Regional Hospital Collaboration and Outcomes in Medicare Heart Failure Patients

See You in 7

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ABSTRACT

OBJECTIVES The objective of this study was to evaluate an interhospital collaborative approach to improve 7-day post-discharge follow-up (7dFU) rates and reduce 30-day readmissions in heart failure (HF) patients.

BACKGROUND Early post-discharge follow-up after HF hospitalization is associated with lower 30-day readmission rates.

METHODS Observational analyses of Medicare HF patients discharged from 10 collaborating hospitals (CH) participating in the Southeast Michigan See You in 7 Collaborative were carried out. We compared pre-intervention (May 1, 2011 to April 30, 2012) and intervention (May 1, 2012 to April 30, 2013) 7dFU rates, unadjusted 30-day readmissions, risk-standardized 30-day readmissions (RSRR), and Medicare payments in CH and Michigan nonparticipating hospitals (NPH).

RESULTS 7dFU rates increased but remained low in both groups (CH: 31.1% to 34.4%; p < 0.001; NPH: 30.2% to 32.6%; p <0.001). During the intervention period, unadjusted readmissions decreased significantly in both groups (CH: 29.0% to 27.3%; p <0.001; NPH: 26.4% to 25.8%, p = 0.004); mean RSRR decreased more in CH than in NPH (CH: 31.1% to 28.5%; p < 0.001; NPH: 26.7% to 26.1%, p = 0.02; p = 0.015 for intergroup comparisons). Findings were similar when CH outcomes were matched 1:1 with similar NPH outcomes. Combined Medicare payments for inpatient and 30 days of post-discharge care decreased by $182 in CH and by $63 in NPH (per eligible HF discharge).

CONCLUSIONS See You in 7 Collaborative participation was associated with significantly lower 30-day readmissions and Medicare payments in HF patients. Increases in 7dFU were modest, but associated processes aimed at this goal may have improved the transition from inpatient to outpatient care. Regional hospital collaboration to share best practices could potentially reduce HF readmissions and associated costs. (J Am Coll Cardiol HF 2015;3:765–73) © 2015 by the American College of Cardiology Foundation.

Heart failure (HF) affects more than 5 million adults and is the leading cause of hospitalizations among those 65 years of age and older in the United States (1). For patients hospitalized with HF, readmissions following hospital discharge are common and can indicate health care inefficiencies (2,3). The Medicare Payment Advisory Commission estimates that preventable readmissions account for at least $12 billion of Medicare annual spending (3,4). Approximately 50% of readmissions are possibly or probably preventable (5), with potentially remediable factors including inadequate transitions from inpatient to outpatient care (3). To address these issues, the American College of Cardiology and the Institute for Healthcare Improvement launched the national Hospital-to-Home Initiative in 2009.

Hospital-to-Home aimed to reduce 30-day, all-cause, risk-standardized readmission rates for patients discharged with HF or acute myocardial infarction by creating a rapid learning community where experts and clinical providers at multiple levels of care shared best practices (6). One area of focus for Hospital-to-Home is promoting early post-discharge outpatient follow-up, which is associated with lower risk for 30-day readmissions in HF patients (7).

In 2011, the Greater Detroit Area Health Council, the American College of Cardiology's Michigan Chapter, the Michigan Peer Review Organization (Michigan's Quality Improvement Organization), and 11 previously nonaffiliated hospitals teamed up to establish the Southeast Michigan See You in 7 (SY7) Collaborative, with the common goals of increasing 7-day post-discharge follow-up and reducing all-cause 30-day readmission rates in HF patients (7). In this study, we examined the relationship between SY7 Collaborative participation and rates of 7-day follow-up and 30-day readmissions in Medicare fee-for-service HF patients discharged from collaborating hospitals (CH) and compared these findings to statewide trends in the remaining 82 Michigan nonparticipating hospitals (NPH).

METHODS

HOSPITAL RECRUITMENT AND GROUP DEFINITIONS. In 2011, the Greater Detroit Area Health Council conducted open recruitment of hospitals in Southeast Michigan for the SY7 Collaborative by using recruitment letters, teleconferences, and scheduled face-to-face meetings with stakeholders to discuss the expectations of the project. As a result, 11 urban and suburban acute care hospitals, including large teaching (n = 7), large nonteaching (n = 3), and medium urban (n = 1) hospitals, enrolled in the year-long program. A large Veterans Affairs teaching hospital participated in the collaborative activities, but because comparable data outcomes could not be obtained through the Michigan Peer Review Organization, only nonfederal hospitals were included in this analysis. Michigan Peer Review Organization privately provided CH with quarterly 7-day follow-up and 30-day readmission data. Each institution was de-identified, and only aggregate data were reported to participants.

