

Original Article

Standardization of rounds on a general paediatric ward: Implementation of a checklist to improve efficiency, quality of rounds, and family satisfaction

Camille Trahan MD, Angela Y. Hui MSc, Navneet Binopal MD

Department of Paediatrics, Queens University, Kingston, Ontario, Canada

Correspondence: Camille Trahan, Paediatrics PGY4, Queen's University and Kingston Health Sciences Centre, 76 Stuart Street, Kingston, Ontario, K7L 2V7, Canada. Telephone 613-549-6666 ext 2352, e-mail 18ct12@queensu.ca

Abstract

Objective: The purpose of this study was to develop a standardized rounding tool for use on the general paediatric ward and to determine if its use can improve quality of rounds as well as patient and parent satisfaction.

Methodology: The study used a pre- and post-intervention prospective observational methodology. The intervention consisted of the implementation of a Checklist Rounding Tool (CRT) entitled the 'Paediatric Inpatient Rounding Checklist (PIRC)' which outlined items deemed essential to discuss during rounds for all patients admitted to the paediatric ward. The PIRC was created by the research team after reviewing the literature and it was peer reviewed by a panel of expert paediatricians. Performance on rounds based on discussion of checklist items as well as patient and parent satisfaction were evaluated by an external observer both pre- and post-PIRC implementation.

Results: Four of the five less frequently addressed checklist items were discussed significantly more post-intervention. The Rounds Quality Score was significantly improved after checklist implementation, the pre- and post-intervention scores being 8.24 and 9.61/10, respectively (P-value <0.001). Patient and parent satisfaction were rated higher with the use of the checklist. There was no difference in the duration of rounds between the pre- and post-implementation phases.

Conclusion: In summary, utilization of a standardized rounding tool on an inpatient paediatric ward led to improvement in quality of rounds as well as patient and parent satisfaction.

Keywords: *Bedside rounds; Checklist; Communication; Patient safety; Rounding tool; Teaching rounds*

Most standardized checklist approaches in medicine have been studied in the adult population (1–4). Almost all studies concerning the use of checklists in paediatrics were performed in paediatric or neonatal intensive care units (PICU or NICU) (5–12). Use of safety checklists in the PICU has been shown to improve quality of care (5,7,10) but few studies have been conducted on standardization of actual rounds presentation (6,11,12). A few studies have shown that use of a standardized

rounding structure leads to a higher level of awareness of problems listed and daily goals for each patient (11), increased family satisfaction with rounds (12) and improvement in all aspects of the rounding process (6) with minimal increase in rounds duration. Most items of these rounding tools were specifically applicable to critically ill patients.

The 'Family-centered rounds (FCR) checklist intervention' by Cox et al. (13), is the only study that examined the impact

of a rounding checklist on a general paediatric ward. Their checklist partially structured rounds to outline items related to family engagement, promoting effective FCR and patient safety.

As none of the tools described above could be used to completely structure rounds on a general paediatric ward, the goal of this study was to develop a checklist rounding tool (CRT) specifically applicable to the general paediatric ward. Our primary aim was to assess if implementation of a standardized CRT could improve the quality of rounds on a general paediatrics ward. The secondary aim was to explore whether families' satisfaction with rounds improved with the use of a standardized CRT. We hypothesized that our intervention would accomplish those two objectives.

METHOD

Literature review

The literature was extensively reviewed. Studies discussing standardized rounds, rounds improvement, checklist use, and rounding tools were included. Of the 38 articles selected, most relevant ones were observational studies measuring impact of rounds standardization. Only six studies proposed actual rounding tools (3,6,7,11–13), none of which were designed to completely structure rounds on a general paediatric ward. There was no Cochrane review found on this subject.

Study design, setting, and participants

This study used a pre- and post-intervention prospective observational methodology. It was conducted on the general paediatric ward of Kingston General Hospital (KGH, Ontario) from March to May 2019 and involved a total of 59 paediatric patients and 21 medical team members (attending physicians, residents, and medical students). For the pre- and post-intervention phases, a convenience sample was used of all patients admitted to the general paediatric ward over a 10- and 8-day period, respectively. Eighty-four and 52 observations were conducted during the pre- and post-intervention phases, respectively. Formal sample size calculations were not done, as the parameters needed to estimate power and sample size did not yet exist. Given that Altman (14) indicates that a sample size of 50 is adequate for testing associations or drawing inferences, we felt that this sample was adequate for testing differences in the number of times key topics were addressed during rounds. A convenience sample was also used for the enrollment of the medical team members. The study was approved by Queen's University Health Sciences & Affiliated Teaching Hospitals Research Ethics Board (HSREB # 6025408).

