional system (Stille et al. 2005), rather than a successful market-driven innovation in coordination.

This study describes a system in which no one provider is accountable for coordination of care across the continuum. The current mandates from JCAHO and the Department of Health and Human Services hold sending organizations responsible for transferring information to the next setting, but the patient accounts in this study raise questions about whether these transfers are timely or adequate to support patient-centered care. Even if the transfers were seamless, moreover, the mandates only support a sequential chain of information from one setting to the next. They do not address integration of care across the continuum.

The instruments used in this study to measure coordination problems capture breakdowns related to patient-centered care. Systematic data collection based on these or similar measures could help to identify links in cross-organizational coordination that most need improvement and, on a large scale, be used to help identify best practices. As a quality indicator, measures of patient-centered coordination could also serve to increase awareness and accountability on the part of providers and payers.

In inpatient settings, there is growing evidence regarding the effective design of coordinating mechanisms such as cross-functional boundary spanners, protocols, and information systems (Gittel and Weiss 2004). Such coordinating mechanisms can be extended and adapted to facilitate the cross-organizational coordination of care (Gittel and Weiss 2004). Because of their central positions and influence in the network of postdischarge care (see Figure 1), insurers, such as managed care organizations or Medicare, are likely candidates to promote cross-organizational coordination by introducing coordinating mechanisms into the system. For example, they might introduce a boundary spanner, like a case manager, to integrate a patient's care between organizations. However, the success of any coordinating mechanism depends upon cooperation from the various providers in the system. No one provider can coordinate alone. Coordination requires mutual communication and action and will not succeed if providers lack the time, resources, availability, or inclination not only to provide information but also to process it. Changes in the reward structure, in performance measures, and in the hiring and training of providers to support the use of coordinating mechanisms are necessary for success.

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