INTERVENTION AND INTENDED IMPROVEMENT. The intervention period was divided into 3 phases over a period of 1 year: pre-implementation (May 1, 2012, through July 31, 2012), test-intervention (August 1, 2012, through January 31, 2013), and evaluation (February 1, 2013, through April 30, 2013). Table 1 shows the timeframes, scheduled activities for the collaborative, and the evaluation plan. Over the 12-month intervention period, See You in 7 Collaborative activities included quarterly face-to-face meetings and several telephone conferences/webinars, and participating hospitals submitted a total of 8 assignments for review and discussion.

During the pre-implementation phase, CH reviewed baseline data, conducted "gap analysis," identified process improvement measurements, and selected strategies from the Hospital-to-Home See You in 7 toolkit (6). During the test-intervention period, on the basis of hospital-specific gap analysis, each collaborating hospital selected 1 or several of the 7 care process goals (Table 1) from the toolkit to focus efforts and measure progress. Once these metrics were identified, CH conducted gap analyses of their current care processes to identify areas of need and then designed and implemented institution-specific quality improvement plans. During the evaluation phase, CH continued implementation of quality improvement processes and received feedback from Michigan Peer Review Organization on 7-day follow-up and 30-day readmissions. Further information on See You in 7 structure is provided in Online Table 1 and in a recently published paper describing the Collaborative's process (8).

Specified evaluation metrics for the See You in 7 Collaborative consisted of changes between the pre-intervention (May 1, 2011, through April 30, 2012) and the intervention (May 1, 2012, through April 30, 2013) periods in 7-day follow-up and unadjusted 30-day readmission rates for HF patients discharged from CH. Preliminary results for these metrics have recently been reported (8). For the current study, we also calculated and examined changes in mean risk-standardized 30-day all-cause readmission rates (RSRR) and then evaluated differences in these rates among CH, NPH, and matched NPH (see below for information on matching). We also compared unadjusted 30-day readmission rates and mean RSRRs for patients with and without 7-day follow-up visits.

OUTCOME DEFINITIONS AND DATA ACQUISITION. We linked Medicare fee-for-service standard analytic inpatient and enrollment files to outpatient claims by using beneficiary health insurance identification codes to identify eligible discharges, determine 7-day follow-up rates, and calculate all-cause 30-day readmission rates for the period May 1, 2011, through April 30, 2013. Eligible discharges were

TABLE 1 Southeast Michigan See You in 7 Collaborative Time Periods, Methods, Tools, and Evaluation Plan

Focus	Methods/Tools	Evaluation Plan	Meetings
Pre-implementation period May–July 2013	Hospitals: establish collaborative partnerships among hospitals serving Southeast Michigan beneficiaries Hospital-to-Home SY7 toolkit Planning team activity Pre-implementation data submission CH selection of SY7 process measures	Gap analysis	Kickoff meetings 2 Conferences calls/webinars
Test intervention period Aug–Jan 2013	SY7 Toolkit process goals: Identify HF patients before discharge; Schedule and document a follow-up visit with cardiologist or PCP that takes place within 7 days of discharge Provide all patients with documentation of the scheduled follow-up appointment Identify and address barriers to keeping appointment Ensure all HF patients arrive at scheduled appointment within 7 days of discharge. Make discharge summary available to follow-up health care providers for all HF patients. Planning Team Activity Collaborative hospitals shared best practices. Quarterly progress reports	Proportion of HF patients identified before discharge Proportion of discharges with scheduled 7-day follow-up visit with cardiologist or PCP Proportion of patients with documentation of 7-day follow-up appointments Follow-up phone calls or risk assessments conducted to identify barriers Proportion of patients who had 7-day follow-up appointments scheduled Proportion of patients who kept scheduled 7-day follow-up appointments. Proportion of discharge summaries transferred to PCP within 24 h of discharge.	2 Quarterly meetings 4 Conferences calls/webinars
Evaluation period February–April 2013	Data and information–Medicare fee-for-service claims data, aggregate, and hospital-level descriptive readmission and 7-day follow-up reports Policy: Hospital comparison Reporting: Hospital-wide Lessons learned and shared among CH Quarterly progress reports Post-implementation data submission	Continued assessment and improvement based on rates of 7-day follow-up	2 Conferences calls/webinars 1 Quarterly meeting

