ISSN 2641-1148

Implementing a Pediatric Resident Physician/ Bedside Nurse Shadow Program to Improve Interprofessional Collaboration and Understanding, and to Transform Practice

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Abstract

INTRODUCTION Resident physician/nurse collaboration is essential for patient safety and optimal clinical outcomes. Interprofessional shadowing experiences can facilitate understanding of team roles; however, enhanced understanding may not transform individual practices leading to workplace improvement. This educational innovation utilized a resident/nurse shadow program to raise awareness of interprofessional roles and as a needs assessment to identify and educate about specific system-wide standards that can lead residents to transform their practices to improve nurse workflow.

METHODS From 2018-2020, 44 first-year pediatric residents at a free-standing children's hospital shadowed nine nurse preceptors. Each nurse received an orientation and checklist of topics to cover. Residents observed nursing responsibilities including admissions, line placement and medication administration. All participants completed pre-post surveys.

RESULTS Post-surveys demonstrated a statistically significant improvement ($p<.00001$) in Likert scores of residents' self-rated understanding of nursing cares and workflow. The experience uncovered three system-wide scheduling standards where resident modification of ordering practices could optimize nursing workflow: timing of morning lab draws, new medication administration, and delivery of dietary formula. The shadow program was modified to include education in these three areas and participants had statistically significant ($p<.01$) increased knowledge of timing of morning labs and new medication administration (35% and 39% improvement, respectively). Nurse understanding of resident workflow was not measured due to limited data.

DISCUSSION A resident/nurse shadow program successfully improved resident awareness of nursing roles and was an innovative way to identify specific areas of workflow improvement. Program modifications are required to create a true, bidirectional, resident/nurse interprofessional shadow experience.

Received: 11/30/2022 *Accepted*: 05/23/2023

Implications for Education and Practice

- Interprofessional shadowing experiences between resident physicians and nurses, as part of a structured educational program, can increase awareness of one another's roles and improve collaboration and communication.
- Physician-nurse shadowing can serve as a valuable needs assessment tool to identify, educate, and assess knowledge on specific resident physician workplace practices and proactively improve nursing workflow and the patient experience.

Introduction

In healthcare, interprofessional collaboration is vital for a safe environment with optimal clinical outcomes (Rosen et al., 2018; Leonard et al., 2004). An integral part of the healthcare team is the physician/nurse dyad. While physicians and nurses have different trainings and approaches to patient care, their partnership can be strengthened by exploring one another's role through a different lens.

The Interprofessional Education Collaborative (2016) describes four competencies to promote safe, high-quality, accessible, patient-centered care across health professions. One competency suggests that team members recognize the relationship between their role and others' to provide best patient care. This standard is also emphasized in medical education training. The Clinical Learning Environment Review (CLER), implemented by the Accreditation Council for Graduate Medical Education (ACGME), describes "teaming" as the optimal environment where healthcare team members recognize one another's value in collaborating for patients' needs (CLER Evaluation Committee, 2019). The ACGME further mandates that medical trainees achieve competence in "systems-based practice," which highlights working in interprofessional teams to enhance patient safety and improve care (ACGME, 2022).

Given the focus on interprofessional education and experiences for physicians, several studies have analyzed interprofessional practices and outcomes. Tan et al. (2017) performed an integrated review of studies on physician/nurse communication and concluded that communication barriers require innovative interventions. Interprofessional shadow experiences are one such innovation and have been implemented across settings and providers. Studies suggest that shadowing improves collaboration by increasing awareness and understanding of other team members' roles (Jain et al., 2012; Johnson et al., 2020; Nolte, 2018; Shafran et al., 2015; Hailu et al., 2020; Rider et al., 2019; Monroe et al., 2021). While gaining this perspective is valuable, study outcomes have not evolved to change practices that may translate into actionable, measurable, and sustainable improvements in the workplace.

In a qualitative study of a pediatric resident/nurse shadow program by Walsh et al. (2017), interviews uncovered the unique theme of "transforming practice," whereby residents identified specific behaviors that changed after the experience. One resident "double-checked orders before signing them to ensure they would be [described] clearly for the nurse implementing them." Chan et al. (2017) similarly asked internal medicine residents, after shadowing nurses, to identify actionable items to improve collaboration. Responses included, "writing orders to accommodate better workflow for nurses." The goal to intentionally "transform practice" based on one's observations, however, still left a gap in the literature – how does one measure that transformation? We created a resident physician/bedside nurse shadow program at our institution with this intent in mind.

