Final Progress Report to Agency for Healthcare Research and Quality

Title of Project

Inpatient Provider Rounding Prioritization of Patients Ready for Discharge

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1. STRUCTURED ABSTRACT

Purpose: To test the effects of inpatient physicians rounding on discharging patients first compared to usual practice.

Scope: Because of hospital capacity strain, hospitals around the country promote prioritizing discharges first; however, the efficacy of this model and the facilitators and barriers to implementation are unknown.

Methods: We conducted a prospective, multi-center, randomized controlled trial at three large academic medical centers. Hospital Medicine attending-level physicians were randomized to either rounding on discharging patients first, as care allowed, or usual practice. The main outcome measure was hospitalist discharge order time. Secondary outcomes were actual discharge time, length of stay, and procedure order time.

Results: Across three hospitals, 4,437 patients were discharged by 59 physicians randomized to see discharging patients first or to round per usual during the 6-month study period. In adjusted per-protocol analyses, we found a statistically significant reduction in the average time of day the discharge order was entered, 12:37 $\pm$ 2h:33 min vs 13:28 $\pm$ 2h:26 min (p-value < 0.0001), for physicians who reported rounding on discharging patients first compared to usual practice. However, there was no significant reduction in hospital length of stay, 79 hours (IQR: 46, 145) vs 75 hours (IQR: 44, 140) (p-value 0.2367). Content analysis of unstructured survey data suggested that patient acuity and geography affected rounding styles and that not considering these factors could lead to inefficiencies.

Key Words: Early discharges, patient flow, capacity, discharge before noon, hospitalist

2. PURPOSE

The purpose of this study was to conduct a prospective, multi-center, randomized controlled trial designed to test the effects of rounding on discharging patients first compared to usual practice and to utilize an effectiveness-implementation hybrid approach.

We pursued the following specific aims:

1. Determine if prioritizing discharging patients first will decrease the time to discharge orders entered and patients leaving the hospital compared to other rounding strategies.

2. Determine if prioritizing discharging patients first will cause other care delays.

3. Determine factors that contribute to physician ability to maintain high fidelity to prioritizing discharges first.

3. SCOPE

Background

Hospitals around the country face bottlenecks and capacity issues.[1-3] When hospitals are successful at managing high capacity and throughput, this allows for increased access for patients who need higher levels of care and expertise.[1,4] Unfortunately, hospital discharges frequently occur in the afternoon or evening hours[4-8] and can adversely affect patient flow throughout the hospital,[1,6,9-11] which, in turn, can result in delays in care,[12-18] more medication errors,[19] increased mortality,[20-22] increased length of stay,[2,22,23] higher costs,[24] and lower patient satisfaction.[25] Late discharges have been shown to directly

impact a hospital's overall capacity and flow.[26] Various interventions have been employed in attempts to find ways of moving discharge times earlier in the day, including preparing the discharge paperwork and medications the previous night,[8] using checklists or team huddles,[4,27] providing real-time feedback to unit staff,[4] and employing multidisciplinary teamwork,[4,5,9,27,28] with variable effect. Research suggests that moving discharges earlier in the day by even an hour can reduce hospital overcrowding.[26]

The process of discharging a patient is complex, multi-layered, time-consuming, and arguably one of the most pivotal times during a patient's hospital stay. Often, much of the work for discharge occurs on the day of discharge, such as coordinating with nursing, pharmacy, and social work all in a relatively short period of time. Our team described two distinct phenotypes of patients nearing readiness for discharge: those possibly being discharged on said day (e.g., ~50% probability of discharge) and those definitely being discharged on said day (e.g., high probability of discharge), with previous studies showing that accuracy improves closer to the time of actual discharge but with substantial potential for changing conditions.[29] Patients who are possible and definite discharges face different barriers to discharge, with possible discharges typically awaiting assessment by other providers or awaiting tests. Orders for definite discharges are often delayed because providers are caring for other patients, thus requiring different interventions for the different phenotypes.