CH = collaborating hospitals; HF = heart failure; PCP = primary care provider; SY7 = See You in 7.

defined as those who received a diagnosis of HF as determined by International Classification of Diseases-9th Revision-Clinical Modification (ICD-9-CM) codes. ICD-9-CM codes were identical to those used by the Centers for Medicare and Medicaid Services Hospital Compare public reporting program for HF patients (9). We included all Medicare fee-for-service and dual eligibility claims. Provider certification numbers were used to extract and aggregate 7-day follow-up and 30-day readmission rates. We used patient-level Medicare payment data to estimate HF-related costs at CH and NPH.

A 7-day follow-up visit was defined as claims identified for any physician outpatient visit within 7 days of discharge for HF patients regardless of provider type. All-cause 30-day readmission was defined as eligible discharges that were readmitted to the same or different hospital for any diagnosis within 30 days of discharge. Multiple readmissions within 30 days were captured in this measurement, as each readmission counted as an index admission, and a subsequent admission within a 30-day period was counted as a readmission for the previous claim. Admissions involving beneficiaries who expired during inpatient hospitalization were readmitted for rehabilitation services, had less than 30-day Medicare fee-for-service enrollment post-inpatient discharge, or were transferred on the day of discharge to another

acute care or critical access hospital were excluded from analysis.

ANALYSIS METHODS. Descriptive statistics were used to describe demographic characteristics and key clinical variables of the sample. The chi-square test was conducted to test for changes in 7-day follow-up and unadjusted 30-day readmission rates between the pre-intervention and intervention periods for CH and NPH. Within-group RSRR were compared between pre-intervention and intervention, using paired Student *t* tests. Intergroup RSRR were compared between CH and NPH, using 2-sample *t*-tests. Throughout the analyses, the p level of 0.05 on a 2-sided design-based test represented the cutoff value for assessing statistical significance. All analyses were conducted with SAS version 9.13 software (SAS Institute Inc., Cary, North Carolina).

The HF cohorts were risk-standardized using the Centers for Medicare and Medicaid Services claims-based model, used for public reporting of RSRR. This hierarchical logistic regression modeling strategy accounted for within-hospital correlation of observed readmission rates and reflected the assumption that, after adjustment for patient risk and sampling variability, the remaining variation was due to hospital quality. RSRR were obtained as the number of "predicted"-to-number of "expected" readmissions ratio, multiplied by the Michigan

unadjusted readmission rate for the time period in question. The predicted number of readmissions for each hospital was estimated by using the risk model given its own patient mixture and with its own hospital-specific intercept. The expected number of readmissions for each hospital was estimated with its own patient mixture and the average hospital-specific intercept based on all hospitals in our sample (9,10).

In order to estimate the economic impact of See You in 7 Collaborative participation, we defined the total number of readmissions prevented for each hospital by multiplying the absolute percentage of reduction in 30-day readmissions between the pre-intervention and intervention periods by the total number of eligible HF discharges during the intervention period. We calculated cost savings related to readmission by multiplying the average Medicare payment per HF hospitalization by the number of readmissions prevented at that hospital during the intervention period. To evaluate outpatient costs at each hospital, we derived the change (between the pre-intervention and intervention periods) in average Medicare outpatient payments over the first 30 days after hospital discharge. We multiplied this change in outpatient payments by the total number of eligible HF discharges at that hospital during the intervention period.

ADDITIONAL ANALYSES. We performed several additional analyses to clarify our results. First, although Hospital-to-Home recommends follow-up within 7 days of hospital discharge, follow-up within 14 days is also associated with reduced 30-day readmission rates (6,8). We obtained 14-day follow-up rates for all hospitals and evaluated associations with 30-day readmission rates as above. Hospitalized older adults are at high risk for adverse events that could be reduced through hospital-wide efforts to improve care transitions regardless of admitting diagnosis (11). Therefore, we evaluated whether See You in 7 Collaborative participation, an HF patient-specific hospital-wide effort, affected readmission rates for non-HF diagnoses.

Finally, we re-analyzed HF outcomes at the CH and 1:1-matched NPH, using Blue Cross Blue Shield hospital peer group categories to match hospitals within the same geographic region having similar size, teaching status, patient demographics, and HF patient volume. We compared 7-day follow-up rates, unadjusted 30-day readmission rates, and RSRR between CH and matched NPH as described above.

