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Targeted Interventions Improve Shared Agreement of Daily Goals in the Pediatric Intensive Care Unit

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Abstract

Objective—To improve communication during daily rounds using sequential interventions.

Design—Prospective cohort study

Setting—Multidisciplinary pediatric intensive care unit in a university hospital.

Subjects—The multidisciplinary rounding team in the pediatric intensive care unit, including attending physicians, physician trainees, and nurses.

Interventions—Daily rounds on 736 patients were observed over a nine month period. Sequential interventions were timed 8–12 weeks apart: (1) Implementing a new resident daily progress note format, (2) creating a performance improvement 'dashboard,' and (3) documenting patients' daily goals on bedside whiteboards.

Measurements and Main Results—Following all interventions, team agreement with the attending physician's stated daily goals increased from 56.9% to 82.7% ($p < 0.0001$). Mean agreement increased for each provider category: 65.2% to 88.8% for fellows ($p < 0.0001$), 55.0% to 83.8% for residents ($p < 0.0001$), and 54.1% to 77.4% for nurses ($p < 0.0001$). In addition, significant improvements were noted in provider behaviors following interventions. Barriers to communication (bedside nurse multitasking during rounds, interruptions during patient presentations, and group disassociation) were reduced, and the use of communication facilitators (review of the prior day's goals, inclusion of bedside nurse input, and order read back) increased. The percentage of providers reporting being 'very satisfied' or 'satisfied' with rounds increased from 42.6% to 78.3%, ($p < 0.0001$).

Conclusions—Shared agreement of patients' daily goals among key healthcare providers can be increased through process-oriented interventions. Improved agreement will potentially lead to improved quality of patient care and reduced medical errors.

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Keywords

Teaching Rounds; Communication; Safety; Health Care Quality Assurance; Interdisciplinary Health Team; Intensive Care Units/ Organization & Administration

Introduction

Effective communication between healthcare providers is essential to safe and reliable patient care [1, 2]. Daily teaching rounds are a particularly important time for communication, as they are often the only time of day the entire care team gathers to discuss a patient's plan of care. In the era of work-hour restrictions, rounds are being increasingly used to transition care between providers as a form of patient handoffs. Handoffs themselves are a high-risk time for communication errors, as highlighted in both the Joint Commission's National Patient Safety Goals and the Accreditation Council for Graduate Medical Education's Committee on Innovation [3, 4].

Despite the crucial importance of daily rounds to sharing patient information, and by extension, to quality patient care, there is a paucity of research regarding the structure or function of the rounding process. Previous studies have shown that a communication facilitator, such as a daily goals worksheet, can significantly improve the perceived quality of communication among providers [5–8]. Pronovost, et. al. demonstrated an association between improved communication on rounds and clinical outcomes, showing decreased length of intensive care unit (ICU) stay after implementation of a daily goals worksheet [7]. Similarly, after institution of a daily checklist, DuBose, et. al. were able to show improved compliance with unit policies, along with decreased rates of catheter-associated line infections and ventilator-associated pneumonia [5].

To date, prior studies have not addressed the primary causes of communication breakdown during daily rounds, nor have they shown objective measures of improved communication following interventions that modify rounds. One approach to objectively measure effective communication is to evaluate how well a patient's plan of care is understood by all providers at the conclusion of daily rounds. The aim of this study was to improve shared agreement of patients' daily plans among multidisciplinary providers in the Pediatric Intensive Care Unit (PICU).

Materials and Methods

Study Population

The Duke PICU consists of a 16 bed unit that cares for critically ill pediatric patients of all medical and non-cardiac surgical specialties, including those requiring extracorporeal life support. The study population included the PICU rounding team: the patient's bedside nurse, the PICU charge nurse, a pediatric respiratory therapist (RT), a pediatric critical care attending physician, a pediatric critical care fellow, and four residents (either pediatric, combined medicine-pediatric, emergency medicine, or anesthesia). This study was approved by the Duke University Institutional Review Board.