We previously found that the median time that the discharge orders were entered into the electronic medical record was 43 minutes earlier if patients were on teams with a lower versus higher starting census, as well as 58 minutes earlier if they were on nonteaching versus teaching services, and that discharges were 48 minutes earlier if they were seen by physicians whose rounding style was to see patients first who potentially could be discharged (Table 1).[29] Although earlier discharges occurred for the rounding on discharges first model, less than 10% of providers stated they rounded in this fashion.[29]

Additionally, earlier discharges may not necessarily mean there is a subsequent reduction in the length of stay, so balancing measures must also be assessed.

Table 1. Effect of starting census, rounding style, and teaching versus nonteaching service on discharge order time and discharge time

	Patients with discharge orders placed (N = 863)	Median discharge order time, hour (IQR)	P-value	Patients discharged from hospital (N = 822)[a]	Median discharge time, hour (IQR)	P-value
Starting census, N (%)			0.0003			0.0057
0-11 patients	498 (58)	11:31 (10:20, 13:31)		459 (56)	14:47 (12:45; 16:37)	
12 and greater	365 (42)	12:14 (10:57, 14:01)		363 (44)	15:14 (13:15, 17:03)	
Rounding style, N (%)			0.0026			0.0010
Discharges first	82 (10)	11:06 (9:40, 13:15)		80 (10)	14:00 (12:11, 15:32)	
All other styles	671 (78)	11:55 (10:37, 13:48)		632 (77)	15:00 (13:07, 16:57)	
Missing	110 (13)	12:03 (11:01, 13:47)		110 (13)	15:05 (13:30, 16:51)	
Teaching, N (%)			<.0001			<.0001
Yes	604 (70)	12:03 (11:00, 14:00)		567 (69)	15:06 (13:20, 17:03)	
No	256 (30)	11:06 (9:31, 13:09)		252 (31)	14:29 (12:27, 16:03)	
Missing[b]	3 (<1)	11:22 (11:04, 13:23)		3 (<1)	17:30 (16:20, 18:00)	

[a]41 (5%) of 863 patients with a discharge order placed were missing the date/time stamp for discharge.
[b]Missing data at the patient level.

Despite hospitals having an increased focus on moving discharges earlier in the day, provider rounding has changed very little in the past several decades, with only a small percentage of providers reporting that they prioritize discharges first.[29] Some work has found that physician-perceived barriers to discharge were extrinsic to providers and even extrinsic to the hospital setting (e.g., awaiting subacute nursing placement and transportation).[30,31] Many of the barriers that we identified in our work, however, relate directly to the providers' work load and rounding styles and to whether the patients were on teaching versus nonteaching services.

Hospitals around the country have also recognized that altering rounding styles (e.g., prioritizing discharges first) may be an important tactic and have employed the "discharge before noon" initiatives,[4,32] asking at an organizational level for providers to prioritize discharge. Per the Society of Hospital Medicine State of Hospital Medicine Report from 2018, approximately 33% of hospitalist groups utilized incentives tied to early morning discharges.[33] Currently, only observational evidence suggests that this prioritization scheme actually results in earlier discharges, and the findings are mixed.[32,34-36] Interventions to improve discharge times have resulted in earlier discharge times in some studies,[5,7] but overall length of stay either did not decrease[27] or increased[37] in others, though these studies were conducted in a pre-post fashion. Werthheimer et al.[4] did find earlier discharge times, but other interventions also occurred during the study period (e.g., extending social work services to include weekends).[4,36] It is also recognized that implementing this rounding style may be facilitated or inhibited by various operational (geographically cohorted patients), patient (acuity), and provider (multiple competing priorities)[29,30,36] ifactors n addition to the fact that it is uncertain what effect such a rounding style may have on other key aspects of care (i.e., delays for other patients inputting orders, calling consults, etc.).[32]

Although there have been several pre-post studies that have shown promising results with simple interventions, there has not been a randomized controlled trial to assess whether rounding style can move discharge times earlier in the day and lower length of stay.[38-40] Through our previous five-site study, we have built the foundation for understanding barriers to earlier discharge. In this study, we aimed to conduct a study of provider rounding styles utilizing a randomized controlled trial study design (1) to assess for physicians randomized to discharges first rounding model if patient length of stay and time of discharge order can be reduced, (2) to determine whether other patients experience delays in their care because of this prioritization, and (3) to identify the facilitators and barriers that contribute to the implementation of prioritizing discharges first in a busy clinical setting.

