ORIGINAL RESEARCH

Impact of Structured Interdisciplinary Rounds on Teamwork on a Hospitalist Unit

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Funding support received from Northwestern Memorial Hospital.

Disclosure: Nothing to report.

This article was published online on July 13, 2010. Some errors were subsequently identified. This notice is included in the online and print versions to indicate that both have been corrected January 19, 2011.

BACKGROUND: Collaboration and teamwork are essential to deliver high quality patient care. Though teamwork is often suboptimal in the inpatient setting, Structured Inter-Disciplinary Rounds (SIDR) has improved nurses' ratings of collaboration and teamwork on a medical teaching unit.
OBJECTIVE: We sought to assess the impact of SIDR on nurses' ratings of collaboration and teamwork on a medical unit staffed by hospitalists.
METHODS: We conducted a controlled trial involving intervention and control inpatient general medical units staffed by hospitalists. On the intervention unit, nurses and physicians participated in SIDR daily using a standardized communication tool. Unit nurses rated the quality of communication and collaboration with hospitalists using a 5-point ordinal scale. Teamwork and safety climate was also assessed using a previously validated instrument. We used multivariable regression analyses to determine the impact of SIDR on length of stay (LOS) and cost using both a concurrent and historic control.
RESULTS: A total of 49 of 58 (84%) nurses completed surveys. More nurses rated the quality of communication and collaboration with hospitalists as high or very high on the intervention unit compared to the control unit (80% vs. 54%; $P = 0.05$). The teamwork and safety climate was rated significantly higher by nurses on the intervention unit ($P = 0.008$ and $P = 0.03$ for teamwork and safety climate, respectively). Multivariable analyses demonstrated no difference in the adjusted LOS and an inconsistent effect on cost.
CONCLUSIONS: SIDR improved nurses' ratings of collaboration and teamwork with hospitalists. No impact on LOS and cost was seen. ***Journal of Hospital Medicine*** **2011;6:88–93.** © *2011 Society of Hospital Medicine.*

KEYWORDS: teamwork, patient safety, communication, hospitalist.

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Delivery of safe, high quality care requires adequate communication among healthcare team members.[1–5] Yet, research documents that nurses and physicians in the hospital do not communicate consistently and frequently disagree on their patients' plans of care.[6,7] Nurses and physicians have discrepant views on the quality of collaboration according to research conducted in operating rooms (ORs), intensive care units (ICUs), and general medical units.[8–10] Although physicians typically rate the quality of collaboration highly, nurses perceive the degree of collaboration with physicians differently and rate the quality of it as relatively poor.

Unlike ORs and ICUs, physicians, nurses, and other healthcare professionals working on general medicine units are usually not in the same location for extended periods of time, and thus often encounter barriers to discussing the care of their patients in person.[10] Interdisciplinary Rounds (IDR) serve as one option to assemble patient care unit team members to collaborate on a patient's plan of care.[11–14]

Use of IDR has been associated with improved ratings of collaboration on the part of physicians,[13,14] but these studies did not adequately assess the effect of IDR on nurses' ratings of collaboration and teamwork. One IDR study did not assess nurses' perceptions,[13] while others used instruments not previously described and/or validated in the literature.[12,14] Previous studies also indicate variable effects of IDR on length of stay (LOS) and cost with 2 studies finding a reduction in LOS and cost with the use of IDR,[12,13] while another did not.[15] Furthermore, all these prior studies evaluated the use of IDR on resident-covered teaching services. The effect IDR has on collaboration, LOS, and cost in a nonteaching hospitalist service setting is not known.

We recently reported on the use of Structured Inter-Disciplinary Rounds (SIDR) on a resident covered teaching service unit.[16] SIDR combines a format for structured

2011 Society of Hospital Medicine DOI 10.1002/jhm.714
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communication with regular interdisciplinary meetings. SIDR was well received by healthcare professionals and resulted in improved ratings of collaboration and teamwork on the part of nurses.[16] For the current study, we sought to assess the impact of SIDR on nurses' ratings of collaboration and teamwork on a general medicine unit staffed by hospitalists. Additional goals included the assessment of the feasibility and sustainability of the intervention as well as the impact on hospital LOS and cost.

