

ORIGINAL ARTICLE

Morning report decreases length of stay in emergency general surgery patients

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Received: May 30, 2019

Accepted: September 8, 2019

Online Published: September 23, 2019

DOI: 10.5430/jha.v8n6p1

URL: <https://doi.org/10.5430/jha.v8n6p1>

ABSTRACT

Objective: Communication in the hospital setting is an easy target for quality improvement. Capturing this change via communication between providers during hand-offs is necessary to reduce delays and errors. While this process has been more widely characterized in medical specialties, we designed this study to address the knowledge gap in surgical specialties.

Methods: Our institution's division of Acute Care Surgery (ACS) implemented Morning Report (MR) in October of 2015. At MR, all admissions and service transfers were discussed from Trauma, Emergency General Surgery (EGS), and Surgical Critical Care services from the previous 24 hours. This study compared patients who underwent a surgical procedure during their hospital stay before and after protocol implementation.

Results: 974 patients were included in this study. The average patient was 50.3 years of age, 65.4% were white, and 51.7% were male. The average length of stay (LOS) was 8.3 days with 1.75 days to procedure. The post-MR cohort LOS was 2.7 shorter and had 0.85 fewer days to procedure. In an adjusted regression analysis, days to procedure and LOS decreased by 33% ($p < .01$) and 17% ($p < .01$) respectively.

Conclusions: Implementation of MR led to a decrease in the overall LOS and days to procedure for operative patients. Our results advocate for the standard use of structured hand-offs in surgical units.

Key Words: Emergency general surgery, Morning report, Length of stay, Quality, Communication

1. INTRODUCTION

Communication in the hospital setting is an easy target for quality improvement. The clinical condition of patients can be rapidly changing. Capturing this change via communication between providers during hand-offs is a necessary function to reduce delays as well as errors and to provide the best possible patient care. Modern work hours restrictions for residents in academic medical centers have encouraged most programs to turn to a night float model for resident call.^[1-4]

As a result, shift changes in surgery often happen early in the morning or late at night and can occur at a brisk pace as there are no Accreditation Council for Graduate Medical Education (ACGME) limitations placed on the number of patients a surgical resident can cover.^[5-10] Where there are handoffs of information, miscommunication can occur, and lead to patient errors and litigation.^[11] Recently, it has been shown that academic medical centers are at greater risk for these types of medical errors.^[12] To deal with the problem

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of miscommunication in healthcare, interventions have been aimed at the standardization of transferring patient information and have shown that structured use of standardized hand offs have been the most efficient and most effective intervention.^[13,14]

Morning conferences are a means of providing a mandatory, standardized patient hand off procedure in many fields of medicine, and is an effective strategy according to physician survey data.^[15] These conferences allow for consistent data transmission, opportunity for collaboration between care providers, and allow for junior residents and faculty to observe more experienced faculty transfer information. This process has been shown to impact patient care in the form of decreased length of stay (LOS) and hospital charges.^[15,16] This process has been more widely characterized in medical specialties; thus, we designed this study to address the non-standardized gap in surgical specialties.

The UAMS Division of Acute Care Surgery (ACS) implemented a morning conference style patient hand off called Morning Report (MR) in October 2015. Previous hand offs were unsupervised communications between the night call resident team and the day call team through the use of email or personal conversation. At MR all admissions and service transfers were discussed from the Trauma, Emergency General Surgery, and Surgical Critical Care services for the previous 24-hour time period. Attendees included the night resident team, day resident team, and the staff surgeons for the Trauma, ACS, and Surgical Intensive Care Units (SICU). The patients discussed have a plan of care formulated with input from all teams in attendance.^[17] During this same period, there were no other significant lab, operational, or faculty changes made. The role of the current study was to determine the impact of this newly implemented MR model on surgical EGS patient outcomes.

2. METHODS

This retrospective, observational study was conducted by querying the Enterprise Data Warehouse of the Arkansas Clinical Data Repository (AR-CDR) for all EGS patients between 2014 and 2018 who underwent a procedure during their hospital stay.^[18] All patients with a LOS of 0 were excluded from the analysis because of their absence from a MR. Patients without procedure codes were also excluded as the aim of this study was to analyze the effect on surgical patients. Nonsurgical patients were excluded due to inconsistencies in admission codes, and to ensure that the patients would have been managed solely by the EGS team instead of as a consult. This ensures that the patients would be discussed in MR.