Context

Healthcare systems across the country, in particular institutions that are tertiary/quaternary academic medical centers and are referral centers both locally and regionally, are plagued with capacity issues. Observational studies suggest that altering provider rounding styles may be an opportunity to improve patient flow by moving discharge times earlier in the day and reducing overall length of stay. This study aimed to add to the evidence to either support or oppose the practice of prioritizing discharges during rounding and to add to the understanding of facilitators and barriers to maintain fidelity to the model. There have been no randomized studies to date that have addressed these issues. Additionally, because a variety of factors influence discharge time and ability to see discharges first, we aimed to also understand how team composition and census impact fidelity to the model and discharge times. Institutions across the country have promoted this model without understanding the factors to implement it successfully or with understanding of the model's effects on other patients and workflow. The findings below are pivotal to the many institutions that face capacity issues. We believe the results are also necessary in order to begin to implement best operational practices for care models. This work is one aspect of a multi-pronged approach to understand and improve hospital flow and patient outcomes in the hospital setting.

Settings

Three large academic hospitals

Participants

Hospital Medicine attending-level physicians and patients the physicians cared for during the study who were at least 18 years of age, admitted to a Medicine service, and assigned by standard practice to a general medical hospitalist team

4. METHODS

Study Design

This study was a prospective, multi-center, cluster randomized trial (randomized at the level of the hospitalist physician) designed to test the effects of rounding on discharging patients first compared to usual practice (Figure 1), and it utilized an effectiveness-implementation hybrid approach.

Data Sources/Collection

We collected demographic information from hospitalist physicians who consented to participate in the study, including years since training, gender, and percent of full-time equivalent (FTE) committed to clinical work. These data were used to ensure that randomization between the two arms resulted in balance on key physician characteristics. We conducted surveys at the end of each shift to understand team composition, team census, rounding style for that day, and whether it was the physician's first day on service. These data were used to assess adherence to randomization as well as any reasons that a physician was not able to adhere to their assigned randomization during a shift.

The time the discharge orders were entered into the medical record and the time the patient was discharged from the hospital were extracted via a data warehouse query. Length of stay, order times for procedures, imaging tests, and consults were extracted via a data warehouse query for all patients cared for during the study period by physicians who consented to participate in the study with the intent of understanding the downstream effects that prioritizing early discharges may have on patient care. Physicians were surveyed each day of their service during the study period to document the rounding practice the physician used that day (discharges first, sickest patients, decompensating patients, new patients, geography, or other), if the physician rounded with any learners or an advanced practice provider (APP), the starting census for their service that day, and whether the physician admitted any new patients. In addition, physicians randomized to rounding on patients ready to discharge first were asked if they were able to round as randomized and, if not, why.

Interventions

Physicians were randomized to one of two groups: (1) rounding on discharging patients first, as care allowed, and (2) usual practice. Rounding on discharging patients was defined to mean that the attending physician and accompanying team (i.e., if they were working with advanced practice providers or learners) would prioritize seeing any patients who were going to discharge that day. The physician could break protocol if needed for patient care purposes. Clinical care occurred as it typically would whether a study was in place or not.

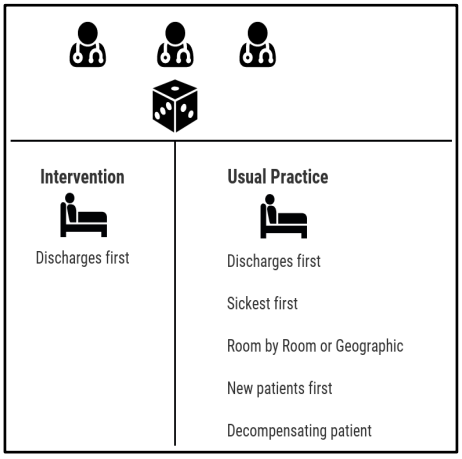

Figure 1. Randomization Schema

Measures

The primary outcome measures were discharge order time and discharge time.

Secondary outcomes were length of stay and procedure, imaging, and consult order time. Additionally, team composition (teaching, nonteaching, teams with advanced practice providers) and team census

(i.e., the number of patients a provider is caring for) were assessed to understand the impact on the ability for physicians to prioritize discharges first. Qualitative methods were utilized to gain an understanding from physicians as to why or why not they were able to prioritize discharges first.