Research Protocol and Data Collection

By convenience sampling, daily rounds were observed by a single Clinical Nurse Specialist (CNS) not directly involved in rounds or in patient care. Prevalence of previously identified communication barriers and facilitators were recorded, including: bedside nurse multitasking, interruptions to the patient presentation prior to forming a daily plan, group

disassociation, review of the prior day's goals, inclusion of bedside nursing input, and read-back of orders. Nurse multitasking was defined as the bedside nurse performing other activities while rounds were taking place on his or her patient, even if the nurse was at the patient's bedside. Examples of interruptions included noise from televisions and radios and prolonged discussion of the plan during data presentation. Brief questions and comments which clarified patient data were not considered interruptions. Group disassociation included members of the rounding team engaging in non-clinical conversations, phone conversations, and text messaging during data presentation and plan formation. Read-back of orders was defined as a verbal summary of the orders entered into computerized provider order entry (CPOE) during that individual patient's rounds.

Immediately after the conclusion of rounds on all PICU patients, the CNS delivered a daily goal checklist for randomly selected patients to key members of the patient's team: the attending physician, on-call fellow, on-call resident, and the patient's primary bedside nurse. These checklists were designed and introduced for the purposes of this study and had not been previously utilized. The checklist contained fifty-seven common daily goals identified during pilot data collection. Each provider then independently completed the checklist without input from other team members or the CNS. Providers were instructed to select up to four daily goals for each patient, and were allowed to free-text goals not listed on the checklist.

To minimize disruption to clinical care, measurements of shared agreement were limited to eight patients per day. To negate selection bias due to patient severity of illness or team performance secondary to length of rounds, patient bed spaces were selected using a software-generated random number list (one to sixteen). If the selected bed space was empty, the CNS identified another occupied bed space for measurement of shared agreement. Providers completing the checklist were blinded to the randomization process.

Interventions

After collection of four weeks of baseline data, three sequential interventions were made over the nine month study period: (1) a new resident daily progress note format, (2) a performance improvement 'dashboard,' and (3) use of a bedside whiteboard to document daily goals. The paper-based daily note served as both the daily progress note for the medical record and also provided the template for patient presentations by residents during rounds. The performance improvement dashboard was a poster that included a summary of our project goals and real-time results, posted prominently in the PICU in a location accessible to all PICU staff. The whiteboard was posted at each bedside, and the on-call fellow was directed to write up to four daily goals on the board at the conclusion of that patient's rounds. Interventions were timed a minimum of eight weeks apart in an effort to achieve a new baseline prior to the subsequent intervention; the whiteboard was delayed until twelve weeks based on availability of supplies.

Survey

Prior to and following the completion of all interventions, a six question on-line survey was sent to all members of the PICU team, including physicians, nurses, and ancillary staff. The questions' themes were (1) satisfaction with rounds and (2) perceptions of team culture, measured using a 5-point Likert scale. Questions regarding team culture in the PICU were modified from the previously validated Safety and Attitudes Questionnaire [9].

Outcomes

The primary outcome of this study was shared goal agreement. Using the attending physician as the gold standard, individual goal agreement was calculated as the percentage

of the attending physician's stated daily goals also stated by each provider (fellow, resident, and bedside nurse). For example, if the attending physician stated the daily goals for a patient as 'extubate,' 'diurese,' 'pulmonary consult' and 'family meeting,' and the resident independently stated the daily goals for the same patient as 'extubate,' 'diurese,' 'family meeting,' and 'control hypertension,' the resident's agreement score for the patient would be 3 out of 4, or 75%. Team goal agreement for one patient was calculated as the average agreement of each individual agreement score for that patient. Secondary outcomes included prevalence of communication barriers and facilitators during rounds, as well as assessment of team culture and satisfaction with rounds.

Statistical Analyses

Continuous variables were evaluated using univariate linear regression; dichotomous variables were compared using Fisher's Exact Test. Data was analyzed using JMP v. 7 (SAS, Inc. Cary, NC). A p value ≤ 0.05 was considered statistically significant for all analyses.

Results

Shared Agreement

Daily rounds on 736 patients were observed over a nine month period. Agreement was measured on 592 patients. Of the 144 observed patients for whom daily goal agreement was not measured, 82 patients were not selected due to randomization and 62 patients were missing the attending physician's daily goal checklists. Overall checklist return rate was 76.7% (2006 of 2616), the great majority of which (89.5%) were completed prior to noon. Baseline mean team agreement prior to initiation of study interventions was 56.9%. Overall mean team agreement increased with each intervention to a final agreement of 82.7% ($p < 0.0001$) (Figure 1). At the completion of the study period, mean agreement had also increased for each provider group: 65.2% to 88.8% for fellows ($p < 0.0001$), 55.0% to 83.8% for residents ($p < 0.0001$), and 54.1% to 77.4% for nurses ($p < 0.0001$).

