Reduce Readmissions With Service-Based Care Management

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ABSTRACT

Purpose of Study: In response to the U.S. Affordable Care Act, the Centers for Medicare & Medicaid Services proposed a change in reimbursement penalties for hospitals beginning October 1, 2012. Reducing the occurrence of unplanned readmissions has become a more urgently focused topic. As part of the health care system, care management aligns with physicians to significantly improve service, financial, and clinical care outcomes. To address the changing health care climate in 2008, care management services were restructured at an academic university medical center located in 1 of the 3 largest counties in California. Changing from a unit-based to a service-based care management model partnered care managers and social workers with physician services. We sought to assess the effect of this change on surrogates for patient experience and clinical quality of care.

Primary Practice Setting: Tertiary academic medical center in southern California.

Methodology and Sample: Retrospective data were collected from 2 databases for all hospital patient care services from November 2008 to January 2010 to determine whether clinical quality of care and experiential service improvements were realized. Primary outcomes included all-cause and related readmission rates. Secondary outcomes were Hospital Consumer Assessment of Healthcare Providers and Systems (H-CAHPS) scores. An interrupted time series analysis compared data from the single institution for the diffusion and postintervention periods.

Results: Comparing data from the diffusion and postintervention periods, the rate of disease-related readmissions decreased significantly (mean 5.43−4.58, $p < .05$), and all-cause readmissions also decreased, although the difference failed to achieve statistical significance (11.42-10.49, $p = .056$). H-CAHPS scores with the patient response of "recommend this hospital" was unchanged over the 2 time points (mean 78.9%−77.8%, $p = .26731$). Data also showed stable care management staffing rates whereas average daily census (ADC) increased over time (ADC 274−297).

Implications for Case Management Practice: With health reform driving value-driven care transformation, partnering care managers and social workers with physician services has the potential to impact the patient's experience as well as financial and clinical care outcomes. Care managers serve a significant role in improving the clinical quality of care by reinforcing a consistent and clear message by the health care team to the patient during the entire hospitalization, not just at the time of discharge. At one institution, partnering physicians with care managers through the acute care continuum (service-based care management) appeared to reduce readmissions without compromising patient satisfaction. Both readmission reduction and effective patient satisfaction scores impact the Centers for Medicare & Medicaid Services value-based purchasing reimbursement calculations.

Key words: *organization, quality, readmission, reimbursement, satisfaction*

In response to the U.S. Affordable Care Act signed on March 23, 2010, the Centers for Medicare & Medicaid Services (CMS) sought to reduce Medicare payments to hospitals through a Value-Based Purchasing program (CMS, 2011; McCarthy, Johnson, & Audet, 2013; U.S. Department of Health & Human Services, 2013). This new approach included a change in reimbursement penalties for hospitals beginning October 1, 2012. As an opportunity for improvement in service, quality, and cost, reducing the occurrence of unplanned readmissions has become a more urgently focused topic. According

to one study, unplanned all-cause readmissions cost Medicare $17.4 billion in 2004, with 20% of the Medicare fee-for-service patients readmitted within 30 days of discharge (Jencks, Williams, & Coleman,

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2009). Whether interventions target all-cause or diagnosis-specific readmissions, this change in reimbursement policies and practices makes generating effective interventions to improve efficiency, quality and patient experience of care a systemwide priority (Hines, Yu, & Randall, 2010).

At the national level, the Agency for Healthcare Research and Quality (AHRQ) supports and offers information regarding two evidence-based projects to help prevent avoidable readmissions: Project BOOST and Project RED (AHRQ, 2012b). Project BOOST, or Project Better Outcomes for Older adults through Safe Transitions, reduces readmissions in two ways: mentor "hospital teams to map current processes and create and implement action plans for organizational change," as well as provide "a suite of evidence-based clinical interventions that can be easily adapted and integrated into each unique hospital environment" (Society of Hospital Medicine, 2012). The project focuses on general medicine patients and recognizes length of stay (LOS) and Hospital Consumer Assessment of Healthcare Providers and Systems (H-CAHPS) scores as areas of improvement (Society of Hospital Medicine, 2012). Project Re-Engineered Discharge (RED) "is a patient-centered standardized approach to discharge planning" that prepares patients for discharge by immediately "designating a Discharge Advocate to coordinate discharge with the care team and patient" (AHRQ, 2012a, 2012b). Both programs have associated hard costs for personnel to focus on the targeted population, but costs vary depending on the institution size. Care managers can provide the level of patient advocacy needed to decrease the tension between evidence-based clinical processes and the patient's comprehension and readiness for discharge.