Limitations

Our intervention was an operationally based behavioral intervention and thus comes with challenges of sustainability and adoption. Additionally, patient care at times required clinicians to override the randomization to ensure proper care. Clinicians face multiple competing tasks. Our study did have contamination of study arms, which is a known risk of this study design, given that some clinicians do practice the 'rounding on discharging patients first' model. Finally, variable capacity rates for our participating hospitals could have influenced the results of the study, although the randomized controlled trial design should have limited this effect.

Statistical analysis

Descriptive statistics were computed for all outcomes and covariates prior to detailed statistical analysis and modeling. We estimated means and standard deviations (SDs) for continuous variables when approximately normally distributed (as assessed by visual inspection of histograms), medians and interquartile ranges (IQRs) when not, and frequencies for categorical variables.

Multivariable linear mixed modeling was used and adjusted for patient-level, clinician-level, and team-level covariates hypothesized a priori to be associated with the outcomes. Discharging physician was included as a random effect in all models to account for correlation between patients cared for by the same physician. The discharge order time and discharge time models were also adjusted for length of stay (LOS). Given that hospital LOS is right skewed, this variable was log-transformed to facilitate regression analysis in both modeling as a primary outcome and as a confounder. We reported a relative difference in hospital LOS by exponentiating the coefficient, subtracting one, and expressing the result as a percentage. Several interaction terms were included to determine whether potential effect modification was supported by the data, including team starting morning census, team composition, and disposition to post-acute care, because we hypothesized that these might impact the findings based upon the literature to date.[29,41-43] Finally, using mixed-effects regression modeling, we evaluated whether rounding on discharging patients first was associated with the average time of day participating physicians entered orders using a noninferiority test, as it was hypothesized that prioritizing discharging patients first might delay care of other patients. For the qualitative analysis, we utilized open-ended questions from the daily surveys completed by the physicians at the end of each shift and explored facilitators and barriers to implementing the discharges-first rounding practice. A priori selected terms were identified by hand searching for occurrences of the identified terms across all comments. Frequency counts for each identified term were calculated and latent content analysis was conducted to ascertain the hypothesized underlying meanings of the words identified in the comments.

5. RESULTS

Principal Findings

We enrolled 61 physicians across three hospitals. The physicians were randomized to one of two groups. Thirty physicians were assigned to see discharging patients first (intervention group), and 31 physicians were assigned to round as per usual practice (control group). Zero physicians were lost to follow up. One physician in each group discontinued the intervention because they disliked the daily survey, and one physician in the control group was excluded from analysis, leaving 29 physicians in the control group and 30 physicians in the intervention group. Physician characteristics were well balanced

between trial arms. Clinician and team characteristics are shown in Table 2 and 3, respectively. Table 4 shows the demographics of patients who were cared for by the participating physicians.

Table 2. Clinician demographics recorded on day of patient discharge

	Randomization Group	
Clinician-level demographics	**Round on discharging patients first (N = 30)**	**Round using usual style (N = 29)**
Site, N (%)		
Denver Health	10 (33.3)	10 (34.5)
Johns Hopkins	10 (33.3)	9 (31.0)
University of Colorado	10 (33.3)	10 (34.5)
Clinician years since training, mean ± SD	7.2 ± 4.2	5.9 ± 5.9
Missing	0 (0)	0 (0)
Clinician percent clinical full-time equivalent, mean ± SD	0.89 ± 0.17	0.82 ± 0.20
Missing	0 (0)	1 (3.3)
Clinician gender identity, N (%)		
Woman	15 (50)	9 (31.0)
Man	15 (50)	20 (69.0)
Missing	0 (0)	0 (0)
Clinician most commonly used rounding style prior to study, N (%)		
Sickest first	14 (46.7)	17 (58.6)
Decompensating patients first	8 (26.7)	7 (24.1)
Geography	2 (6.7)	2 (6.9)
New patients first	4 (13.3)	1 (3.5)
Discharges first	1 (3.3)	1 (3.5)
Other	1 (3.3)	1 (3.5)