Observed Behaviors

Following interventions, improvements were also noted in provider behaviors believed to affect information transfer. Multiple barriers to communication were reduced, including: bedside nurse multitasking during rounds (27.5% to 9.4%, $p < 0.0001$), interruptions during patient presentations (17.4% to 7.6%, $p = 0.01$), and group disassociation (17.4% to 7.6%, $p = 0.01$). Similarly, use of facilitators of communication increased: the prior day's goals were reviewed (1.1% to 93.7%, $p < 0.0001$), bedside nurse input was solicited (74.3% to 97.0%, $p < 0.0001$), and orders were read back at the conclusion of patient discussion (76.4% to 93.1%, $p = 0.0001$). Time required to complete rounds was unchanged (12.3 vs. 12.2 minutes per patient, $p = 0.45$).

Satisfaction and Team Culture

Pre- and post-intervention survey response rate was 115/210 (54.8%). By discipline, response rate was 47/66 (71.2%) for physicians, 55/120 (45.8%) for nurses, and 13/24 (54.1%) for other staff. At the conclusion of the study, the percentage of providers who reported being 'very satisfied' or 'satisfied' with rounds significantly increased from 42.6% to 78.3%, ($p < 0.0001$). Responses to other team culture questions are summarized in Table 1. Table 2 delineates responses by discipline; statistics were not reported due to low numbers of responses in each category. Favorable responses were not significantly different by discipline for any of the survey questions.

Discussion

This single-center, prospective cohort study demonstrated an increase in the medical team's shared agreement of patient's daily goals following a series of three simple interventions. All disciplines saw increases in individual agreement with the attending physician. The improved shared agreement was also associated with enhanced team culture and higher provider satisfaction with daily rounds.

With the knowledge that poor communication is a major contributing factor to medical errors [10, 11], it is imperative that healthcare providers focus on improving information transfer. Daily rounds are uniquely comprised of multiple critical factors that affect communication, including: discussion among providers of different disciplines, transfer of care, and plan formation. Rounds are also increasingly being used for handoff communication, which is a recognized high risk time for communication errors [2–4, 12–14]. Our study is the first to show an objective improvement in communication during daily rounds following specific interventions.

Previous studies have shown that a tool such as a daily goals worksheet or checklist can subjectively improve communication, as generally reported by staff surveys following interventions [6–8]. Our results are consistent with prior work, in that our staff reported improved perception of communication and teamwork following sequential interventions. However, because self reported data may not always be reliable [15, 16], it was important that these findings be confirmed using an objective measure. Furthermore, we minimized the Hawthorne effect by using as our observer a CNS who had already been periodically observing rounds months before the onset of this study.

A significant challenge in our study was determining how to objectively measure communication effectiveness. Through our collection of preliminary data, we determined that 'formation of daily plan' was listed as the principal reason for rounding, regardless of discipline or level of training [17]. With this primary objective in mind, we chose to measure agreement among providers regarding their impression of each patient's plan of care at the conclusion of rounds, essentially determining if everyone was 'on the same page.'

Periodic briefings, an integral component of crew resource management, are used to promote situation awareness, ensuring providers are aware of common goals and potential pitfalls [18–20]. Prior to the onset of this study, the Duke PICU had already instituted pre- and post- rounds huddles to improve team awareness of expected patient flow and to delineate priorities for patient care. However, bedside nurses were not included in these briefings, and these briefings did not guarantee agreement regarding the daily plan among all team members. Furthermore, no prior improvements had been focused on individual presentations during rounds.

A staff survey and preliminary observations of rounds identified multiple drivers which potentially affected shared goal agreement among providers; our interventions were targeted at the primary driver themes: presentation style, team approach, and clarity of final plan. Presentation style was addressed via redesign of the resident's daily note. This new note created a format that focuses on patient trajectory and acute issues, and also includes triggers for review of daily goals, nursing input, and readback of orders. The project dashboard emphasized the entire medical team's involvement in the project by providing real-time feedback and serving as a constant reminder of the importance of this initiative. Finally, the whiteboard forced the medical team to clearly define patient goals in written form prior to concluding rounds on an individual patient. This served a similar function to the daily goals worksheet used by centers in prior studies [7, 8, 21], but was easily completed and remained visible throughout the day to bedside staff and families.

