Inpatient Resident Rounding Standardization in a Family Medicine Residency

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Abstract

This was a was a prospective case control study performed at UnityPoint Health Methodist hospital with a family medicine residency program. The study looked at standardizing inpatient rounding styles in our residency program to see if they had an outcome on patient length of stay, readmission rate, cost of care, as well as looking at resident and faculty satisfaction. We looked at 2 main models called a Hybrid model which encompassed rounding at the bedside and table rounds, and a Split model which decreased the attending to resident ratio but all patients were rounded at bedside. This study was performed over a 14 week time period. Outcomes found were that patient length of stay, cost of stay, and readmission rate were not affected by standardization. Resident and faculty satisfaction with education improved.

Introduction

Inpatient rounding is one of the foundations of inpatient medicine learning and residency experience. Every attending physician has their own style in rounding and teaching so learning their styles and trying to fit in education is difficult. It was a recurring theme on feedback of our inpatient service that residents felt like they did not get enough time set aside for learning and that the program values service over learning.

Our family medicine residency program is comprised of a total of 30 residents and 14 faculty members. The residents rotate on the inpatient adult medicine service twice intern year, once second year, and twice again in the third year. The inpatient service is stand alone and patients are split between the hospitalist service designated by the patient's primary care provider. Our service admits approximately 2-6 admission per 24 hour day with an average of 12-20 of patients total on our service at any given time. Residents leave on average 2 half days in the afternoons for didactics or their own clinic making it difficult to get through rounds, make calls to consultants and families, writing notes, and signing out to the residents who are staying in the afternoon. So, because 2 of the 4 residents on the service left every afternoon, their patients were given priority to get them out on time and led to the residents that were staying in the afternoon to continue rounding in the afternoon while managing admissions and the other 2 residents patients. This made the service in the afternoon cumbersome. The 4 residents and 1 attending were scheduled to be on service Monday thru Friday with only 2 residents rounding on the weekend with possibly a different attending than during the weekdays.

This topic was important because of the recurring theme in the program about not enough devoted education. On a literature search, it was found that there has been very limited research in this field. The only rounding style that has been well researched is called Rounding In Flow. This style sets up bedside rounds with the team and all of the tasks for that patient is completed before moving onto the next, including notes are written, consults called, and orders are placed. This style improved patient care and decreased time of rounds. So, we set out with the plan of standardizing the style of rounds to find out if it has effect on patient care and resident satisfaction.

Methods

This was a prospective case control study with IRB exemption and was performed at UnityPoint Health Methodist hospital in Peoria, IL, with the family medicine residency program adult inpatient medicine team (called FMS which stands for Family Medical Service). The study was performed over a 14 week periods from 4/24/2017 thru 7/28/2017. A total of 998 patient

were admitted to our service over the 14 weeks. 2 different standardized models were studied, called the Hybrid model and Split team model. These models were compared to a control which was unstandardized. The tested models were followed for a total of 6 weeks each compared to 2 weeks of the control. FMS is comprised of 1 supervising attending physician and 4 residents made up of 2 senior residents and 2 interns. The 2 senior residents can be one 3rd year resident and one 2nd year resident or can be two 3rd year residents. The residents rotate through FMS every 4 weeks. The models were tested on weekdays, Monday thru Friday, as these were the days the entire team was present and consistent with the same residents and attending. The models were tested in the sequence of 2 weeks of control. The following FMS teams would perform the Hybrid model the first 2 weeks of their rotation with the Split team model on the last 2 weeks of their rotation. There was a total of 4 different FMS teams that participated in this study. Each team participated in both of the tested models to help decrease any bias. Tested rounding models were decided by a survey of current residents in the program.

The Hybrid model is comprised of a combination of both table rounds as well as bedside rounds. Table rounds are when patients are discussed/presented to the attending physician then only the attending goes and sees the patient by themselves, compared to bedside rounds where the patient is presented in the room or just outside of the room before going in to see the patient as an entire team. The Hybrid model was set up so a minimum of 25% of the number of patients on the FMS census was rounded on at the bedside, while the remaining patients were rounded by table rounds. The patients for bedside rounds were chosen by the senior resident on service which had the most complexity or the best availability for an educational moment.