With health reform driving value-driven care transformation, aligning care management with physician services can significantly improve the patient's experience as well as financial and clinical care outcomes. Care managers serve a significant role in reducing readmissions (Hughes, 2012). One meta-analysis of 12 studies, 7 of which were conducted in the United States, identified "a 6% decrease in readmission rate for patients who received hospital-based care management interventions" (Kim & Soeken, 2005). However, few studies have examined the relationship between the structure of care management and readmissions.

According to the Case Management Society of America (2012), "case management is a collaborative process … to meet an individual's health needs [in order] to promote quality cost-effective outcomes." A well-established model of outcomes management—the Vanderbilt model—established the care manager as part of a triad with the social worker and utilization management to best coordinate a patient's hospitalization (Erickson, 1998). The arrangement of care management varies by hospital, with staff often assigned as either service- or unit-based. Both methods have pros and cons that must be considered if converting from one system to another (Zander & Warren, 2005).

SERVICE-BASED CARE MANAGEMENT

In 2009, care management services were restructured at the University of California, Irvine (UCI) Medical Center, a health care setting that renders tertiary acute and ambulatory services for patients. The transition from a unit-based to service-based system was in response to perceived overstaffing of the care management department based on a review by an independent consulting firm in early 2008. By June 2008, a resource management expert reviewed the care management program structure and functional responsibilities. Given the national emphasis on efficiency and effectiveness at the bedside, the consultants recommended realignment to a service-based model. Service-based care management provided uniform care coordination, decreased confusion between care teams and patient families, managed expenses at the point of service, and mobilized a team leader to coordinate care from admission to discharge, with a handoff to the ambulatory setting when necessary. It was determined that a reduction in care management staffing was not necessary, but rather an enhanced emphasis on resource management was needed.

A multidisciplinary work team was assembled and comprised care managers, nonlicensed authorization coordinators, and clinical social workers, championed by the executive director, UCI Hospitalist Program, and other medical staff leaders along with the Director of Case Management, with the support of the chief medical officer for UCI Medical Center. The team outlined goals, including a target of improving efficiencies in care delivery and reducing readmissions, while maintaining effective discharge

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satisfaction scores. The roles and responsibilities of the disciplines were defined, with the understanding that each service line would function as a team, often with roles overlapping on the basis of the case (see Table 1).

By August 2008, the staffing and resource needs were drafted utilizing historical case mix index, average LOS, and volume (the number of discharges and patient days) for the physician service lines. The payer mix was also considered an important element due to insurance resource limitations that often drive the ability, or inability, to transition care to the next level. Based on staffing guidelines from the Center for Case Management, it was anticipated that the service-line

model would require 12.7 additional staff, including 3.4 clinical social workers, 4.2 RN care managers, and one decision support analyst (Center for Case Management, 2007). The team proceeded in support of the resource management expert opinion and did not seek additional staff at that time.

The service-based care management model was officially rolled out in April 2009. We evaluated the impact of this program on 30-day all-cause and disease-specific readmission rates and patient experience.

METHODS

Research Design

Retrospective data for all services from April 2009 to January 2010 were abstracted to assess the impact of the program on clinical service improvements. Improvements were a measure of reduced 30-day readmission rates and increase or maintenance of patient satisfaction following implementation of the program. Two databases were available and used: University Health System Consortium (UHC) and Office of Statewide Health Planning & Development (OSHPD). Primary outcomes include all-cause and related readmission rates. H-CAHPS scores were secondary outcomes. The study time period was evaluated on the basis of 2 defined periods of intervention: April 2009 through August 2009 represents implementation and diffusion of the intervention, and

TABLE 1
Service-Based Care Management Functional Team Practices

Clinical Social Worker	Care Manager	Care Coordinator
Verify discharge issues	Verify discharge needs	Verify discharge needs
Interact with family and care team	Interact with family and care team	Obtain equipment
Educate on resources	Facilitate resources	Arrange resources
Initiate border letters	Initiate border letters	Research border resources
Assess adjustments to illnesses (social)	Assess adjustments to illnesses (social)	
Evaluate presumptive disability	Evaluate presumptive disability	
Initiate disability letters/FMLA	Initiate disability letters/FMLA	
Arrange patient/family conferences	Arrange patient/family conferences	
Monitor compliance with advance health care directive	Assess adjustments to illnesses (clinical)	
Collaborate with team on alternative care plans	Collaborate with team on alternative care plans	
Plan community resource needs	Plan community resource needs	
	Conduct retrospective reviews on discharged cases	
	Monitor utilization management with payer	
	Evaluate resource utilization opportunities for organizational improvement	
	Negotiate with payers to secure resources for safe patient discharge	
	Facilitate follow-up care with physicians, anticoagulation clinic, and education	
	Arrange follow-up care for unfunded	
	Collaborate with Pharmacy on medication needs for safe discharge	
	Coordinate psychiatric/acute patient transfers	

Note. FMLA = Family and Medical Leave Act.