RESULTS

DESCRIPTIVE CHARACTERISTICS. Approximately 20% of statewide 30-day HF readmissions at baseline were from the CH, indicating a prime opportunity to make an impact on readmission reduction. Each collaborating hospital chose at least 2 See You in 7 toolkit process goals (**Table 1**), with the overall breakdown, as follows: 9 hospitals chose scheduling 7-day follow-up visits; 6 hospitals chose providing 7-day follow-up appointment documentation, assessing and addressing barriers to 7-day follow-up, and confirming that 7-day follow-up appointments were attended; 5 hospitals chose making discharge summaries available to outpatient providers; and 4 hospitals chose identification of HF patients early in the hospital stay.

Table 2 contains information on the eligible HF discharges and patient exclusions for the study sample at CH and NPH during both study periods. Of note, in-hospital mortality did not significantly change between the pre-intervention and intervention periods. For the 10 CH, the number of eligible HF discharges ranged from 1,203 to 4,359, and in the 10 matched NPH, from 1,046 to 6,636 discharges. The ranges of unadjusted 30-day readmission rates during the pre-intervention period were similar for CH and matched NPH (25.5% to 32.7% vs. 24.8% to 34.2%, respectively). **Table 3** shows key demographic and

TABLE 2	Eligible Heart Failure Discharges at Collaborating and Nonparticipating Hospitals							
		Total Sample With HF					**Final Sample**	
Hospital Group or Time Interval	No. of Hospitals	N	Age <65 yrs	% of In-Hospital Deaths	% of Transfers Out	% of Discharge AMA	n	% of Total
CH pre-intervention	10	28,238	14.98%	3.63%	1.39%	0.59%	26,744	94.7
CH intervention	10	26,358	14.89%	3.91%	1.56%	0.56%	24,849	94.3
NPH pre-intervention	82	100,866	16.68%	4.30%	2.12%	0.64%	93,928	94.5
NPH intervention	82	99,391	16.60%	4.42%	2.14%	0.62%	92,321	92.9
Matched NPH pre-intervention	10	28,722	16.64%	3.79%	1.55%	0.61%	27,049	94.2
Matched NPH intervention	10	27,350	16.03%	3.74%	1.62%	0.59%	25,709	94.0

AMA = against medical advice; CH = collaborating hospitals; HF = heart failure; NPH = nonparticipating hospitals.

TABLE 3 Selected Demographic and Clinical Characteristics at Collaborating and Nonparticipating Hospitals

Population Segment		CH Total Discharges Eligible for Readmission		NPH Total Discharges Eligible for Readmission	
		Pre-Intervention	Intervention	Pre-Intervention	Intervention
Race	White	19,617 (73.35)	17,999 (72.43)	72,709 (77.41)	71,451 (77.39)
	Black	6,677 (24.97)	6,294 (25.33)	19,115 (20.35)	18,724 (20.28)
	Other	450 (1.68)	556 (2.24)	2,104 (2.24)	2,146 (2.32)
Age	<65 yrs	3,974 (14.86)	3,687 (14.84)	15,559 (16.56)	15,201 (16.47)
	65-74 yrs	6,333 (23.68)	6164 (24.81)	23,868 (25.41)	24,186 (26.20)
	>75 yrs	16,437 (61.46)	4,511 (27.44)	54,501 (58.02)	52,934 (57.34)
Sex	F	15,474 (57.86)	14,145 (56.92)	52,122 (55.49)	50,853 (55.08)
	M	11,270 (42.14)	10,704 (43.08)	41,806 (44.51)	41,468 (44.92)
Length of index admission	<4 days	9,264 (34.64)	8,712 (35.06)	33,667 (35.84)	32,915 (35.65)
	4–8 days	12,297 (45.98)	11,441 (46.04)	41,399 (44.08)	41,372 (44.81)
	>8 days	5,183 (19.38)	4,696 (18.90)	18,862 (20.08)	18,034 (19.53)
No. of admissions in the previous 3 months	0	13,808 (51.63)	13,335 (53.66)	51,502 (54.83)	51,531 (55.82)
	1	7,433 (27.79)	6,902 (27.78)	25,396 (27.04)	24,883 (26.95)
	2	3,439 (12.86)	2948 (11.86)	10,721 (11.41)	10,338 (11.20)
	>2	2,064 (7.72)	1664 (6.70)	6,309 (6.72)	5,569 (6.03)
Total		26,744	24,849	93,928	92,321

Values are n (%).