Table 3. Team-level demographics

Team-level demographics[1]	**Rounded on discharging patients first (N =708)**	**Rounded using other style (N = 1,007)**	**Round on discharging patients first (N = 864)**	**Round using usual style (N = 982)**
Site, N (%)				
Denver Health	213 (30.1)	413 (41.0)	315 (36.5)	335 (34.1)
Johns Hopkins	165 (23.3)	269 (26.7)	226 (26.2)	275 (28.0)
University of Colorado	330 (46.6)	325 (32.3)	323 (37.4)	372 (37.9)
Learners on team, N (%)				
Yes	350 (49.4)	568 (56.4)	436 (50.5)	482 (34.1)
No	358 (50.6)	439 (43.6)	371 (42.9)	426 (43.4)
Missing	0 (0)	0 (0)	57 (6.6)	74 (7.5)
Type of team, N (%)				
Physician only	253 (35.7)	286 (28.4)	241 (27.9)	298 (30.3)
Physician and APP, independent	34 (4.8)	63 (6.3)	41 (4.7)	56 (5.7)
Physician and APP, shared	185 (26.1)	240 (23.8)	207 (24.0)	218 (22.2)
Physician and resident	236 (33.3)	418 (41.5)	318 (36.8)	336 (34.2)
Missing	0 (0)	0 (0)	57 (6.6)	74 (7.5)
Starting morning census, mean ± SD	11.4 ± 2.4	11.6 ± 2.6	11.5 ± 2.4	11.5 ± 2.6
Missing	0 (0)	0 (0)	57 (6.6)	74 (7.5)

Table 4. Patient-level demographics

	Reported Group		Randomization Group	
	Rounded on discharging patients first (N = 1,903)	**Rounded using other style (N = 2,286)**	**Round on discharging patients first (N = 2,118)**	**Round using usual style (N = 2,319)**
Site, N (%)				
Denver Health	693 (36.4)	1,110 (48.6)	908 (42.9)	952 (41.1)
Johns Hopkins	405 (21.3)	524 (22.9)	476 (22.5)	625 (24.8)
University of Colorado	805 (42.3)	652 (28.5)	734 (34.7)	792 (34.2)
Patient age, mean ± SD	57.7 ± 17.6	57.9 ± 16.7	57.5 ± 17.1	58.0 ± 17.2
Missing	0 (0)	0 (0)	0 (0)	0 (0)
Patient gender, N (%)				
Female	878 (46.1)	1002 (43.8)	977 (46.1)	1048 (45.2)
Male	1025 (53.9)	1284 (56.2)	1141 (53.9)	1271 (54.8)
Missing	0 (0)	0 (0)	0 (0)	0 (0)
Patient Charlson Comorbidity Index severity levels, N (%)				
None	269 (14.1)	316 (13.8)	309 (14.6)	330 (14.2)
Mild	484 (25.4)	619 (27.1)	550 (26.0)	630 (27.2)
Moderate	493 (25.9)	588 (25.7)	550 (26.0)	583 (25.1)
Severe	654 (34.4)	757 (33.1)	707 (33.4)	769 (33.2)
Missing	3 (0.2)	6 (0.3)	2 (0.09)	7 (0.3)

From February 9 to July 31, 2021, participating physicians were scheduled for 2,318 shifts, for which 2,156 (93.0%) had an associated physician-completed daily evaluation. During this time, 4,437 patients were discharged by physicians participating in the study, for which 189 (94.4%) had an associated physician-completed daily evaluation.

Primary Outcome

In per-protocol analyses, we found a statistically significant reduction in the time of day the discharge order was entered into the electronic health record (EHR) by the discharging physician (12:37 ± 2h:33 min vs 13:28 ± 2h:26 min) and the time of day the patient left the hospital (14:58 ± 2h:50 min vs 15:41 ± 2h:42 min) for physicians who reported rounding on discharging patients first compared to physicians who reported rounding using some other style. Both the effect size and statistical significance were consistent between unadjusted and adjusted models ($p < 0.0001$) (Table 5). In intention-to-treat analyses, there were no significant differences found for discharge order time, discharge time, or length of stay (Table 6).