Methods

Setting and Study Design

We conducted the study at Northwestern Memorial Hospital (897-bed tertiary care teaching hospital in Chicago, IL) over a 24 week study period beginning in August 2008. This controlled trial implemented SIDR on a 30-bed medicine unit randomly selected for the intervention, while a similar 30-bed unit served as the control. The Institutional Review Board of Northwestern University approved the study.

Each unit consisted of 30 beds and was equipped with continuous cardiac telemetry monitoring. Units were also identical in physical structure and staffing of nonphysician personnel. The intervention unit included a heart failure-hospitalist comanagement service. Patients followed at the Center for Heart Failure in the Bluhm Cardiovascular Institute of Northwestern were preferentially admitted to this service. All other patients were admitted to units based on bed availability in a quasi-randomized fashion. Hospitalists worked 7 consecutive days while on service and cared for patients primarily on the units involved in this study. Therefore, hospitalists cared for patients on both the intervention and control units during their weeks on service. Hospitalists cared for patients independently without the assistance of resident physicians or mid-level providers (ie, physician assistants or nurse practitioners).

Intervention

As described previously, SIDR combined a structured format for communication with a forum for regular interdisciplinary meetings.[16] The optimal timing, frequency, and location for SIDR was determined by a working group, consisting of nurses, hospitalists, and the unit pharmacist, social worker, and case manager, who met weekly for 12 weeks prior to implementation. They finalized the content of a structured communication tool (See Appendix online) to be used during SIDR for newly admitted patients. The structured communication tool was modeled after prior research demonstrating the benefit of daily goals of care forms[17,18] and ensured that important elements of the plan of care were discussed. Based on the working group's recommendation, SIDR took place each weekday at 11:00 AM in the unit conference room, lasted approximately 30 minutes, and was co-led by the nurse manager and a unit medical director. All nurses and hospitalists caring for patients on the unit, as well as the pharmacist, social worker, and case manager assigned to the unit attended SIDR. The structured communication tool was used for new patients (admitted in previous 24 hours). The plan of care for other patients was also discussed in SIDR, but without the use of the structured communication tool.

Provider Survey

We surveyed nurses working on the intervention and control units 16 to 20 weeks after implementation of SIDR to assess ratings of collaboration and teamwork. The survey was divided into 3 parts. The first section was based on previously published surveys assessing teamwork attitudes among providers.[6,7] Nurses rated the quality of communication and collaboration they had experienced with hospitalists using a 5-point ordinal scale (1 = very low, 2 = low, 3 = adequate, 4 = high, 5 = very high). The second section assessed teamwork and safety climate using the teamwork and safety domains of the Safety Attitudes Questionnaire (SAQ),[19] which is based on previous research in aviation and medicine and has been validated in clinical settings.[20,21] The final section of the survey assessed nurses' perceptions of whether SIDR improved efficiency of communication, collaboration among team members, and patient care using a 5-point Likert scale (1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree).

Hospitalists received only the final section of the survey at the completion of each clinical rotation. Because hospitalists worked with nurses on both units, and in light of our prior research demonstrating that hospitalists rate the quality of collaboration with nurses highly,[10] we did not assess hospitalists' ratings of collaboration. All surveys were administered in a web-based format using an internet link (www.formsite.com from Vroman Systems, Inc.) delivered through email. Respondents entered the survey website using a unique login, which allowed for identification of nonresponders. However, survey responses were de-identified. We sent nonresponders up to 3 reminder emails. The low number of social workers, case managers, and pharmacists on each unit precluded our ability to meaningfully assess their perceptions of collaboration and ratings of teamwork and safety climate.