Patients were placed into two cohorts based on date of admission (prior to or after October 1st, 2015). Population statistics on age, gender, race, CPT codes for region of procedure, Elixhauser readmission score, LOS, and days to procedure were gathered and then analyzed to create a bivariate analysis of group means and proportions. Patients were defined as “multigroup” if more than one anatomical region was impacted and operated on in their first procedure. Patients were defined as “multiple procedure” if they underwent more than one procedure during their admission. To assess significant differences between the two cohorts, t-tests were used for continuous variables and chi-square tests were used for categorical variables. Statistical significance was set at $\alpha = 0.05$ for all analyses. Correlation analysis was completed to identify potential multicollinearity among the independent variables. The analysis was conducted using Stata 14.0 (College Station, Texas). To adjust for selection bias and the differences between the two cohorts, propensity score weighting was performed using the TWANG package developed by RAND to balance the two cohorts to aid in the determination of a causal inference.^[19] Propensity scores are used to ensure the two patient cohorts have similar characteristics to those that would be created through random assignment. Propensity score weighting was used over the matching method because weighting ensures that all the patients in the sample are used, whereas propensity score matching results in a reduction in sample size because of unmatched patients. Due to the nature of the outcome variables and the skewness of the distribution, count models were used to analyze the impact of MR on the outcome measures. The Pearson Chi2 dispersion statistic was used to determine model fit between a negative binomial regression and Poisson model. LOS and days to operation were treated as count models, and subsequently negative binomial regression was used for both LOS, and days to first procedure using the propensity score weighted sample. The coefficients were to be exponentiated to allow for easier interpretation of percentage change.

This study was conducted in accordance with all applicable government regulations and UAMS research policies and procedures. The UAMS Institutional Review Board approved this study and granted a waiver of informed consent for this research because it involved no more than minimal risk to the subjects.

3. RESULTS

Table 1 displays the descriptive statistics of the population. The patients were typically around 50 years of age and predominately white with a roughly even balance of males and

females. The average LOS for all 974 patients was 8.85 days with 1.92 days to procedure. The most common CPT code for region of procedure was for abdominal procedures in this population.

Table 2 shows that there post cohort was slightly older (48 vs. 51 years) than the pre protocol implementation cohort. Additionally, the post cohort had a lower LOS by 2.7 days and days to procedure by 0.85 days. The two populations did not differ significantly in gender, race, or CPT region of procedures performed.

Table 3 demonstrates that after propensity score matching, the post-MR cohort has a close to 17% decrease in LOS compared to the pre cohort. Being identified as white, having multiple regions operated on, injuries to the cardiovascular system, and having multiple operations all demonstrated significantly increased LOS.

Table 4 demonstrates that MR has a similar effect on days to procedure as it does on LOS. MR demonstrates a close to 33% decrease in days to procedure.

Table 1. Study population descriptive statistics (n = 974)

Study population Descriptive Statistics (n = 974)	
Age, y	50.3
Male, n (%)	504 (51.7)
Race	
Black, n (%)	275 (28.2)
White, n (%)	637 (65.4)
Other, n (%)	56 (5.7)
Unknown, n (%)	6 (0.6)
Pre or Post Morning Report	
Pre, n (%)	195 (20)
Post, n (%)	779 (80)
CPT Region for Procedure	
Genitourinary, n (%)	10 (1.0)
Chest, n (%)	64 (6.6)
Cardiovascular, n (%)	95 (9.8)
Soft Tissue, n (%)	276 (28.3)
Abdomen, n (%)	529 (54.3)
Readmit score	13.1 ± 16.5
Length of Stay, days	8.85 ± 10.0
Days to first procedure	1.92 ± 1.85

Table 2. Pre vs. post MR bivariate analysis

	Pre Morning Report (n = 386)	Post Morning Report (n = 1,425)	p-value
Age, y	47.9 ± 17.7	51.0 ± 18.3	.034
Male n, (%)	90 (46.2)	414 (53.1)	.081
Race, n (%)			
White	123 (63.1)	514 (66.0)	.446
CPT Region for Procedure			
Genitourinary, n (%)	1 (0.5)	9 (1.2)	.426
Chest, n (%)	14 (7.2)	50 (6.4)	.701
Cardiovascular, n (%)	20 (10.3)	75 (9.6)	.791
Soft tissue, n (%)	55 (28.2)	221 (28.4)	.964
Abdomen, n (%)	105 (53.8)	424 (54.4)	.884
Readmit score	15.0	12.6	.064
Length of Stay, d	11.0	8.3	< .01
Days to first procedure	2.6	1.75	< .01

Table 3. Coefficients for negative binomial regression of LOS with propensity score matching

	Coefficients	p-value	95% CI
Post MR	-0.019	.007	[-0.33, -0.053]
Age	0.0037	.057	[-0.00011, 0.0076]
Male	0.046	.49	[-0.083, 0.18]
Race, Black	-0.13	.055	[-0.26, 0.003]
CPT Region			
Multigroup (> 1 CPT regions)	0.82	< .01	[0.69, 0.95]
Multiple Procedure	0.53	< .01	[0.403, 0.67]
Soft Tissue	0.057	.43	[-0.085, 0.199]
CV	0.29	< .01	[0.084, 0.49]
Chest	0.19	.028	[0.021, 0.37]
Genitourinary	-0.0086	.98	[-0.616, 0.598]
Readmit Score	0.0091	< .01	[0.0047, 0.013]

Note. Gender referent is “female”; Race referent is “white”; “Multigroup” refers to patients who had multiple anatomical regions affected based on their CPT codes; “Multiple procedure” refers to patients who underwent multiple procedures during their stay; CPT region referent is “abdominal”.