September 2009 through January 2010 represents the postintervention time period.

Data Abstraction

Data were collected for the study time period on patients discharged from UCI Medical Center and then they experienced a subsequent readmission within 30 days of the index admission. Data collected from UHC exclude chemotherapy, radiation therapy, rehabilitation, dialysis, newborn deliveries, mental diseases, and alcohol and drug use patients. Patient satisfaction scores reflect patients older than 18 years with a hospital admission during the defined study period.

Intervention Periods

Two time periods were evaluated in this study. The diffusion period was April 2009 through August 2009 and represents the period of implementation. Implementation began in April 2009 with full implementation complete by August 2009. The postintervention period was September 2009 through January 2010. This was the period following full implementation of the intervention and represents a period of equal length of time to the diffusion period.

Description of Measures

All-Cause Readmission
All-cause readmission monthly rate calculations were based upon patients aged greater than 18 years who returned to the hospital within 30 days of discharge from the index admission, regardless of the Medicare diagnosis-related group (MS-DRG) of either admission.

Related Readmission
Related readmission monthly rates were limited to patients who returned to the hospital within

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30 days with an MS-DRG related to the index admission.

Analysis

Data Consistency
Trends comparing two data sources for 30-day readmissions during the study time period were evaluated to confirm the observed trends for data collected from the primary data source, UHC. Pearson's *r* (see Table 2) was calculated to evaluate the correlation of monthly UCI 30-day readmission rates from the UHC database to the rates from OSHPD data source.

Interrupted Time Series
An interrupted time series (ITS) analysis (see Table 2) was conducted comparing trends between the diffusion and postintervention periods for both all-cause and related monthly 30-day readmission rates. An autoregressive integrated moving average model (see Table 2) was used to assess the difference in slope

TABLE 2
Glossary of Statistical Terms

Term		Definition
Pearson's *r*	Linear or product moment correlation	Measures the strength of the linear relationship between 2 variables. The correlation coefficient, *r*, ranges from −1 to 1. A value of 0 indicates no association.
ITS	Interrupted time series analysis	A method of statistical analysis to compare time trends before and after intervention.
ARIMA	Autoregressive integrated moving average	ARIMA methodology is applied to stationary time series data to describe movement as a function of autoregressive (AR) and moving average (MA) parameters.
AR	Autoregressive	Assessment of how a data set is related to itself over time.
MA	Moving average	Used as a form of smoothing, by relating what happens in a time period to the random error on the previous time period

From "Interrupted Time-Series Analysis and Its Application to Behavioral Data," by D. P. Hartmann, J. M. Gottman, R. R. Jones, W. Gardner, A. E. Kazdin, and R. S. Vaught, 1980, *Journal of Applied Behavior Analysis*, 13(4), pp. 543-559.

TABLE 3
Comparison of Mean Proportion of 30-Day Readmissions for Diffusion and Postintervention Periods

Readmission Type	Phase	Mean Rate	Mean Difference	SE	average n^a	p
All-cause	Diffusion	11.42	0.931	0.429	1474	0.056
	Post	10.49		0.301	1444	
Related	Diffusion	5.43	0.857	0.271	1474	0.02
	Post	4.58		0.226	1444	

Note. All-cause = patients older than 18 years who returned to the hospital within 30 days of discharge from index admission, regardless of Medicare diagnosis-related group (MS-DRG) of either admission. Related = patients older than 18 years who returned to the hospital within 30 days of discharge from index admission, with an MS-DRG related to the index admission.
Diffusion period = April–August 2009.
Postintervention period = September 2009–January 2010. SE = standard error.
^{a}Average number of cases per month.

between the diffusion and postintervention periods for each measure.