SIDR Characteristics and Attendance

During each day of the study, the unit medical director documented the duration of SIDR, the number of patients on the unit, the number of patients discussed each day, and attendance by each discipline.

Data Analysis

Demographic data on providers was obtained from completed surveys and group comparisons were done using chi-square and *t* tests. We also used chi-square to compare the percentage of nurses on each unit rating of the quality of communication and collaboration with hospitalist

2011 Society of Hospital Medicine DOI 10.1002/jhm.714
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physicians as high or very high. Teamwork and safety climate scores were compared using the Mann Whitney U test.

We used methods similar to our prior research,[16] and obtained patient data from administrative databases for both the control and intervention unit during the study period as well as for the intervention unit in the 24 weeks preceding the study period. Demographic data were compared using chi-square and *t* tests. Primary discharge diagnosis *ICD-9* codes were grouped into diagnosis clusters using the Healthcare Cost and Utilization Project system of the Agency for Healthcare Research and Quality.[22] Diagnosis clusters were then analyzed using the chi-square test. Because of case mix differences between patients on the intervention and control units, we analyzed LOS and cost using a concurrent control as well as an historic control. Unadjusted LOS and costs were compared using the Mann Whitney U test. We then conducted multivariable linear regression analyses to assess the impact of SIDR on LOS and cost. To satisfy normality requirements and distribution of residuals, we explored 2 methods of transforming skewed data on LOS and cost: logarithmic conversion and truncation at the mean LOS + 3 standard deviations (SDs). Since both techniques yielded similar results, we chose to present results by using truncation. Covariates for multivariable analyses included age, gender, race, payor, admission source, case-mix, discharge disposition, presence of ICU stay during hospitalization, and Medicare Severity-Diagnosis Related Group (MS-DRG) weight. We used standard errors robust to the clustering of patients within each physician. All analyses were conducted using Stata version 10.0 (College Station, TX).

Results

Characteristics of Providers, Patients, and SIDR

Forty-nine of 58 (84%) nurses completed the survey. Eighty-eight of 96 (92%) surveys were completed by hospitalists at the end of their week on service. Hospitalist surveys represented 33 different hospitalists because individuals may have worked on study units more than once during the study period. Nurses were a mean 35.0 ± 10.4 years of age and had been working at the hospital for a mean 5.0 ± 6.3 years. Hospitalists were a mean 32.8 ± 2.8 years of age and had been working at the hospital for a mean 2.6 ± 1.9 years.

Patient characteristics are shown in Table 1. Intervention unit patients were admitted from the Emergency Department slightly more often in the postSIDR period. Patient case mix differed between the control and intervention unit, but was similar when comparing the intervention unit preSIDR and postSIDR. Intervention unit MS-DRG weight was lower in the postSIDR period.

SIDR occurred each weekday (with the exception of holidays) on the intervention unit and lasted a mean 27.7 ± 4.6 minutes. The unit had a mean 27 patients per day and 86% of patients on the unit were discussed each day. Attendance exceeded 85% for each discipline (hospitalists, nurses, and the unit pharmacist, social worker, and case manager).

Ratings of Teamwork and Perceptions of SIDR

As shown in Figure 1, a larger percentage of nurses rated the quality of communication and collaboration with hospitalists as high or very high on the intervention unit compared to the control unit (80% vs. 54%; $P = 0.05$).

Nurses' ratings of the teamwork and safety climate are summarized in Table 2. The median teamwork climate score was 85.7 (interquartile range [IQR], 75.0–92.9) for the intervention unit as compared to 61.6 (IQR, 48.2–83.9) for the control unit ($P = 0.008$). The median safety climate score was 75.0 (IQR, 70.5–81.3) for the intervention unit as compared to 61.1 (IQR, 30.2–81.3) for the control unit ($P = 0.03$).