The Split team model is comprised 2 separate teams. An extra attending was added to bring the ratio of attending to resident to 1:2 compared to normal 1:4. Patients were split as evenly as possible between the 2 teams. Teams nor attendings changed throughout the week of service. One resident from each team was present in the afternoon for continuity of care.

The outcomes studied were time for rounds per patient, length of stay, cost of care, readmission rate, resident and faculty satisfaction with education and flow of rounds.

The senior resident on FMS kept a stopwatch on hand to record length of rounds. Time was started when the first patient was discussed and stopped after the last one. Time was stopped in the middle of rounds for emergencies such as Code Blue the residents in the hospital were to respond and run all Code Blues in the hospital. The number of patients rounded on by each method as well as time for rounds were recorded by the senior resident each day after rounds.

Resident and faculty satisfaction was studied by surveys. A one question survey on paper was filled out by residents on the FMS team to fill out everyday before leaving the hospital that asked them to rate their educational experience on a scale of 1 thru 5 with 5 being the most satisfied. A different one question survey was provided to residents on FMS on Fridays asking them to rate their experience of rounds on a scale of 1 thru 5 with 5 being the most satisfied. Attendings were survey also at the end of the week with a 2 question survey asking them to rate their experience with rounds and observation of educational experience, both on a scale of 1 thru 5 with 5 being most satisfied. The surveys were collected at the end of each week.

At the end of the study period, data was collected on the patients admitted to our service by searching the dates studied and all potential admitting providers which were all of our faculty that take call and do inpatient rounds. Inclusion criteria included all patients admitted to the FMS service from 4/24/2017 thru 7/28/2017. Exclusion criteria were patients that were rounded on by multiple methods and patients that were rounded on less than 50% by a method. For example, a patient that was admitted on Friday and rounded on by the team was discharged on Sunday so the patient was only rounded on the weekday or certain method 33% of the time by a certain method. There were a total of 998 patient admitted to FMS during the time of the study. 287 of the 998 met criteria for the study. 45 were patients in the control group, followed by 113 patients in the Hybrid model, and 129 patients in the Split team model. Data extracted from the EHR included

length of stay, total cost of care, direct cost of care, and notification if the patient was readmitted within 30 days of discharge.

All data was sent to a statistician for analysis. The methods for data analysis included Chi square, ANOVA-F, and Kruskal-Wallis.

Results

For outcomes of patient care, length of stay, total cost, direct cost, and readmission rates were evaluated. Length of stay were compared among groups using Kruskal-Wallis test. There is no statistically significant difference in LOS among three groups, p_value=0.964.Total costs were compared among groups using Kruskal-Wallis test. There is no statistically significant difference in Total costs among three groups, p_value=0.499. Total direct costs were compared among groups using Kruskal-Wallis test. There is no statistically significant difference in Total direct costs among three groups, p_value=0.491. The readmission rate in Control group is 13.3%. The readmission rate in Hybrid group is 10.6%. The readmission rate in Split group is 9.3%. Exact Chi-square test was used to compare the readmission rates among three groups. There is no statistically significant difference in readmission rates among three groups, p_value=0.758. There was no statistical significance between the control and experimental groups. There was also no statistical significance between the 2 control groups.

Patient break down

| | | Control | | | |
	Total N=287(%)	Control N=45(%)	Hybrid N=113(%)	Split N=129(%)	P Value
LOS					0.964 ^{K}
N	287	45	113	129	
Median (min - max)	3.0 (1.0 - 15.0)	2.0 (1.0 - 9.0)	3.0 (1.0 - 12.0)	3.0 (1.0 - 15.0)	
Mean ± SD	3.6 ± 2.6	3.5 ± 2.3	3.6 ± 2.7	3.6 ± 2.6	
Missing	0	0	0	0	
Total Cost					0.499 ^{K}
N	287	45	113	129	
Median (min - max)	5236.9 (373.2 - 40944.0)	6376.1 (373.2 - 24836.8)	4691.4 (861.4 - 30819.6)	5453.7 (651.7 - 40944.0)	
Mean ± SD	7464.2 ± 6773.5	7700.9 ± 5896.3	6947.7 ± 6013.8	7834.1 ± 7650.1	
Missing	0	0	0	0	
Total Direct Cost					0.491 ^{K}