Overall Mean Comparison

Mean 30-day readmission rates for the diffusion and postintervention periods were also compared to assess an overall change in 30-day readmission rates following implementation and diffusion of the intervention. Mean monthly hospital satisfaction scores from the H-CAHPS survey were also assessed as a secondary outcome to determine impact of the service-based model on the patient's satisfaction with regard to recommending the hospital.

RESULTS

Readmission Rates

Pearson's r evaluating the correlation of monthly UCI 30-day readmission rates from the UHC database to the rates from OSHPD data source showed a significant correlation verifying consistency of the observed trends in the primary data source ($r = .9$, $p < .001$).

The ITS analysis for 30-day readmission rates for all-cause and related readmissions showed insignificant negative slope changes comparing diffusion with postintervention periods. An overall reduction

in mean readmission rates for all-cause and related 30-day readmissions was noted from diffusion of intervention to postintervention (see Table 3). A reduction in mean all-cause 30-day readmission from 11.42% to 10.49% readmissions was noted with a significant reduction in the mean related 30-day readmission rate from 5.43% to 4.58% readmissions.

Patient Satisfaction

The ITS analysis performed on monthly patient satisfaction scores for nursing communication showed insignificant slope changes comparing intervention periods. In addition, there was no significant change in overall mean satisfaction between diffusion of intervention and postintervention time periods (see Table 4).

Staffing

Service-based care management typically requires additional staffing due to logistical challenges of services not geographically localized. However, additional staff was not hired for this realignment. As the census increased during the diffusion period of the study due to hospital growth, additional per diem staff supplemented the team as needed. From November 2008 through January 2010, 1.67 additional FTEs were used while the census increased by

TABLE 4
Comparison of Mean Satisfaction Scores for Diffusion and Postintervention Periods

Phase	Mean Rate	Mean Difference	SE	Average n^a	p
Diffusion	78.9	1.08	1.43	185	0.267
Post	77.8		0.86	178	

Note. Satisfaction scores obtained from H-CAHPS survey response to "Recommend the hospital." Diffusion Period = April–August 2009; Postintervention Period = September 2009–January 2010. SE = standard error.
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approximately 25 patients per day (1:15 ratio equivalent; see Figure 1).

DISCUSSION

When faced with limited resources and reductions in reimbursement for readmissions, changing from a unit-based to a service-based care management model assisted with reductions in readmissions without compromising patients' experience of the quality of care. Given the importance of transitions of care, discharge planning is a key focus for reducing readmissions. It is well established that care management is

a field that can effectively assist with discharge planning (Maramba, Richards, Myers, & Larrabee, 2004; Naylor, Aiken, Kurtzman, Olds, & Hirschman, 2011; Simmons, 2005).