Sixty-five of 88 (74%) hospitalists and 18 of 24 (75%) nurses agreed that SIDR improved the efficiency of their workday. Eighty of 88 (91%) hospitalists and 18 of 24 (75%) nurses agreed that SIDR improved team collaboration. Seventy-six of 88 (86%) hospitalists and 18 of 24 (75%) nurses agreed that SIDR improved patient care. Sixty-seven of 88 (76%) hospitalists and 22 of 25 (88%) nurses indicated that they wanted SIDR to continue indefinitely.

SIDR Impact on LOS and Cost

The unadjusted mean LOS was significantly higher for the intervention unit postSIDR as compared to the control unit (4.0 ± 3.4 vs. 3.7 ± 3.3 days; $P = 0.03$). However, the unadjusted mean LOS was not significantly different for the intervention unit postSIDR as compared to the intervention unit preSIDR (4.0 ± 3.4 vs. 4.26 ± 3.5 days; $P = 0.10$). The unadjusted cost was lower for the intervention unit postSIDR as compared to the control unit ($7,513.23 ± 7,085.10 vs. $8,588.66 ± 7,381.03; $P < 0.001$). The unadjusted mean cost was not significantly different for the invention unit postSIDR as compared to the intervention unit preSIDR ($7,513.23 ± 7,085.10 vs. $7,937.00 ± 7,512.23; $P = 0.19$).

Multivariable analyses of LOS and cost are summarized in Table 3. The adjusted LOS was not significantly different when comparing the intervention unit postSIDR to either the control unit or the intervention unit preSIDR. The adjusted cost for the intervention unit postSIDR was $739.55 less than the control unit ($P = 0.02$). The adjusted cost was not significantly different when comparing the intervention unit postSIDR to the intervention unit preSIDR.

Discussion

Nurses working on a unit using SIDR rated the quality of communication and collaboration with hospitalists significantly higher as compared to a control unit without it. Notably, because hospitalists worked on both the intervention and control unit during their weeks on service, nurses on each unit were rating the quality of collaboration with the same hospitalists. Nurses also rated the teamwork and

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TABLE 1. Characteristics of Patients*

	Control Unit (n = 815)	Intervention Unit Pre-SIDR (n = 722)	Intervention Unit Post-SIDR (n = 684)	*P* Value for Comparison of Intervention Unit Post-SIDR vs. Control	*P* Value for Comparison of Intervention Unit Post- vs. Pre-SIDR
Mean age, years (SD)	63.8 (16.0)	64.2 (16.3)	64.1 (17.2)	0.74	0.92
Women, n (%)	403 (49)	347 (48)	336 (49)	0.90	0.69
Ethnicity, n (%)				0.22	0.71
White	438 (54)	350 (48)	334 (49)		
Black	269 (33)	266 (37)	264 (39)		
Hispanic	48 (6)	40 (6)	34 (5)		
Asian	6 (1)	8 (1)	4 (1)		
Other	54 (7)	58 (8)	48 (7)		
Payor, n (%)				0.07	0.67
Medicare	456 (56)	436 (60)	399 (58)		
Private	261 (32)	176 (24)	182 (27)		
Medicaid	67 (8)	75 (10)	65 (10)		
Self pay	31 (4)	35 (5)	38 (6)		
Admission source, n (%)				0.51	0.03
Emergency department	695 (85)	590 (82)	593 (87)		
Direct admission	92 (11)	99 (14)	65 (10)		
Transfer	28 (3)	33 (5)	26 (4)		
Case mix, n (%)					
Congestive heart failure	78 (10)	164 (23)	144 (21)	<0.01	0.45
Cardiac dysrhythmia	167 (20)	69 (10)	81 (12)	<0.01	0.17
Chest pain	100 (12)	47 (7)	59 (9)	0.02	0.13
Coronary atherosclerosis	52 (6)	19 (3)	19 (3)	<0.01	0.87
Hypertension	24 (3)	38 (5)	24 (4)	0.54	0.11
Syncope	27 (3)	23 (3)	26 (4)	0.61	0.53
Fluid or electrolyte disorder	11 (1)	25 (3)	23 (3)	0.01	0.92
Pneumonia	14 (2)	13 (2)	22 (3)	0.06	0.09
Pulmonary heart disease	16 (2)	13 (2)	14 (2)	0.91	0.74
Intervertebral disc or other back problem	32 (4)	3 (0)	6 (1)	<0.01	0.28
Other diagnosis	294 (36)	308 (43)	266 (39)	0.26	0.15
Cardiovascular procedure during admission	151 (19)	95 (13)	86 (13)	<0.01	0.74
Intensive care unit stay during admission, n (%)	39 (5)	44 (6)	27 (4)	0.43	0.07
Discharge disposition, n (%)					
Home	736 (90)	646 (89)	610 (89)	0.88	0.82
Skilled nursing facility or rehabilitation	66 (8)	61 (8)	63 (9)		
Other facility	9 (1)	11 (2)	7 (1)		
Expired	4 (0)	4 (1)	4 (1)		
Mean Medicare severity -diagnosis related group weight (SD)	1.08 (0.73)	1.14 (0.76)	1.06 (0.72)	0.61	0.04