Development of the Checklist Rounding Tool and Patient and Parents Satisfaction surveys

The CRT entitled the Paediatric Inpatient Rounding Checklist (PIRC) was developed by the research team (Figure 1). The items on the PIRC were selected from the Structured

interdisciplinary bedside rounds (SIBR) by Stein et al. (3), the 'CERTAINp' study (6), 'WE CARE 4 KIDS' tool (7), and the survey results from Holton et al. (15). The PIRC was peer reviewed by an expert panel of three paediatricians who were not on service during the study. The content of the checklist was approved by the panel and some modifications to the phrasing of the items were made to ensure complete understanding by junior trainees (see italicized questions on PIRC).

The Patient and Parents Satisfaction survey (Supplementary Appendix 1) was developed through focus groups with parents to identify issues most valued by them during rounds. Our survey was also inspired from patient appreciation surveys in the literature and the survey results described by Holton et al. (15).

Pre-intervention

During the pre-intervention phase, a research assistant (RA) provided direct in-person observation of rounds which were conducted at the bedside and involved one attending physician, one senior and one junior paediatric resident and two to four off-service residents and medical students. The RA assessed the quality of rounds by identifying which items on the PIRC were discussed for each patient. The medical team was blinded to the PIRC content.

Intervention

The medical team was educated about the PIRC and were encouraged to use it to structure their patient's presentation during rounds.

Post-intervention

Rounds were observed by the RA the same way as during the pre-intervention phase. However, this time, the medical team was using the PIRC to structure their rounds presentation. The composition of the medical team for the post-intervention phase was the same as during the pre-intervention phase (i.e., Medical students, residents, attending staff); however, the individual members were different.

Data collection

Demographic data, American Society of Anesthesiologists (ASA) score, daily Paediatric Early Warning System (PEWS) score, length of stay, most responsible diagnosis, checklist items discussed during rounds and total duration of rounds were collected for all recruited patients pre- and post-intervention. Satisfaction surveys were distributed to patients and/or parents during both pre- and post-intervention phases after every rounds observation.

Data analysis

Descriptive statistics, including means, standard deviations and medians for continuous data, and frequencies and percentages for categorical data, were used to analyze patient demographic characteristics. Data collected regarding items discussed during

Paediatric Inpatient Rounding Checklist

- Age and presenting problem** (Why did the child come to hospital?)

- Problem List** (What are the child's active issues now?)
 - Discussion of active issues on problem list

- Nutrition/IV Fluids**

- Investigations** (Blood work, imaging, urine test results, etc)

- Medications (MAR) review**

- PEWS review**

- Physical Examination**

- Assessment & Plan:**
 - Discussion of plan BY PROBLEM LIST
 - Discharge criteria (When can the child go home?)
 - Review of monitoring needs (PCCU, oximetry, routine monitoring?)

- Patient/Parent questions** (Does the patient/parent have any questions?)

MAR: Medication Administration Record
 PEWS: Pediatric Early Warning Signs
 PCCU: Pediatric Critical Care Unit

Figure 1. The Paediatric Inpatient Rounding Checklist (PIRC).

rounds were analyzed initially using frequencies. Comparisons between pre- and post-intervention data were performed with inferential statistics including independent samples t-tests, and the Pearson chi-square or Fisher's Exact test as appropriate. The Rounds Quality Score (RQS) was designed by this research team and inspired from the 'Total checklist compliance score' from Hulyalkar et al (6), to give an overview of rounds performance. Every item discussed was worth one point. The total number of points obtained for one patient's presentation was divided by the number of checklist items and multiplied by 10. Data obtained from the score were analyzed with the independent samples t-test, as were the data from the patient and parent satisfaction daily surveys. Twenty and 15 patients

were assessed more than once, pre- and post-intervention respectively. The association of observation number (1, 2, 3, and 4+) with the items discussed during rounds was assessed using the Pearson chi-square test. Finally, the associations between PEWS of the day, ASA and the RQS were assessed overall, and pre and post separately, using the Spearman correlation.