Numerous factors lie at the core of the issue of readmissions. For one, studies have shown that there is an important link between clinical quality and the patient experience, referred to as experiential quality (Chandrasekaran, Senot, & Boyer, 2012; Glickman et al., 2010). Chandrasekaran's team found that "CMS process management is positively associated with clinical quality but negatively associated with experiential quality, suggesting a tension between the two healthcare outcomes." When they further explored the link between readmissions and experiential quality among 2,942 hospitals, a significant and much stronger correlation was identified than found with clinical process measures. In addition to experiential quality, factors such as insurance status and LOS greater than 2 days can predict a readmission for medicine service patients (Hasan et al., 2009). Others argue that there are numerous barriers beyond tangible factors. According to an online survey of 51 National Association of Public Hospitals and Health Systems member facilities, one of four categories of barriers to reducing readmissions is "hospital quality of care barriers—systems or processes within a hospital that
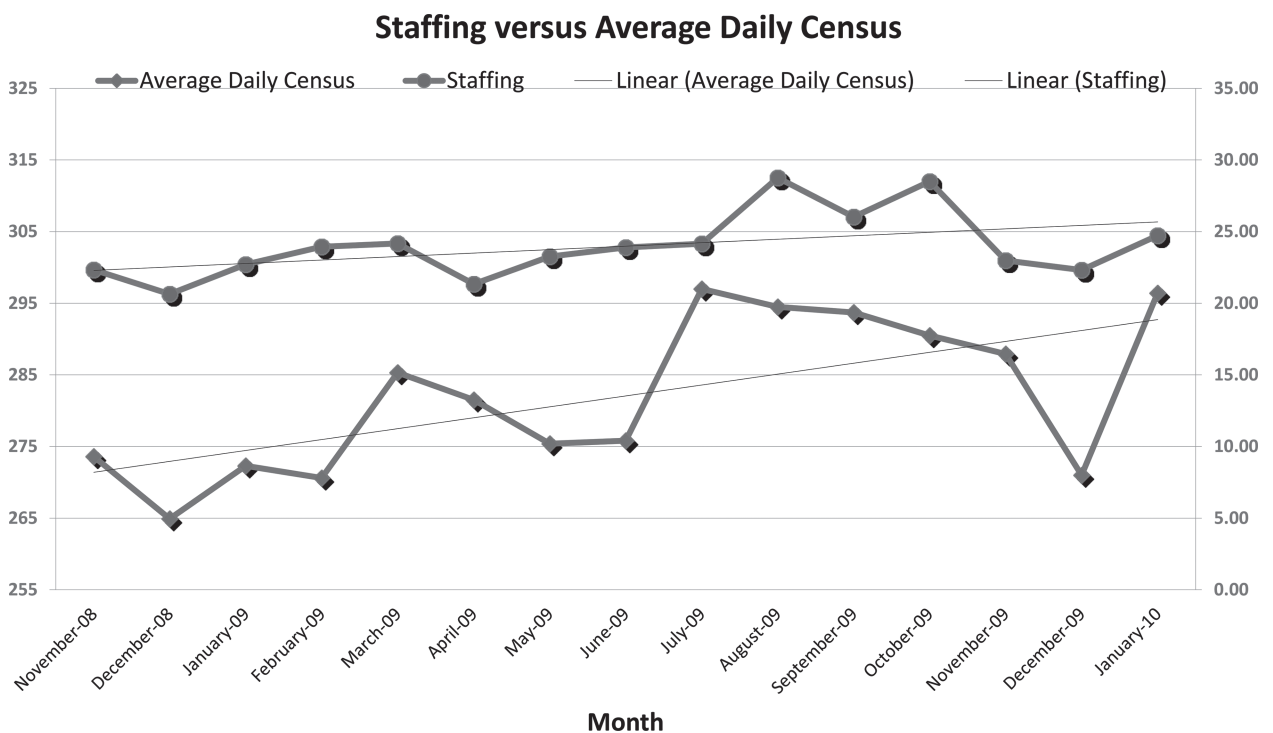

FIGURE 1

Care management staffing versus average daily census for care managers. Staffing, number of care managers during the given month. Average Daily Census, number of cases supported by care managers on average per day during the given month. Preintervention Period, November 2008–March 2009. Diffusion Period, April–August 2009. Postintervention Period, September 2009–January 2010.

directly contribute to poor quality of care for patients (e.g., poor coordination of care)" (Siegel, 2011). Addressing these factors is a viable focus for improvement in the quality of care. Employing care management in patient satisfaction may reduce readmissions and LOS (Patient Satisfaction Planner, 2007).

The Affordable Care Act includes provisions for hospital-level accountability for patients' experience of health care quality. As a community safety-net hospital in southern California, this type of hospital has incurred greater reimbursement reductions due to unfavorable readmission rates (Berenson & Shih, 2012; Joynt & Jha, 2013; Rau, 2012). Extrapolation of these findings to other institution types is limited. However, all hospitals should strive for improved patient experience that service-based care management maintained.

In the age of value-based purchasing, one must question the most appropriate intervention for care management structure and readmission management. Projects RED & BOOST may be less cost-effective to pursue, compared with changing from a unit- to service-based structure.

Factors external to the implementation of the service-based care management model may have contributed to the success, given the organizational focus on improving heart failure, acute myocardial infarction, and pneumonia readmission rates. With the care management team aligned by service, the level of expertise and knowledge of that population's needs resulted in a more proactive approach to discharge planning.

Targeted resource utilization analysis for specific diagnostic-related groups (DRG) and cost of care are currently being evaluated to determine secondary improvements. A Resource Utilization Council employs the expertise of the care management experts to help delineate opportunities for efficiency and effectiveness improvements by DRGs within each service line.

There are several limitations to this study. First, this is a retrospective study, with index cases from a 5-month period. Data stem from a single institution, which may limit its application to other populations. Furthermore, readmissions were considered if both the index and second admission occurred at our institution. Failure to capture a readmission at another institution limits the generalization to larger-scale readmission reduction efforts. Finally, reliance on H-CAHPS scores excludes patients who did not complete the survey and may be an insufficient surrogate for all components of patient satisfaction.

CONCLUSIONS

The presence of care management in patient care is essential to reducing readmissions. Our service-based care management model contributed to reducing related readmissions for all physician service lines despite decreased staffing and without compromising patient satisfaction.

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