CH = collaborating hospitals; NPH = nonparticipating hospitals.

clinical characteristics for the CH and NPH. On average, the CH cared for an older patient population than the NPH did, with a slightly higher proportion of female and minority patients. Additional information on HF patient comorbidities and clinical characteristics relevant to the RSRR risk model is contained in Online Table 2.

7-DAY FOLLOW UP AND 30-DAY READMISSION RATES. The primary findings of the study are shown in Table 4. The See You in 7 Collaborative's primary process goal was to improve 7-day follow-up rates between the pre-intervention and intervention periods. Modest but statistically significant increases in 7-day follow-up, as well as in 14-day follow-up, occurred in both the CH and the NPH during the intervention time period.

In the CH, unadjusted 30-day readmissions were substantially more common than in the NPH during the pre-intervention period (chi-square test = 72.57; p < 0.001) but similar to those in matched NPH (chi-square test = 3.56; p = 0.06). The unadjusted 30-day readmission rate in HF patients significantly decreased during the intervention period in CH (p < 0.001) and statewide NPH (p = 0.004) but not in matched NPH (p = 0.06). Thirty-day readmission rates were lower in non-HF patients and decreased similarly in all 3 hospital groups during the intervention period (CH: 18.8% to 18.1%; NPH: 17.4% to 16.8%; matched NPH: 19.6% to 18.9%).

HOSPITAL 30-DAY RISK-STANDARDIZED READMISSION RATES. The overall discrimination of the RSRR model was similar to that in the original derivation cohort, with a C statistic of 0.60 for 30-day readmission in both time periods at CH and NPH (Table 4). As with unadjusted 30-day readmission rates, RSRR in CH were higher at baseline than in the NPH but comparable to those in matched NPH. The mean RSRR for the CH decreased significantly during the intervention period (relative improvement ratio [RIR]: 8.3%; p < 0.001). In NPH, the mean RSRR also improved slightly during the intervention period (RIR: 2.5%; p = 0.02) but significantly less so than in CH (p = 0.015). Mean RSRR did not significantly decline during the intervention period in matched NPH (RIR: 3.6%, p = 0.32).

When mean RSRR was weighted by each contributing hospital's number of eligible HF discharges, during the intervention period, the RSRR gap between CH and NPH narrowed, and that between collaborating and matched NPH further widened (Table 4). Figure 1 demonstrates that RSRR decreased in all CH during the intervention period. Individually, the NPH had various changes in RSRR.

RELATIONSHIP BETWEEN FOLLOW-UP AND 30-DAY READMISSION. As seen in Table 4, unadjusted 30-day readmission rates for patients with 7-day follow-up were significantly higher than those who did not attend 7-day follow-up appointments.

TABLE 4 Follow-Up and 30-Day Readmission Rates in Collaborating, Nonparticipating, and Matched Nonparticipating Hospitals

Rate	CH		NPH		Matched NPH	
	Pre-Intervention	Intervention	Pre-Intervention	Intervention	Pre-Intervention	Intervention
Post-discharge follow-up						
7-day follow-up*	31.1%	34.4%§	30.2%	32.6%§	31.5%	33.8%§
14-day follow-up*	47.2%	50%§	46.3%	47.9%§	47.3%	48.7%‖
Overall 30-day readmission						
Unadjusted 30-day readmission*	29.0%	27.3%§	26.4%	25.8%‖	29.8%	28.9%‖
Mean 30-day RSRR§	31.1%	28.5%§	26.7%	26.1%‖	31.0%	29.9%
Weighted 30-day RSRR*	30.7%	28.2%	28.5%	27.4%	31.1%	29.9%
Readmission by follow-up status						
Mean RSRR with 7-day follow-up†	31.1%	28.5%	26.7%	26.1%	31.0%	29.9%
Mean RSRR with no 7-day follow-up†	31.1%	28.5%	27.0%	26.0%	31.0%	29.9%
Mean RSRR with 14-day follow-up†	31.1%	28.5%	26.7%	26.1%	31.0%	29.9%
Mean RSRR with no 14-day follow-up†	31.1%	28%	27.0%	26.0%	31.0%	29.9%
Inter-group comparison						
Pre-post Δ mean RSRR‡	0.0259		0.0065¶		0.0112¶	
Pre-post Δ mean RSRR, with 7-day follow-up‡	0.026		0.0064¶		0.0111¶	

Pre-post comparison. *for chi-square test results. †for 2-sample *t*-test results. ‡inter-group comparison for 2-sample *t*-test comparison with CH group. §p < 0.001. ‖p < 0.01. ¶p < 0.05.