Table 4. Coefficients for negative binomial regression of days to first procedure with propensity score matching

	Coefficients	p-value	95% CI
Post MR	-0.41	< .01	[-0.596, -0.223]
Age	0.003	.301	[-0.0027, 0.0086]
Male	-0.109	.24	[-0.29, 0.072]
Race, Black	-0.075	.36	[-0.234, 0.0849]
CPT Region			
Multigroup (> 1 CPT regions)	-0.038	.69	[-0.224, 0.148]
Multiple Procedure	0.0439	.62	[-0.129, 0.217]
Soft Tissue	-0.151	.12	[-0.341, 0.0387]
CV	-0.219	.084	[-0.467, 0.0296]
Chest	0.0641	.67	[-0.231, 0.359]
Genitourinary	-0.0787	.86	[-0.937, 0.78]
Readmit Score	-0.0000377	.99	[-0.00631, 0.00624]

Note. Gender referent is “female”; Race referent is “white”; “Multigroup” refers to patients who had multiple anatomical regions affected based on their CPT codes; “Multiple procedure” refers to patients who underwent multiple procedures during their stay; CPT region referent is “abdominal”.

4. DISCUSSION

In this study, we hypothesized that implementing a mandatory MR would improve outcomes in emergency general surgery patients who underwent a procedure during their hospital stay. Analysis of the data showed that the most significant effect of MR was a decrease in the overall LOS from 11 to 8.3 days, and decreased time to procedure by approximately one day (0.85 days) between pre- and post-MR patients. Additionally, the data indicates that patients requiring multiple procedures, procedures involving multiple body regions, injuries to the cardiovascular system, or a higher readmission score will have a longer LOS.

Decreasing LOS is an important focus of efforts to improve healthcare outcomes because the majority of patients, regardless of admission service, have been shown to have increased risk of mortality with increasing LOS.^[20] The increased risk of mortality is most notably attributed to the correlation between LOS and hospital acquired bloodstream infections.^[21]

While the importance of structured hand-offs has been better characterized in medical fields,^[22] there is limited data regarding Acute Care Surgery (ACS). One comprehensive study by Pringle et al. described how the strategic implementation of MR could lead to better outcomes, but how variability in team member attendance and lack of structured protocol can lead to under-utilization and suboptimal benefit of the model.^[23] In our own institution, we wanted to address a previously identified issue of deficiencies in the patient hand-off systems, resulting in a gap in resident education in these necessary skills.^[24] Studies have shown that MR is a valid format for resident education in efficient and effective patient handoffs.^[25] In our institution, there has been a drastic improvement in the culture and commitment to structured patient hand-offs since the implementation of MR.

The benefit of MR handoff systems comes from the increased collaboration between care providers during the conference. Allowing all providers involved in care management to help formulate treatment and discharge planning created increased efficiency in the care of patients. Additionally, standard patient handoff procedures compared to informal procedures allow intervention at earlier time points in a patient's hospital course. All of these factors contribute to increases in efficiency of care.^[19,26]

5. CONCLUSIONS

This study demonstrates that the implementation of a MR led to a shorter time to procedure, and a shorter overall LOS in emergency general surgery patients who underwent an operation. Also, it is an intervention that improved the outcomes of operative EGS patients. Our data advocates for the standard use of structured handoffs, such as MR, across emergency general surgery units nationwide. Further work is needed to describe the more detailed mechanism by which LOS and days to procedure are decreased. Another limitation of this study is exclusion of nonsurgical patients due to lack of reliability in using admission codes to categorize patients. Future work would benefit from prospectively categorizing patients in order to increase sample sizes for analysis, and from comparison of private vs public hospital systems since there evidence has shown that outcomes differ between the two systems. Furthermore, more studies are needed to be able to fully characterize the differences in outcomes between private and public institutions.^[27]

ACKNOWLEDGEMENTS

The authors would like to acknowledge Judy Bennett for her help with data handling and analysis for this project.

CONFLICTS OF INTEREST DISCLOSURE

The authors declare they have no conflicts of interest.

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