Secondary Outcomes

Hospital length of stay

In per-protocol analyses, we did not find a significant reduction in median hospital LOS in hours (79 [IQR: 46, 145] vs 75 [IQR: 44, 140]) in either unadjusted or adjusted models ($p = 0.1090$ and $p = 0.2367$, respectively) (Table 5). In the intent-to-treat analyses, hospital LOS in hours was 75 (IQR: 45, 141) vs 78 (IQR: 46, 144) in unadjusted and adjusted models ($p = 0.5619$ and $p = 0.4186$, respectively) (Table 6).

Procedure, imaging tests, and consult order time

In both unadjusted and adjusted models for average time of day that other orders were entered into the electronic health record, we found that physicians who reported rounding on discharging patients first did not see later order times compared to physicians who reported rounding using

some other style (10:48 ± 3h:54 min vs 10:52 ± 4h:04 min, respectively; alpha = 0.05, noninferiority margin = 30 min) (Tables 5, 6).

Effect modification analyses

In addition, in effect modification analyses, we did not find that the time of day the discharge order was entered into the EHR by the discharging physician, time of day the patient left the hospital, or hospital LOS varied according to whether the patient was discharged to post-acute care, the number of patients assigned to a team at 7 AM each morning, or by team composition for patients discharged by a physician who reported rounding on discharging patients first compared to physicians who reported rounding using some other style.

Qualitative content analysis

Content analysis of 2,197 surveys completed by physicians included 501 surveys with unstructured comment data for a total of 648 comments. Factors that influenced rounding style were patient acuity, team composition, readiness for discharge, geography, and balancing new patients. Rounding on discharging patients first was felt to impede workflows.

Table 5. Per-protocol patient-level outcomes by reported rounding style

Reported group		**Discharge order time, mean (SD)**	**Discharge time, mean (SD)**	**Length of stay in hours, median (IQR)**	**Procedure order time, mean (SD)[1]**
Rounded on discharging patients first (N = 1,903)		12:37 ± 2h:33 m[2]	14:58 ± 2h:50 m	79 (46, 145)	(N = 1,376) 10:48 ± 3h:54 m
Rounded using other style (N = 2,286)		13:28 ± 2h:26 m[2]	15:41 ± 2h:42 m	75 (44, 140)	(N = 1,659) 10:52 ± 4h:04 m
Unadjusted results		Mean difference in minutes	Mean difference in minutes	Mean percentage decrease	Mean difference in minutes
	95% CI	-48.6 (-58.4, -38.8)	-42.7 (-53.5, -31.9)	4.8% (-1.0%, 10.9%)	4.2 (-11.0, 19.3)
	P value	<.0001	<.0001	0.1090	0.6521
Adjusted results		Mean difference in minutes	Mean difference in minutes	Mean percentage decrease	Mean difference in minutes
	95% CI	-45.6 (-55.1, -36.0)	-39.5 (-49.8, -29.2)	2.8% (-1.8%, 7.6%)	0.8 (-17.0, 18.7)
	P value	<.0001	<.0001	0.2367	0.9259

[1]Includes all patients for whom a note was written by a participating physician on a day they were scheduled to work
[2]Observations missing discharge order time, 34 (1.7%) and 31 (1.4%) for row 1 and row 2, respectively

Table 6. Intent-to-treat patient-level analysis by randomized rounding style

Randomization group		**Discharge order time, mean (SD)**	**Discharge time, mean (SD)**	**Length of stay in hours, median (IQR)**
Round on discharging patients first (N = 2,118)		13:03 ± 2h:31 m[1]	15:22 ± 2h:50 m	75 (45, 141)
Round using usual style (N = 2,369)		13:11 ± 2h:33 m[1]	15:21 ± 2h:50 m	78 (46, 144)
Unadjusted results		Mean difference in minutes	Mean difference in minutes	Mean percentage decrease
	95% CI	-8.0 (-32.6, 16.7)	0.40 (-24.4, 25.2)	-2.4% (-10.0, 5.9%)
	P value	0.5271	0.9729	0.5619