CH = collaborating hospitals; NPH = nonparticipating hospitals; RSRR = risk-standardized readmission rate.

However, risk-standardization eliminated those baseline readmission rate differences between patients with and those without 7-day follow-up in all 3 hospital groups. Moreover, within each hospital group, improvements in mean RSRR during the intervention period were nearly identical whether or not patients attended 7-day follow-up visits. Results were similar for 14-day follow-up, that is, baseline RSRR and reductions in RSRR during the intervention were unrelated to whether or not patients attended 14-day follow-up appointments.

MEDICARE PAYMENTS FOR CARE. Total Medicare payments for acute HF care and post-discharge outpatient care decreased substantially between the pre-intervention and intervention periods at the 10 CH, with overall reduction of $4.5 million ($451,000 per hospital). In the much larger group of 82 NPH, Medicare payments decreased $5.8 million ($70,000 per hospital) over the same time period. The average decrease in Medicare payment per discharged Medicare HF beneficiary was $182 at CH and $63 at NPH.

DISCUSSION

The Southeast Michigan See You in 7 Collaborative aimed to increase rates of early outpatient follow-up after HF hospital discharge and reduce 30-day readmission rates in Medicare HF patients. In our analysis, See You in 7 Collaborative participation was associated with only modest improvement in early post-discharge follow-up rates. Both CH and NPH

reduced readmissions during the intervention period, likely influenced by federal financial penalties for excessive readmissions that took effect in 2013. However, 30-day readmission rates and overall Medicare payments for HF care decreased substantially more in CH than statewide nonparticipating hospital comparators.
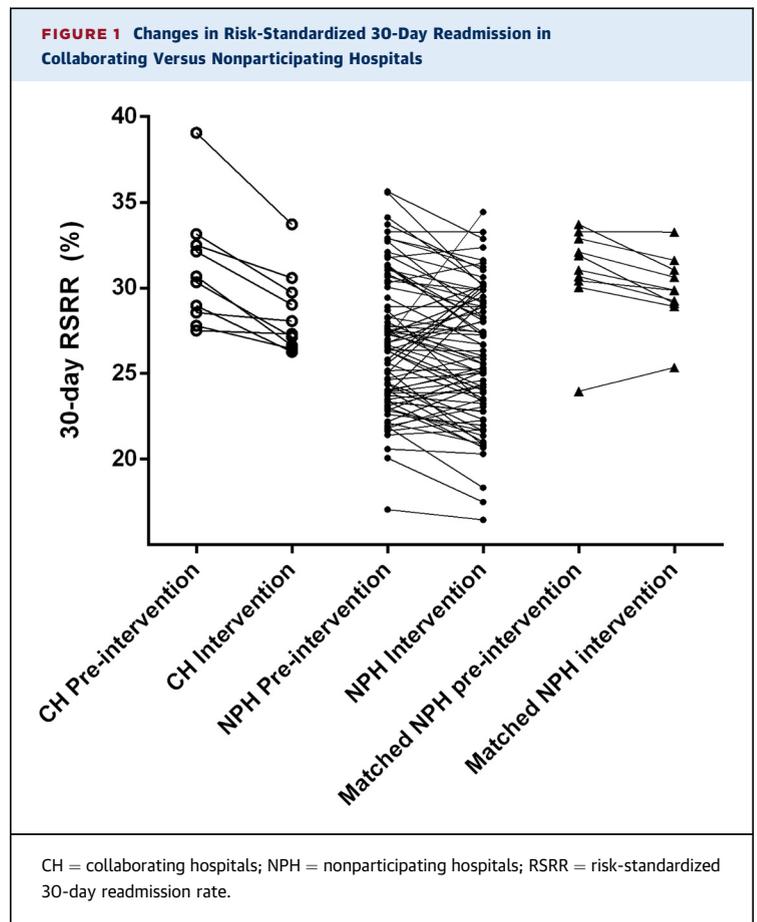
In recent years, national trends toward shorter hospital lengths of stay in complex patients with multimorbidity illnesses have been associated with increased 30-day all-cause readmission rates [12]. Recently implemented financial penalties for excessive readmissions have focused attention on preventable causes of rehospitalization. According to the American Heart Association and American College of Cardiology, an early post-acute follow-up visit following an inpatient HF discharge can reduce preventable readmissions [13]. However, even at higher-performing hospitals, most Medicare HF patients are not evaluated by a physician within 7 days of hospital discharge [7].