Unfortunately, despite separating each of the three discrete interventions by at least eight weeks, it was not possible to differentiate the individual effects from the cumulative change occurring over time due to earlier interventions. However, significant improvements were noted after each individual intervention, suggesting an added benefit with each process change. Furthermore, prior studies have shown that successful targeting of human factors and culture change often requires sequential interventions [22, 23].

Since no prior studies have objectively measured shared goal agreement between providers, we were required to develop a novel measurement methodology. We first formed a list of common PICU daily goals using pilot data and observations. However, the infinite list of potential daily goals required allowance for free-response data from multiple providers, which did not conform to standard statistical techniques for measuring agreement. We therefore developed a metric of shared goal agreement, converting free-response data to a reproducible numerical assessment. We chose the attending physician as the gold standard for this measurement tool.

This selection of the attending physician as the gold standard for this measurement is inherently associated with some limitation and does not address the appropriateness or correctness of a given set of goals. However, in our PICU, the attending represents the person responsible for coordinating and directing the multidisciplinary team with ultimate responsibility for all of the daily plans that are implemented. Despite limitations to this study, many of which are common to performance improvement initiatives, we were able to achieve both objective and subjective improvements in communication during daily rounds. Keys to the success of this project included taking time to understand inherent barriers to communication, identification of actions which facilitated communication, and using a team-oriented approach to achieve our study aims. We will continue to periodically monitor shared agreement among providers to ensure that we are able to sustain the successes of this project.

Ultimately, we would like to continue future studies that link improvements in communication of this nature to clinical and patient safety outcomes, including medical errors, length of stay, and mortality. We also plan to use the lessons learned in this study to investigate agreement between medical providers and families, and to expand this study to other units which may benefit from enhanced communication during daily rounds.

Conclusions

Shared agreement of a patient's daily goals among key healthcare providers can be improved through targeted, process-oriented interventions. Improved agreement may potentially lead to better quality of patient care and fewer medical errors. Interventions such as the ones in this study may be easily applied to multiple other areas within the healthcare system that utilize rounds for patient care.

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Figure 1. Run chart of team agreement over time

Each data point represents one rounding event. Over the course of this study, agreement increased from a baseline of 56.9% to a new rate of 82.7% ($p < 0.0001$), with significant increases after each intervention. (66.2% following the institution of a new daily note and 71.9% after the institution of a project dashboard.)

Table 1

Summary of team culture survey results.

	Survey respondents giving a favorable response		
	Pre N = 54	Post N = 60	<i>p</i> -value
Question Asked:			
I am satisfied with rounds	42.6%	78.3%	$p < 0.0001$
I am a valued team member on rounds	58.5%	76.7%	$p = 0.038$
My input is appreciated on rounds	59.3%	71.7%	$p = 0.16$
Data presented on rounds is accurate	77.8%	81.7%	$p = 0.61$
The presenter is frequently interrupted during rounds	37.0%	46.7%	$p = 0.30$
At the end of rounds, I understand the patient's goals	77.8%	90.0%	$p = 0.072$

Table 2

Summary of team culture survey results, by discipline.

Question Asked:	Survey respondents giving a favorable response							
	Physicians		Nurses		Others			
	Pre N=24	Post N=23	Pre N=21	Post N=33	Pre N=9	Post N=4		
I am satisfied with rounds	33.3%	73.9%	61.9%	81.8%	22.2%	75.0%		
I am a valued team member on rounds	62.5%	82.6%	45.0%	69.7%	77.8%	100%		
My input is appreciated on rounds	66.7%	78.3%	52.4%	66.7%	55.6%	75.0%		
Data presented on rounds is accurate	87.5%	91.3%	66.7%	75.8%	77.8%	75%		
The presenter is frequently interrupted during rounds	16.7%	39.1%	61.9%	54.6%	33.3%	25.0%		
At the end of rounds, I understand the patient's goals	91.7%	100%	66.7%	84.9%	66.7%	75%		