Adjusted results		Mean difference in minutes	Mean difference in minutes	Mean percentage decrease
	95% CI	-13.6 (-30.3. 3.0)	-5.3 (-19.2. 8.6)	2.0% (-2.8, 7.1%)
	P value	0.1093	0.4534	0.4186
Discharge to post-acute care *(Reference group = yes)*		Mean difference in minutes	Mean difference in minutes	Mean percentage decrease
	95% CI	0.2 (-26.5, 26.9)	11.9 (-17.3, 41.1)	-2.7% (-10.6, 5.3%)
	P value	0.9894	0.4237	0.5098
Starting morning census		Mean difference in minutes	Mean difference in minutes	Mean percentage decrease
	95% CI	-1.3 (-5.0, 2.3)	0.5 (-3.4, 4.4)	0.4% (-0.6, 1.5%)
	P value	0.4759	0.7878	0.4067
Team composition *(Reference group = physician and resident)*		Mean difference in minutes	Mean difference in minutes	Mean percentage decrease
Physician only	95% CI	-15.0 (-40.4, 10.4)	-11.7 (-38.3, 14.8)	5.5% (-1.3, 12.3%)
	P value	0.2481	0.3851	0.1111
Physician and APP, independent	95% C	26.1 (-13.0, 65.2)	33.3 (-8.2, 74.8)	8.7% (-2.1, 19.6)
	P value	0.1910	0.1161	0.1145
Physician and APP, shared	95% C	-17.3 (-42.7, 8.2)	5.9 (-20.9, 32.7)	4.0% (-2.9, 10.9%)
	P value	0.1830	0.6667	0.2587

[1]Observations missing discharge order time, 29 (1.4%) and 44 (1.9%) for row 1 and row 2, respectively

Discussion

We found that, in per-protocol analysis, there was a statistically significant reduction in time of day of discharges for the intervention group; however, a resultant improvement in length of stay did not occur. This is important, because hospitals across the country have numerous initiatives to prioritize discharges first, with the main goal being to improve hospital throughput.[1,4,44] Several observational studies have alluded to the fact that prioritizing discharges first may not lead to improvements in throughput[27,45] or can in fact lead to increased length of stay.[37] We found that this very common practice of prioritizing discharges first does not appear to improve throughput. Our results were similar in both per-protocol analysis as well as analysis comparing physicians by randomized assignment (intent to treat). We did not find that rounding on discharging patients first delayed care of other patients.

Based on previous work, only a small percentage of physicians have reported rounding on discharging patients first[29]; however, in this study, 59.2% of discharges by physicians randomized to rounding on discharging patients first were rounded on in this fashion; in the control group, 40.8% of discharges received this rounding style suggesting that the study may have impacted the practices of both groups or that clinicians may actually prioritize discharges and workflows without recognizing their practice is as such. Physicians in our study broke protocol to care for sick patients or because of the geographic location of patient hospital rooms.

Conclusions

In this randomized controlled trial, prioritizing discharging patients first compared to usual practice did improve discharge order time but did not improve hospital length of stay.

Significance

The significance of these findings are that commonly utilized tactics, such as prioritizing discharges first without the context and understanding that clinicians also must balance sick patients and the practical aspects of care (i.e., maximizing geographical efficiency when rounding), may actually disrupt workflows. In this study, although not significant, prioritizing on discharging patients first led to an increased length of stay.

Implications

Prioritizing discharging patients as a sole tactic does not appear to improve throughput. Assessing other tactics that may be more fruitful in improving throughput should be sought. Potential future areas of study will be on how workloads may influence these measures.

6. LIST OF PUBLICATIONS AND PRODUCTS

Burden M, Keniston A, Gundareddy V, Kaufmann G, Keach J, McBeth L, Raffel K, Rice J, Washburn C, Kisuule F. Discharge in the AM: A Randomized Controlled Trial of Physician Rounding Styles to Improve Hospital Throughput and Length of Stay. Under review.

Publications/projects in development

We have begun the processes for secondary analyses of the data and will plan to (1) validate electronic measures of workload (note count) with hospitalist reported workloads; (2) determine the relationship between workload and patient and institutional outcomes; (3) look for measures that are impacted by workload and understand which measures (and combinations of measures) of workload influence these outcomes; and (4) assess healthcare workers' high workloads, which are shown to be a driving factor for burnout and turnover (including both attrition as well as reduced clinical effort), to understand the potential impacts of a less experienced clinical workforce (i.e., years since training) or a reduction in clinical effort on patient and institutional outcomes. We anticipate that this work will result in an additional one to two manuscripts and additional dissemination efforts.

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