RESULTS

Population demographic data

As shown in Table 1, the patients' mean age was between 5 and 6 years for both pre- and post-intervention phases. Sex distribution showed a slight predominance of male patients. Most

Table 1. Pre- and post-intervention demographic data

Characteristics		Time observation	Std. deviation				
Age: mean in years	Pre	5.41	5.88				
	Post	5.99	5.68				
		Male	Female	Other			
Sex: absolute (%)	Pre	18 (50)	17 (47.2)	1 (2.8)			
	Post	13 (56.5)	10 (43.5)	0 (0)			
		1	2	3	4		
ASA score: absolute (%)	Pre	15 (41.7)	19 (52.8)	2 (5.6)	0 (0)		
	Post	8 (34.8)	11 (47.8)	3 (13.0)	1 (4.3)		
		Respiratory	GI	Neuro	Trauma/ Incident	Endo	Other
Most responsible diagnosis: Absolute (%)	Pre	15 (41.7)	6 (16.7)	3 (8.3)	1 (2.8)	3 (8.3)	8 (22.2)
	Post	7 (30.4)	9 (39.1)	2 (8.7)	2 (8.7)	1 (4.3)	2 (8.7)

patients had an ASA score of 1 or 2. For most patients, the most responsible diagnosis for admission was a respiratory or gastrointestinal condition.

Quality of rounds

As outlined in [Table 2](#), frequency statistical analysis showed that before our intervention, *Nutrition*, *IV Access*, *Medication*, *Physical Exam*, and *Discharge* were the items most omitted during rounds, being discussed less than 80% of the time. After the implementation of the checklist all those items, except for *IV Access*, were significantly more addressed during rounds. *PEWS*, discussed relatively often without the PIRC, was more frequently mentioned post-intervention. *Most Responsible Diagnosis*, *Active Issues*, *Plan* and *Patient/Parents' questions answered* were initially discussed more than 90% of the time and their frequency of discussion remained the same post-intervention.

Rounding time

The mean rounding time per patient was 0.21 and 0.22 hour during the pre- and post-intervention phases respectively (P-value 0.705).

Rounds Quality Score (RQS) and influencing factors

For the pre- and post-intervention phase, the mean RQSs were 8.24/10±1.36 and 9.61/10±0.61 respectively (P-value < 0.001). This shows a significant improvement in quality of rounds with the CRT.

With repeated presentations for the same patient during a hospital admission, a decrease in rounds quality, especially regarding discussion of *Most Responsible Diagnosis*, *Nutrition* and *Physical Exam*, was observed pre-intervention, but not post-intervention.

From the first observation to the fourth for a same patient, *Most responsible diagnosis* was discussed from 100% to 75% of time (P-value 0.027), *Nutrition* from 85.7% to 45.5% (P-value 0.035) and *Physical exam* from 83.3% to 50% (P-value 0.02).

For the pre-intervention phase exclusively, a significant correlation between PEWS and quality of rounds was observed (P-value 0.024). Higher PEWS were associated with greater quality of rounds.

Regarding the ASA score, the only significant observation was that *Medication* was more often discussed for patients with an ASA score of 2 or 3 in comparison to 1, during the pre-intervention phase. Complete omission of medication was observed 37% of time with ASA 1 patients compared to 4% and 0%, respectively with ASA 2 and 3 patients (P-value 0.001).

It was not possible to assess the influence of the diagnosis type on quality of rounds given the small sample of each diagnosis type.

Patient and parent satisfaction

The Patient and Parents Satisfaction survey ([Supplementary Appendix 1](#)) was completed 20 times by patients and 52 by parents during the pre-intervention phase and 7 times by patients and 42 by parents during the post-intervention phase. Almost all surveys distributed were completed.

As provided in [Table 3](#), understanding of discharge timing achieved the lowest level of satisfaction pre-intervention, which improved from a mean of 6.48 to 8.67/10, (P-value < 0.001) post-intervention. The items A, B, D, and E improved significantly post-intervention. Finally, the only item for which there was no difference in satisfaction pre- and post-intervention was the perception of rounding time, with a mean score of approximately 5, meaning *just the right* duration.

