

The Effect of Family Presence on Rounding Duration in the PICU

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ABSTRACT

BACKGROUND AND OBJECTIVE: The incorporation of family-centered rounds has become standard in PICUs across the United States. We compared rounding times in our institution, with and without family members present, to determine the effect on total rounding time and work flow.

METHODS: This observational study of a convenience sample was conducted over a 17-month period (May 2014–October 2015), accounting for typical seasonal variation in the PICU. The individual patient rounding times for 2657 encounters were recorded. The presence of family members, intubation status, physician assistant participation, interruptions during rounds, attending physician's full- or part-time status, and patient census were documented. The effect of family presence on per-patient rounding time was analyzed, while controlling for influential variables.

RESULTS: Family members were present during 1743 of 2657 (66%) rounding encounters. The average per-patient rounding time with and without family members present was 8.6 minutes and 7.3 minutes, respectively, a difference of 1.3 minutes per patient. In statistical models that accounted for other influential variables, the presence of family members was associated with a highly significant (20.4%, $P < .001$) increase in the per-patient rounding time.

CONCLUSIONS: The presence of family members increases per-patient rounding times in the PICU. Family presence on rounds may have benefits that outweigh the additional time required to complete each patient interaction.

www.hospitalpediatrics.org

DOI:10.1542/hpeds.2016-0091

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HOSPITAL PEDIATRICS (ISSN Numbers: Print, 2154-1663; Online, 2154-1671).

FINANCIAL DISCLOSURE: The authors have indicated they have no financial relationships relevant to this article to disclose.

FUNDING: No external funding.

POTENTIAL CONFLICT OF INTEREST: The authors have indicated they have no potential conflicts of interest to disclose.

Ms Gupta made substantial contributions to the acquisition of data and drafted and critically revised the article for important intellectual content; Drs Perkins, Shelak, Demirel made substantial contributions to the analysis and interpretation of data and critically revised the article for important intellectual content; Ms Hascall made substantial contributions to the acquisition of data and drafted the article; Dr. Buchholz made substantial contributions to the conception and design of the study, acquisition of data, and analysis and interpretation of data and critically revised the article for important intellectual content; and all authors approved the final manuscript as submitted.

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Family-centered rounds (FCR) are a multidisciplinary approach to rounding that partners with patients and their families, facilitating their inclusion in medical decision-making.^{1,2} FCR have been shown to increase family satisfaction during inpatient pediatric admissions because families have a positive view of the experience in that it allows them to be contributing members of the care team^{3,4} without inhibiting daily workflow.⁵ Additional benefits of FCR have been widely documented, including improved staff satisfaction, better family communication, more efficient coordination of care, and improved educational opportunities.^{6,7} FCR have also been shown to reduce length of stay because family members become more knowledgeable of their child's clinical condition and understand how to better manage symptoms at home.⁸ Beginning in pediatrics, FCR were originally implemented as a result of the unique roles of families during periods of illness in children; in 2003, the American Academy of Pediatrics issued a policy statement recommending that attending physician bedside rounds should include families.⁹

Despite its many advantages, one of the barriers to conducting FCR is the perception by surveyed clinicians that it increases rounding times, thereby negatively affecting team efficiency and productivity.^{10,11} Studies including between 75 and 250 patient rounding encounters have shown family presence to significantly increase rounding times by up to 4 minutes per patient.^{4,12,13} This review of the literature is somewhat limited in that the environments in which the studies were conducted may be vastly different; for example, the NICU provides an entirely different set of care needs compared with inpatient pediatric wards. Nevertheless, the Society for Critical Care Medicine has strongly advocated the presence of family during rounds in the PICU.¹⁴

We aimed to determine whether the observed trend of increased rounding times during FCR was substantiated by our large cohort of 2657 rounding encounters,

which to our knowledge is the largest reported to date. Furthermore, we hypothesized that certain factors (patient- or provider-related) may be associated with observed differences in rounding times and may potentially impact efficiency for providers.