*Percentages may not equal 100% because of rounding.

Abbreviations: SD, standard deviation; SIDR, Structured Inter-Disciplinary Round.

safety climate higher on the intervention unit. Observational research has shown that nurses are often dissatisfied with the quality of collaboration with physicians,[6–8] potentially due to differences between nurses and physicians with regard to status/authority, gender, training, and patient care responsibilities.[6] SIDR appears to have overcome these barriers, providing a facilitated interdisciplinary discussion and enabling the exchange of critical clinical information and collaboration on the plan of care. These results are consistent with findings from our research on units staffed exclusively by teaching services with residents and medical students.[16]

Given that poor communication is a major factor contributing to adverse events in hospitals,[1–5] SIDR offers an effective option to enhance communication among hospitalists, nurses, and other staff caring for general medicine

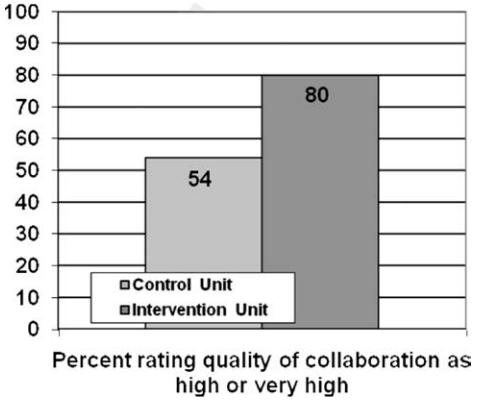

FIGURE 1. Nurses' ratings of the quality of communication and collaboration with hospitalists by unit. *$P = 0.05$.

2011 Society of Hospital Medicine DOI 10.1002/jhm.714
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TABLE 2. Nurses' Ratings of Teamwork and Patient Safety Climate by Unit

	Control Unit, n = 24	Intervention Unit, n = 25	*P* Value
Median Teamwork Climate Score (IQR)	61.6 (48.2–83.9)	75.0 (70.5–81.3)	0.008
Median Safety Climate Score (IQR)	61.1 (30.2–81.3)	85.7 (75.0–92.9)	0.03

Abbreviation: IQR, interquartile range.

TABLE 3. Adjusted Analyses of Length of Stay and Cost

	Adjusted Difference for Intervention Unit Post-SIDR vs. Control	*P* Value for Adjusted Difference for Intervention Unit Post-SIDR vs. Control	Adjusted Difference for Intervention Unit Post- vs. Pre-SIDR	*P* Value for Adjusted Difference for Intervention Unit Post- vs. Pre-SIDR
Length of stay	0.05	0.75	−0.04	0.83
Cost	−739.55	0.02	302.94	0.34

NOTE: Multivariable analyses included age, gender, ethnicity, payor type, admission source, case-mix, intensive care unit stay, discharge disposition, and Medicare Severity-Diagnosis Related Group (MS-DRG) weight as covariates. Analyses were adjusted for clustering of physicians and truncated at the mean LOS + 3 SDs.
Abbreviations: LOS, length of stay; SD, standard deviation; SIDR, Structured Inter-Disciplinary Round.

patients. While randomized controlled trials are lacking, observational studies document better patient outcomes are associated with higher ratings of collaboration and teamwork.[23–25] Future research should assess whether use of SIDR to improve collaboration also produces improvements in the safety of care and outcomes on inpatient medical units.