Table 2. Quality of rounds: Comparison between pre- and post-intervention

Rounding tool's Items	Time	Items addressed, frequency (%)	Chi-square	P-value
Most responsible diagnosis	Pre	92.8	3.934	0.082*
	Post	100		
Active issues	Pre	97.6	1.257	0.524*
	Post	100		
Nutrition	Pre	72	14.773	< 0.001
	Post	98.1		
IV access	Pre	76.2	0.980	0.443
	Post	87.5		
Medication†	Pre	48.8	29.896	< 0.001
	Post	94.2		
PEWS‡	Pre	84.1	7.001	0.03
	Post	98.1		
PE§	Pre	66.7	16.243	< 0.001
	Post	96.2		
Plan	Pre	100	1.627	0.382*
	Post	98.1		
Discharge discussed	Pre	65.4	4.698	0.03
	Post	82.7		
Patient/Parents' questions answered	Pre	90.5	2.957	0.228
	Post	92.3		

*Corrected P-value (Fisher's Exact test)

†MAR directly reviewed

‡PEWS sheet directly reviewed

§Physical exam findings discussed, or Physical exam stated as not done

Table 3. Parents and patients' rounds satisfaction survey results

Questions	Time	Mean	Std.-deviation	P-value
A. Important information discussed*	Pre	9.03	1.98	0.010
	Post	9.78	0.507	
B. Understand the plan*	Pre	8.81	1.95	0.002
	Post	9.72	0.784	
C. Understand timing of discharge*	Pre	6.48	3.25	< 0.001
	Post	8.67	2.135	
D. Felt included*	Pre	8.78	2.13	0.002
	Post	9.76	0.591	
E. No unanswered questions*	Pre	8.93	2.02	0.014
	Post	9.70	0.953	
F. Rounding time perception†	Pre	4.90	1.01	0.283
	Post	5.06	0.240	

*The first five statements were ranked from 1 to 10, 1 being *completely disagree* and 10 *completely agree*.†The sixth statement was ranked from 1 to 10, 1 being *too short*, 5 *just right* and 10 *too long* regarding rounding time perception.

The qualitative analysis of comments on the survey showed general appreciation (42% and 64% of the comments, respectively pre- and post-intervention) and comments regarding negative experiences or suggestions for improvement (33% and 36%, respectively pre- and post-intervention). Few comments mentioned confusion regarding discharge timing and miscommunication amongst team members during the pre- (3 comments) and post-intervention phases (2 comments).

DISCUSSION

The primary outcome of this study was to assess if the quality of daily inpatient paediatric rounds, which was defined as discussing all items deemed essential for patient care, could be improved by using a standardised rounding tool. In light of our results, using the PIRC improved quality of rounds, without affecting rounding efficiency. Indeed, the RQS showed a significant improvement in global quality of rounds post-intervention. Furthermore, the pre-intervention phase clearly identified important items that were regularly not discussed during rounds: *Nutrition, IV Access, Medication, Physical Exam, and Discharge*. The use of the PIRC led to significant improvements in addressing these items except for IV Access. Strategies that might improve the addressing of IV access during rounds include assigning an individual on the team to remind team members to use the PIRC during rounds. Idahosa and Kahn (2) observed that encouragement to use a tool by the supervising staff resulted in better uptake of the tool, making omission of rounding items less likely. As time management is a real challenge in all medical units, it is even more interesting that those results were obtained without prolonging rounding time. We can postulate that use of the PIRC helps structure patient presentation on rounds, allowing the team to discuss more topics in a time efficient manner.

The secondary outcome of this study was to explore if patient and parent satisfaction with rounds could be improved with the use of a standardized rounding tool. After comparative analysis of pre- and post-checklist implementation survey data, improved satisfaction was noted, especially with regards to understanding discharge planning. Knowing that discharge criteria is one of the most sought-after pieces of information for a patient/parent (15), use of the PIRC clearly improves the patient/family-centred approach to care.

Some factors were identified as influencing the quality of rounds during pre-intervention observations. Patients' length of stay and quality of rounds were inversely proportional with respect to discussion of *Most Responsible Diagnosis, Nutrition and Physical Exam*. These items were progressively more omitted throughout the same patient's admission. An association between higher PEWS and increased quality of rounds was observed in the pre-implementation phase. Although this

is positive, all patients, irrespective of their acuity, deserve all aspects of their care discussed. Using the PIRC controls for these influencing factors and allows higher quality of rounds for all patients, regardless of their acuity or length of stay.