METHODS

Rounding Structure

Randall Children's Hospital (RCH) is a 165-bed children's hospital with departmental academic affiliations with Oregon Health and Science University (Portland, OR). The RCH PICU is a 24-bed regional referral unit staffed continuously by pediatric critical care board-certified attending physicians, admitting >1000 patients yearly. A full complement of subspecialty support is available and the PICU provides extracorporeal membrane oxygenation (ECMO) and continuous renal replacement therapy services. Outcome data are submitted to the Virtual Pediatric Systems Database and a vigorous quality improvement program is maintained. Although we do not provide a pediatric critical care fellowship or resident rotations, pediatric emergency medicine and surgery fellows have the opportunity to participate in clinical electives within the PICU.

Multidisciplinary rounds have been conducted at the RCH PICU for the past 20 years. FCR begin at 9:00 AM on weekdays (Monday through Friday) and conclude between 10:00 AM and 12:00 PM, depending on the census. In general, rounds start at 1 end of the ward and progress from room to room; this routine may be altered depending on subspecialist availability. For each patient encounter, the attending physician presents the case in front of family members and input for the daily plan is obtained from the rounding team.

Because our rounding team is sizeable (attending physician, bedside nurse, charge nurse, respiratory therapist, pharmacist, dietician, case manager, social worker, physician assistant [PA], medical scribe, subspecialists, family members, and patient, if appropriate), we instituted hallway rounds to ensure that there was sufficient

space for the entire team as well as family members to be present. Hallway rounds allow the team to overcome the issue of isolation precautions, directly protecting patient safety by decreasing the number of individuals entering and exiting the room of an isolated patient. At the time of admission, families receive information regarding our PICU's use of FCR and how patient confidentiality is maintained, primarily by performing FCR during designated hours.

Study Design

This was a prospective, observational study of a convenience sample of patient-centered work rounds conducted in a tertiary care PICU. Before rounds begin, the PICU attending physician reviewed the patient electronic medical record and updated patient charts with the help of a medical scribe. Scribes also timed rounding interactions with a stopwatch. The stopwatch was started when discussion was initiated by the PICU attending physician, and was stopped at the conclusion of the discussion for that patient. The total time of each encounter included all discussion of patient care, such as reviewing the history of present illness, case presentation, educational points, and daily plan review. Transit time between patient rooms was included in the rounding time for the next patient. A paper spreadsheet was used to record the following information: date of rounds, patient room number, per-patient rounding time, intubation status, family presence, PA presence, ECMO status, and rounding interruptions (eg, phone calls or pages, requests for new admissions, computer malfunction, emergent procedures, off-topic conversations that delayed an encounter, and waiting for staff).

Although the team was aware that data collection was taking place, the results were not shared or discussed with team members during the study period. Of note, data for non-English speaking families where an interpreter was required were eliminated from the analysis because these rounding encounters often occurred outside of the scheduled rounding period. The data were transferred to an electronic database

constructed in Filemaker Pro, version 9 (FileMaker, Inc., Santa Clara, CA).

Statistical Analysis

Inspection of the distribution of the per-patient rounding times (in seconds) showed that it was nonnormal with a significant right skew. Box-Cox power analysis suggested that a log transform of the per-patient rounding times would be a more appropriate dependent variable while building statistical models; we used the base 10 logarithm. Initial univariate analyses were performed to determine which predictor variables were significantly associated with rounding times.

A multivariable model was then constructed to examine the effect of family presence on rounding times while controlling for predictors that were found to be influential in the univariate analyses. It was also decided to consider rounding data to be clustered by attending physician (some physicians tended to round faster than others), and we accounted for this clustering by using a generalized estimating equation (GEE) model.¹⁵ GEEs are a form of generalized linear models used commonly in epidemiology because they can handle unmeasured dependence, or correlation, between the outcome data; they consist of repeated measures over time or are clustered in some other manner. In our case, rounding times for each attending physician were likely correlated, with some attending physicians having faster average rounding times than others. All statistical analyses were performed in the R package for statistical computing.¹⁶

This study was conducted in an ethically adherent manner and did not involve patients or subjects other than observation of normal clinical operations. Clinical data points (date of rounds, patient room number, intubation status, family presence, ECMO status) were not associated with identifiable protected health information. The Legacy Health Institutional Review Board found this study to be exempt from review.