The majority of providers agreed that SIDR improved patient care as well as the efficiency of their workday and attendance was high among all disciplines. Prior IDR studies either did not report attendance or struggled with attendance.[11] Involving frontline providers in the design of SIDR allowed us to create a sustainable intervention which fit into daily workflow. SIDR may also yield benefits with increased nurse retention as higher ratings of teamwork culture have been associated with nurse retention.[26,27]

Our bivariate analyses found significant patient case-mix differences between the intervention and control unit, limiting our ability to perform direct comparisons in LOS and cost. Pre-post analyses of LOS and cost may be affected by cyclical or secular trends. Because each approach has its own limitations, we felt that analyses using both an historic as well as a concurrent control would provide a more complete assessment of the effect of the intervention. We included case mix, among other variables, in out multivariable regression analyses and found no benefit to SIDR with regard to LOS and cost. Two prior studies demonstrated a reduction in LOS and cost with the use of IDR.[12,13] One study was conducted approximately 16 years ago and included patients with a longer mean LOS.[12] The other used a pre-post study design which may not account for unmeasured confounders affecting LOS and cost.[13] A third, smaller study found no effect on LOS and cost with the use of IDR.[15] No prior study has evaluated the effect of IDR on LOS and cost in a nonteaching hospitalist service setting.

Several factors limit interpretation of our study. First, our study was performed at only one site. Studies involving multiple hospitals will be required to confirm our findings. Second, we did not conduct preintervention provider surveys for comparison ratings of collaboration and teamwork. A prior study, conducted by our research group, found that nurses gave low ratings to the teamwork climate and the quality of collaboration with hospitalists.[8] Because this baseline study showed consistently low nurse ratings of collaboration and teamwork across all medical units, and because the units in the current study were identical in size, structure, and staffing of nonphysician personnel, we did not repeat nurse surveys prior to the intervention. Third, our study did not directly assess the effect of improved teamwork and collaboration on patient safety. Further research is needed to evaluate this. Although we are not aware of any other interventions to improve interdisciplinary communication on the intervention unit, it is possible that other unknown factors contributed to our findings. We believe this is unlikely due to the magnitude of the improvement in collaboration and the high ratings of SIDR by nurses and physicians on the intervention unit.

In conclusion, SIDR improved nurses' ratings of collaboration and teamwork on a unit staffed by hospitalists. Further study is required to assess the effect of SIDR on patient safety measures.

Note

The authors of the preceding manuscript—O'Leary KJ, Haviley C, Slade ME, Shah HM, Lee J, Williams MV. Impact of structured interdisciplinary rounds on teamwork on a hospitalist unit—wish to express their apologies and regret for an error that resulted in initial online dual publication of parts

2011 Society of Hospital Medicine DOI 10.1002/jhm.714
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of the title, abstract, introduction, and final paragraph of this paper and the following paper: O'Leary KJ, Wayne DB, Haviley C, Slade ME, Lee J, Williams MV. Improving teamwork: Impact of structured interdisciplinary rounds on a medical teaching unit. J Gen Intern Med 2010;25(8);826–832. This error could have potentially allowed readers to perceive that the two articles represent duplicate publications of the same research. However, the manuscripts describe two different studies using similar methodology in different settings and patient populations. There is no evidence of dual reporting, nor falsification of results. The data, analysis, and results are distinct between the two manuscripts. The authors have re-written the title, abstract, introduction, and final paragraph for the preceding paper, and added citation of the publication in the Journal of General Internal Medicine.

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