The regional See You in 7 Collaborative effort engaged providers from neighboring, and often directly competing, health systems serving HF patients at several levels of care. The Collaborative created a multidisciplinary learning and action network designed to test best practices, quantify findings, share information, and spread evidence. Despite these extensive efforts, 7-day follow-up rates at CH during the intervention period remained below the national median of 38%, and increases in 14-day

follow-up were similarly small (7). Our observations clearly illustrate the significant challenge of coordinating early post-acute care follow-up. We speculate that interhospital collaboration did not produce the desired improvements because individual hospitals can face entirely different barriers to 7-day follow-up (e.g., insufficient outpatient provider availability, communication with and between multiple separate outpatient practice settings, and different patient and community characteristics).

Previous root-cause analysis among the Southeast Michigan recruited communities has identified several obstacles to timely follow-up care following HF hospitalization. Individual and system barriers in this region include lower health care access (14), lack of transportation, and poorer patient activation, all underlying determinants of poor health. The Medicare patient mixture in the CH included a larger proportion of dual eligibility beneficiaries than that in the state as a whole. Hospitals in this area also serve more patients with complex health care and socioeconomic needs. Other causes include clustering of multiple health systems within close proximity yet poor designation of primary care providers and access to specialists. Patients in this region often bounce between hospitals, increasing the likelihood of poor care coordination after hospital discharge. These same challenges to 7-day follow-up also increase the risk for 30-day readmission (15).

By working to address the Hospital-to-Home See You in 7 toolkit process goals in an iterative and collaborative manner, CH self-identified deficient areas, learned potentially useful strategies from peer hospitals, and appointed champions to implement and evaluate solutions in the context of a multidisciplinary team. For example, the collaborating hospital established methods to prospectively identify hospitalized patients with HF early in the hospital stay, for example, by tracking admitting diagnosis of shortness of breath and administration of diuretic therapy in the emergency department or during the first hospitalization day, obtaining updates from regular case management meetings, and incorporating multidisciplinary rounds. After identifying patients, the collaborative hospitals worked to increase direct interaction between outpatient team members, patients, and families during the hospital stay in order to assess barriers to early follow-up. Many CH incorporated discharge summaries into the electronic medical records, and patients were provided with copies of their discharge summaries to take with them to their first outpatient appointment. A designated staff member at CH followed up with the patients and outpatient providers to document

FIGURE 1 Changes in Risk-Standardized 30-Day Readmission in Collaborating Versus Nonparticipating Hospitals

CH = collaborating hospitals; NPH = nonparticipating hospitals; RSRR = risk-standardized 30-day readmission rate.

successful 7-day follow-up visits or investigate reasons why the appointment did not take place. Overall, this process engaged patients and caregivers and helped both sides better understand barriers to care and address them before and after discharge. These efforts likely enhanced care coordination for the medically and socioeconomically vulnerable Medicare HF patients served by the CH and might have contributed to the observed decreases in 30-day readmission.

One additional finding of our analysis merits further discussion. Early post-discharge follow-up is described by Hospital-to-Home as an evidence-based strategy to reduce readmissions (6). Although hospitals in the highest quartile of 7-day follow-up rates tend to have lower 30-day readmission rates (7), no previous multicenter studies have reported the direct effects of early follow-up on RSRR. Previous research suggests that the timing of early post-discharge outpatient visits is confounded by severity of illness (16). Indeed, we observed consistently higher unadjusted 30-day readmission rates in patients presenting for 7-day follow-up than in those who did not have early follow-up.

Reduction in 30-day readmission rates could occur without substantially increasing the number of 7-day follow-up visits if higher-risk HF patients were specifically targeted for early discharge follow-up. Recognizing that post-discharge resources are limited, Amarasingham et al. (17) recently reported impressive results with this strategy. In our study, CH used a variety of methods to identify high-risk HF patients who might benefit from 7-day follow-up, including previously published instruments such as the BOOST (Better Outcomes for Older adults through Safe Transitions) tool, previously associated with readmission reduction in a multihospital collaborative (18). However, following risk standardization with the model currently used for public reporting, 30-day readmission rates were identical pre-intervention and decreased identically during the intervention regardless of whether patients attended a 7-day follow-up visit. This finding was remarkably consistent across CH, NPH, and matched NPH (Table 4), suggesting that other aspects of care beyond simply attending a 7-day follow-up appointment contributed to readmission reduction at CH.