RESULTS

A total of 2657 patient rounding encounters were observed over a 17-month period (May 2014–October 2015), accounting for the

seasonal variation typically encountered in the PICU. Family members were present during 1743 (65.6%) and absent from 914 (34.4%) rounding encounters. The mean per-patient rounding time for the entire group was 487 s (median = 417, first quartile = 272, third quartile = 619). The mean per-patient rounding durations for encounters with family members present or absent were 513 s (median = 451, first quartile = 297, third quartile = 645) and 438 s (median = 370, first quartile = 238, third quartile = 563), respectively. In a univariate GEE model, the presence of family was significantly associated ($P < .001$) with a 22.1% increase in per-patient rounding time (Fig 1, Table 1).

In additional univariate analyses, we found that per-patient rounding time was also significantly associated with intubation status, the presence of a PA, and the total number of patients rounded on (all $P < .001$; Table 1). Although employment status of the attending physician (part-time or full-time) had only a borderline association with rounding time in the univariate analysis ($P = .080$; Table 1), it was included in the multivariable model.

In the final GEE multivariable model (Table 2), the presence of family resulted in a significant increase in per-patient rounding time (20.4%, $P < .001$). The effect of having family present was observed while controlling for patient intubation status (62.8% longer per-patient rounding time when intubated; $P < .001$), whether a PA was present or not (6.8% shorter per-patient rounding time when PA was present; $P = .006$), the total number of patients rounded on (2.2% shorter per-patient rounding time for each additional patient rounded on; $P < .001$), and employment status of the attending physician (17.4% longer per-patient rounding time for part-time attending physicians; $P < .001$).

To place these percentage changes in perspective, it is worth examining the predicted rounding times for different patient–family–physician scenarios. For example, the model would predict that rounding by a part-time attending physician on an intubated patient with family present but without a PA on a fairly light day

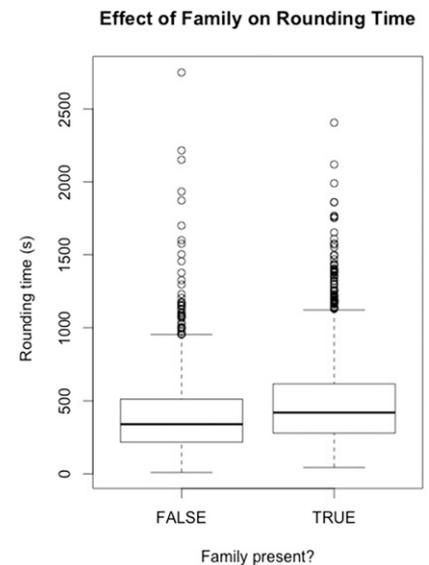


FIGURE 1 Effect of family on rounding time. Box-and-whiskers plot of per-patient rounding times (in seconds) for rounding encounters where family members were present (TRUE) or absent (FALSE). For each box-and-whisker, the bold horizontal line represents the median, the box covers the interquartile range, and the whiskers are placed 1.5 times the interquartile range from the median. Circles represent individual per-patient rounding encounters that took at least 1.5 times the interquartile range longer than the median.

(7-patient census) would take 12 minutes and 42 seconds per patient. On the other hand, the model would predict that rounding by a full-time attending on a nonintubated patient without family present, but with a PA on a heavier day (12-patient census) would take 4 minutes and 36 seconds per patient.

DISCUSSION

To our knowledge, this is the largest study to evaluate the duration of FCR in the PICU based on the presence or absence of family during rounds. Specifically, we found that our multidisciplinary rounding times were significantly longer when family was present. Intubation status and the total number of patients rounded on were significantly associated with increased rounding duration in the univariate analysis,

TABLE 1 Results of Univariate Analyses From GEE Regression Models That Also Account for Attending Physician as a Source of Clustering

Variable	Coefficient	Effect	P
Family present	0.087	+22.1%	<.001
Intubated	0.217	+64.4%	<.001
PA present	-0.039	-8.6%	<.001
No. of rounded patients	-0.012	-2.7%	<.001
Attending physician employment status	0.047	+11.3%	.080

The analyses were conducted using \log_{10} -transformed rounding times and the "Coefficient" column shows the regression coefficients from these models. The "Effect" column shows the results back-transformed to show percentage changes in the original units (seconds) associated with each of the variables. For the first 3 rows, the results show the effect of these variables being "true." For "No. of rounded patients," the results show the effect of each additional patient rounded on. For "Attending physician employment status," the results show the effect of part-time (versus full-time) employment status.

meetings. Efficient scheduling can reduce bottlenecks throughout the organization and increase overall throughput. Standardization of our rounding technique may have contributed to our efficiency; however, the emphasis on family communication and satisfaction remains a priority, despite the complexities of a labile PICU environment.