There were some limitations to this study. First, quality of rounds was arbitrarily defined as discussion of all items outlined on the PIRC, without studying the impact of omitting a certain item. Further, the PIRC developed by the research team was not a validated tool; however, we tried to overcome this by incorporating items from other rounding tools in the literature which had been previously validated. The PIRC was also peer reviewed by a panel of general paediatricians. In a future study, it would be interesting to assess the real impact of the checklist on patients' care such as rates of medical errors and critical incidents, as well as length of stay and re-admission. Second, the RA was not blinded as to whether the rounding tool was being used or not, as the medical team used physical copies of the tool and members were encouraged to use the tool by the senior resident if it was forgotten. We did however ensure the RA was rigorously trained to identify items discussed during rounds that were consistent with the PIRC items. Third, with respect to the secondary outcome of assessing patient and parent satisfaction with rounds, the patient/parent sample size was small. It would be interesting to repeat the study with a greater sample of patients to confirm or invalidate our results. Finally, the impact of the checklist was studied in a teaching hospital, where good communication is often challenging given multiple professionals and learners involved in patient care. We would expect similar outcomes in other teaching hospitals. In the community setting however, its applicability may not be as strong as a single physician typically rounds alone, reducing the need for structured rounds presentation. In that situation, the checklist could be used as a reminder to prevent overlooking important components of patient care, rather than using it as a communication tool. The research team is happy to report that the original version of the PIRC continues to be in use with good uptake from staff physicians at KGH.

In sum, this study suggests that use of a standardized rounding tool can improve quality of rounds on a general paediatric ward. It showed significant improvement in terms of addressing all items deemed essential to discuss during daily rounds for optimal patient care and led to increased patient and parent satisfaction with rounds, without impacting rounding time.

SUPPLEMENTARY DATA

Supplementary data are available at *Paediatrics & Child Health Online* by searching for pxab080.

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References

- Collins S, Hurley AC, Chang FY, et al. Content and functional specifications for a standards-based multidisciplinary rounding tool to maintain continuity across acute and critical care. *J Am Med Inform Assoc* 2014;21(3):438–47.
- Idahosa O, Kahn JM. Beyond checklists: using clinician prompts to achieve meaningful ICU quality improvement. *Crit Care* 2012;16(1):305.
- Stein J, Payne C, Methvin A, et al. Reorganizing a hospital ward as an accountable care unit. *J Hosp Med* 2015;10(1):36–40.
- O’Leary KJ, Killarney A, Hansen LO, et al. Effect of patient-centred bedside rounds on hospitalised patients’ decision control, activation and satisfaction with care. *BMJ Quality & Safety* 2016;25(12):921–8.
- Sharma S, Peters MJ. “Safety by DEFAULT”: Introduction and impact of a paediatric ward round checklist. *Critical Care* 2013;17:R232.
- Hulyalkar M, Gleich SJ, Kashyap R, et al. Design and α -testing of an electronic rounding tool (CERTAINp) to improve process of care in pediatric intensive care unit. *J Clin Monit Comput* 2017;31(6):1313–20.
- Ganesan R, Rajakumar P, Fogg L, Silvestri J, Kane JM. WE CARE 4 KIDS: Use of a rounding tool in the Pediatric Intensive Care Unit. *Pediatr Qual Saf* 2017;2(6):e044.
- Chuo J, Graysib S, Hufnal C, Carroll J, Jani G. Results from implementing medical checklist “rounding tool” into care practices in a large Neonatal Intensive Care Network. *Pediatrics* 2018;142:364.
- Arriaga Redondo M, Sanz López E, Rodríguez Sánchez de la Blanca A, et al. Mejorando la seguridad del paciente: utilidad de las listas de verificación de seguridad en una unidad neonatal [Improving patient safety: Usefulness of safety checklists in a neonatal unit]. *An Pediatr (Barc)* 2017;87(4):191–200.
- Mckelvie BL, McNally JD, Menon K, Marchand MGR, Reddy DN, Creery WD. A PICU patient safety checklist: Rate of utilization and impact on patient care. *International Journal for Quality in Health Care* 2016;28(3):371–5.
- Seigel J, Whalen L, Burgess E, et al. Successful implementation of standardized multidisciplinary bedside rounds, including daily goals, in a pediatric ICU. *Joint Commission Journal on Quality and Patient Safety* 2014;40(2):83,AP1–90,AP2.
- Lopez M, Vaks Y, Wilson M, et al. Impacting satisfaction, learning, and efficiency through structured interdisciplinary rounding in a pediatric intensive care unit: A quality improvement project. *Pediatric Quality & Safety* 2019;4(3):e176–e176.
- Cox ED, Jacobsohn GC, Rajamanickam VP, et al. A family-centered rounds checklist, family engagement, and patient safety: a randomized trial. *Pediatrics* 2017;139(5):e20161688
- Altman DG. *Practical Statistics for Medical Research*. London: Chapman and Hall; 1991:456.
- Holton R, Patel R, Eggebrecht M, et al. Rounding on rounds: Creating a checklist for patient- and family-centered rounds. *Am J Med Qual* 2015;30(5):493.