Variables	Total N=287(%)	Control N=45(%)	Control Hybrid N=113(%)	Split N=129(%)	P Value
N	287	45	113	129	
Median (min - max)	2702.6 (189.7 - 21164.3)	3271.6 (189.7 - 12842.0)	2426.2 (456.7 - 15684.8)	2823.0 (338.7 - 21164.3)	
Mean ± SD	3866.4 ± 3499.0	3987.3 ± 3036.5	3590.8 ± 3090.0	4065.7 ± 3964.7	
Missing	0	0	0	0	
Returns					0.758 [C +]
No	257 (89.5)	39 (86.7)	101 (89.4)	117 (90.7)	
Yes	30 (10.5)	6 (13.3)	12 (10.6)	12 (9.3)	
Missing	0	0	0	0	

[+]Exact test
[A]ANOVA F-est; [C]Chi-square test; [K]Kruskal-Wallis test

Time per patient were compared among three groups using Kruskal-Wallis test. At significance level of 0.05, time per patient are statistically significantly different among three groups. In order to perform pairwise comparison, Dunn' test was used and Bonferroni method was used to adjust for multiple comparison. There is no statistically significant difference in ratings between Hybrid group and Control group, p_value=0.126. There is no statistically significant difference in ratings between Split group and Control group, p_value=0.338. Split group has statistically significantly longer time per patient than Hybrid group does. (p_value < .001).

Patients vs Length of rounds

Variables	Total N=60(%)	Control N=6(%)	group Hybrid N=27(%)	Split N=27(%)	P Value
Time_per_patient					<.001 [K]
N	60	6	27	27	
Median (min - max)	15.3 (5.3 - 30.0)	17.3 (6.7 - 21.7)	10.6 (5.3 - 30.0)	18.5 (12.9 - 30.0)	
Mean ± SD	15.8 ± 6.0	15.6 ± 5.9	12.0 ± 4.9	19.6 ± 4.7	

Comparisons	Adjusted p_value
Hybrid vs Control	0.126
Split vs Control	0.338
Split vs Hybrid	<.001

Resident learning experience was evaluated at the end of each day. Rating values were compared among three groups using Kruskal-Wallis test. At significance level of 0.05,

rating values are statistically significantly different among three groups, p_value < .001. In order to perform pairwise comparison, Dunn' test was used and Bonferroni method was used to adjust for multiple comparison. Hybrid group has statistically significantly higher rating than control group does, p_value < .001. Split group has statistically significantly higher rating than control group does, p_value < .001. There is no statistically significant difference in ratings between Hybrid group and Split group, p_value=0.772. This shows that educational experience was improved with standardization of rounds overall and with each model individually compared to the control of no standardization.

Daily Resident Educational Survey

	group				
Variables	Total N=214(%)	Control N=27(%)	Hybrid N=85(%)	Split N=102(%)	P Value
Rating					<.001 K
N	214	27	85	102	
Median (min - max)	4.0 (1.0 - 5.0)	3.0 (1.0 - 5.0)	4.0 (1.0 - 5.0)	5.0 (1.0 - 5.0)	
Mean ± SD	3.8 ± 1.4	2.9 ± 1.2	4.2 ± 0.9	3.7 ± 1.7	

Comparisons	*Adjusted p_value*
Hybrid vs Control	*<.001*
Split vs Control	*<.001*
Split vs Hybrid	*0.772*

Residents were surveyed at the end of week to evaluate their flow of rounds to help find out their experience in getting out on time for noon lectures and for afternoon didactics/clinic. Round ratings were compared among three groups using Kruskal-Wallis test. At significance level of 0.05, rounding rating values are statistically significantly different among three groups. In order to perform pairwise comparison, Dunn' test was used and Bonferroni method was used to adjust for multiple comparison. Hybrid group has statistically significantly higher round rating than control group does, p_value =0.008. Split group has statistically significantly higher round rating than control group does, p_value =0.006. There is no statistically significant difference in ratings between Hybrid group and Split group, p_value=1. There was statistical significance of flow of rounds with standardization of rounds.