STUDY LIMITATIONS. Administrative data sets were used to calculate the outcomes of interest: 7-day follow-up, 30-day readmission, and cost. Administrative data do not provide information on the functional status of beneficiaries, severity of illness, or quality of care delivered by the post-hospital care provider(s). We did not have financial data beyond Medicare payments, and our analysis therefore does not include non-Medicare-related expenditures by hospitals aimed at HF readmission reduction.

The limitations of observational analyses must be considered, including bias due to unmeasured confounding variables and lack of random assignment for the intervention and comparison groups. These limitations are similar to those of other observational studies. In order to reduce these biases as much as possible, we also evaluated outcomes at closely matched NPH. We compared multiple outcomes between hospital groups, making a type I error (incorrect rejection of the null hypothesis) more probable. However, given the consistent nature of the observed differences between hospital groups across these outcomes (Table 4), type I error seems unlikely to completely explain our findings.

The open recruitment nature of the project introduced selection bias. Recruited hospitals that chose not to participate cited competing priorities, reduced revenue, and limited staff and time as barriers to participation. As seen in the baseline data, CH presented higher baseline early follow-up rates and 30-day readmission rates than NPH. As such, the CH may be characterized as highly motivated and possessing increased readiness to address the problem compared to other hospitals. In addition, higher baseline rates present an opportunity for regression to the mean rather than true improvement. However, 1:1-matched NPH in the same geographic region had similar baseline 7-day follow-up rates, unadjusted 30-day readmission rates, and RSRR but did not experience similar declines in readmission during the intervention period.

Given the observational nature of the study, we cannot confirm that improvements in 7-day follow-up or 30-day readmission rates directly resulted from See You in 7 Collaborative participation. As each hospital created an individualized plan based on gap analysis of shortcomings and resources, we are unable to formally report the degree of exposure of the intervention components in the CH. Our results may not be generalizable to hospitals outside of the study sample.

CLINICAL IMPLICATIONS. Despite an intensive and sustained multidisciplinary effort, the Southeast Michigan See You in 7 Collaborative only modestly improved 7-day follow-up rates for hospitalized Medicare HF patients beyond secular trends. These disappointing results do not support interhospital collaboration focused specifically on this goal. However, Collaborative data on readmission rates were more promising, as the absolute decrease in 30-day RSRR during the intervention period was 4 times greater in CH than in NPH and twice as great at CH as in closely matched NPH. Reductions in RSRR in all hospital groups were unrelated to whether or not patients had 7-day follow-up, suggesting that other improvements in care coordination were responsible. Further study is needed to clarify the most helpful aspects of interhospital collaboration, assess the sustainability of readmission reduction following participation, and understand the optimal resource allocation to 7-day follow-up versus other aspects of the post-discharge transition.

CONCLUSIONS

Hospital participation in the Southeast Michigan See You in 7 Collaborative was associated with substantial reductions in 30-day readmission rates and Medicare payments related to HF care. Increases in post-discharge 7-day follow-up were modest, but associated processes aimed at this goal may have

improved the overall transition from inpatient to outpatient care. Our study suggests that regional hospital collaboration to share best practices can be an effective strategy to reduce HF readmissions and associated costs.

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PERSPECTIVES

COMPETENCY IN MEDICAL KNOWLEDGE: An inter-hospital collaborative approach only modestly increased early post-discharge follow-up from heart failure hospitalization, but was associated with substantial reductions in 30-day readmission rates and Medicare payments. Collaborating hospitals performed system-specific gap analysis to identify challenges and limitations in processes related to transitions of care, then implemented and evaluated quality improvement measures recommended by the national Hospital-to-Home initiative.

TRANSITIONAL OUTLOOK: Each collaborating hospital developed its own targets and strategies for improvement based on its specific needs and resources. Further study is needed to determine which aspects of the collaborative process would be helpful in other regions and patient populations.

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KEY WORDS care transitions, heart failure, outcomes, readmissions

APPENDIX For supplemental tables, forms, and phases, please see the online version of this article.