There were several limitations to our study. First, although the number of rounding encounters are the largest reported to date, this was a single-center study and therefore may not be generalizable to every PICU. Second, we included transit time within the rounding time, which may have increased rounding times by 5 to 10 seconds per encounter. Nevertheless, we believe that our transit times are minimal, primarily because we begin rounds at 1 end of the unit and proceed in numerical order of patient rooms. Third, interruptions during rounds occurred in ~15% of all patient interactions, resulting in slightly increased average rounding times. These interruptions consisted mainly of phone calls from subspecialists concerning other patients, contributing to inconsistencies in per-patient rounding times. Fourth, significant differences in rounding times were observed between physicians. These inconsistencies suggest that rounding styles, including communication techniques, may differ from physician to physician. We did, however, account for these differences in our analysis where all of the data for a physician were considered to be clustered. Fifth, although our findings were highly statistically significant, additional studies are required to determine whether there is a clinical impact of increased rounding times. For example, it would be expected that the longer a patient has been in the PICU, the less time would be required to round on that patient. In addition, it might also be less likely that family would be present during rounds for a "long-term" patient. If true, this would cause these 2 factors to be associated, but there would not be a causal relationship. However, the number of PICU days for a patient was not tracked during this study, and therefore this issue could not be accounted for in the analyses. Finally, for non-English speaking

as well as part-time employment status of attending physicians in the multivariate analysis.

Previous publications have shown that rounding times are increased when family is present,^{10,17} with 1 author reporting FCR to take ~20% longer than traditional rounds.¹⁸ In our institution, the presence of family on rounds led to a 1.3 minute increase in per-patient rounding times, less than what is currently reported in the literature. However, we believe that there are many benefits associated with having family present during rounds. Family presence has been shown to increase family satisfaction because they become more knowledgeable about physician medical decision-making and can have their concerns addressed and questions answered immediately by the care team. Family presence on rounds is also beneficial to the care team itself because they can communicate with parents at a designated time and do not

routinely need to meet with them later in the day. Furthermore, medical staff may also be able to encourage families to maintain a degree of autonomy; FCR thus provide an educational opportunity for both staff and families. The multidisciplinary nature of FCR also encourages teaching and knowledge sharing among providers from several fields and levels of experience. We have found that keeping the patient at the center of the rounding discussion, maintaining open lines of communication, and answering questions can be accomplished efficiently despite the complexity of a modern PICU.

Using results from multivariable regression analysis, it is possible to better plan resources for the hospital system. Due to census variability (anywhere from 1–24 patients), the ability to anticipate expected rounding times would allow the team to better plan their activities, such as rounding on other floors and administrative

TABLE 2 Results of Multivariable Analyses From GEE Regression Models That Also Account for Attending Physician as a Source of Clustering

Variable	Coefficient	Effect	P
Family present	0.081	+20.4%	<.001
Intubated	0.212	+62.8%	<.001
PA present	-0.031	-6.8%	.006
No. of rounded patients	-0.010	-2.2%	<.001
Attending physician employment status	0.070	+17.4%	<.001

The analyses were conducted using \log_{10} -transformed rounding times and the "Coefficient" column shows the regression coefficients from these models. The "Effect" column shows the results back-transformed to show percentage changes in the original units (seconds) associated with each of the variables. For the first 3 rows, the results show the effect of these variables being "true." For "No. of rounded patients," the results show the effect of each additional patient rounded on. For "Attending physician employment status," the results show the effect of part-time (versus full-time) employment status.

families, an interpreter was required and these discussions often occurred outside of the scheduled rounding period. This factor needs to be accounted for when planning workflow to maximize efficiency.

CONCLUSIONS

Family presence is associated with slightly longer rounding time, although qualitatively, we believe that the benefits outweigh the costs.

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