Weekly Resident Round Survey

	Group				
Variables	Total N=47(%)	Control N=4(%)	Hybrid N=21(%)	Split N=22(%)	P Value
Weekly round Rating					0.013 K
N	47	4	21	22	
Median (min - max)	4.0 (1.0 - 5.0)	2.0 (1.0 - 3.0)	4.0 (3.0 - 5.0)	5.0 (1.0 - 5.0)	
Mean ± SD	4.0 ± 1.3	2.0 ± 0.8	4.3 ± 0.7	4.0 ± 1.4	

Comparisons	*Adjusted p_value*
Hybrid vs Control	*0.008*
Split vs Control	*0.006*
Split vs Hybrid	*1.000*

Weekly attending survey looked at flow of rounds and educational experience. Only 1 of the attending's surveys were submitted during the control time period so could not be compared to the experimental groups. Control group only has one observation, so we only compare Hybrid and Split groups using Wilcoxon rank-sum test. There is no statistically significant difference in flow of round rating between two groups, p_value=0.967. There is no statistically significant difference in resident learning rating between two groups, p_value=0.837.

Weekly Attending Survey

	Group			
Variables	Total N=16(%)	Control N=1(%)	Hybrid N=7(%)	Split N=8(%)
Flow of Rounds Rating				
N	16	1	7	8
Median (min - max)	4.0 (3.0 - 5.0)	4.0 (4.0 - 4.0)	4.0 (3.0 - 5.0)	4.5 (3.0 - 5.0)
Missing	0	0	0	0
Resident Learning Rating				
N	16	1	7	8
Median (min - max)	4.5 (2.0 - 5.0)	4.0 (4.0 - 4.0)	5.0 (4.0 - 5.0)	4.5 (2.0 - 5.0)
Missing	0	0	0	0

Weekly Attending Survey

	Group			
Variables	Total N=15(%)	Hybrid N=7(%)	Split N=8(%)	P Value
Flow of Rounds Rating				0.967 [W +]
N	15	7	8	
Median (min - max)	4.0 (3.0 - 5.0)	4.0 (3.0 - 5.0)	4.5 (3.0 - 5.0)	
Mean ± SD	4.3 ± 0.7	4.3 ± 0.8	4.4 ± 0.7	
Missing	0	0	0	
Resident Learning Rating				0.837 [W +]
N	15	7	8	
Median (min - max)	5.0 (2.0 - 5.0)	5.0 (4.0 - 5.0)	4.5 (2.0 - 5.0)	
Mean ± SD	4.4 ± 0.8	4.6 ± 0.5	4.3 ± 1.0	
Missing	0	0	0	

Conclusions

Inpatient rounds in a family medicine residency program is one of the pillars of resident education and experience as a learning resident. It is one of the most stressful times as a resident as well. This research was designed to help improve that experience. From this study, our hypothesis was proven in that resident satisfaction of rounds and educational experience improved with standardization of rounds into either the hybrid or split team model when compared with the control of no standardization. Length of stay, cost of care, and readmission rates were unaffected by style of rounds, meaning standardization does not affect patient care. Hybrid model was more efficient than Split team when looking at time spent per patient.

Limitations of the study was the power, too few patients met the criteria. Also, the control group was not the same amount of weeks as the standardized groups. There was likely bias due to the changing of FMS teams every 4 weeks as well as a different attending every week. Also, there could have been some

bias between the 2 study groups as the Hybrid model was done the first 2 weeks and the Split model was done the last 2 weeks because residents get into a flow and feel like they get the hang of rounds/inpatient medicine as the rotation goes along.

Studying this subject in the future, we felt like this study was set up well but would like to extend the time of the study and increase power for statistical significance. Also, we would like to investigate different styles of rounding and additional variables to more broadly define patient care.

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