The purpose of our project was to determine if a structured resident physician/bedside nurse interprofessional shadow experience 1.) improved understanding of interprofessional roles, 2.) identified residents' knowledge of specific system-wide standards that directly affect nurses' workflow, and 3.) successfully educated residents on how transforming their individual practices may benefit the working environment. To our knowledge, the use of a shadow experience for needs assessment, where participants make real-time observations of workflow and identify areas for improve-

ment in time management, resource utilization, and patient experiences with a goal to modify their practices, has not been previously described.

From here on, for brevity, 'pediatric resident physician' and 'inpatient bedside nurse' will be referred to as 'resident' and 'nurse,' respectively.

Methods

The resident/nurse shadow experience was created at a large, urban, free-standing children's hospital. The initial idea was developed by a nurse and resident and then presented to resident class representatives and nursing leaders who were enthusiastically supportive. The study team next met with independent focus groups, averaging six nurses and residents each, who developed program goals. Subsequently, project leaders identified shared objectives which informed the shadow program design. These focus groups met three times throughout the project to define measurable criteria.

From 2018-2020, first-year pediatric residents were scheduled a four-hour shadow block during an inpatient rotation in one of two acute care units which offered the greatest variety and frequency of nursing responsibilities. The program ran annually from July-December and resumed April-June to avoid high-census winter months. Nursing leaders selected preceptors that had at least one-year of nursing experience, strong interpersonal and time management skills per clinical evaluations, a range of technical nursing competencies, and were interested in engaging with residents. During the 30-minute preceptor orientation, program objectives were defined and preceptors received a checklist of topics to review with each resident, creating a standardized experience across participants (Table 1). To maintain a consistent preceptor pool, each nurse served as a preceptor multiple times.

The morning of their assigned shadowing block, residents met their preceptor and observed night-to-day nurse handoff, a face-to-face exchange of patient information for continuity of care across shifts. The residents then followed the nurses as they conducted their daily tasks. Nurses discussed their responsibilities as topics from the checklist presented, answered questions, addressed misunderstandings, and were specifically encouraged to ask residents about their daily workflow.

Using the theoretical framework of Kirkpatrick's Evaluation Model levels one and two, pre-post surveys were designed to measure nurse and resident participants' reactions and knowledge acquisition that resulted from the shadow program (Kirkpatrick, 2006). The pre-surveys contained 5-7 Likert-scale questions, an assessment of resident knowledge of specific nursing tasks, and open-ended questions. The nurse survey also

Checklist of Nursing Topics for Shadow Program

- ✓ Nursing handoff
- ✓ Bedside patient assessments
- ✓ Medication administration and delivery
- ✓ Lab specimen collection
- ✓ Placing and assessing intravenous lines
- ✓ Obtaining dietary formula and managing feeds
- ✓ Nursing role during physician rounds
- ✓ Admission and discharge processes

Specificity Added to Topics

- ✓ Timing of morning blood draws
- ✓ Delivery time of premixed formula
- ✓ Default timing of new medications

Table 1. *Nursing Topics for Shadow Program*

included three multiple-choice knowledge questions about resident responsibilities. Post-surveys elicited feedback about the shadow program (Table 2). Surveys were distributed via Research Electronic Data Capture.

In 2019, through focus groups and surveys, three system-wide standards were identified where resident knowledge of could potentially improve nursing workflow: timing of morning lab draws, delivery times of premixed patient dietary formulas to the unit, and default timing of new medications ordered without a start time. These three topics were added to the shadowing checklist. Resident knowledge of these specific areas was assessed via updated pre-, post-, and year-end surveys. Paired T-test and average Likert-scores were calculated to compare survey data. This project was exempted by our Institutional Review Board and participants could opt-out at any time.

Results

From 2018-2020, 44 residents and 9 nurses participated in the shadow program. Resident survey completion was 100% pre-survey (44/44) and 80% post-survey (35/44). Each nurse completed the pre-post surveys once (9/9). Due to the focus of this case report, not all survey results have been included.

Average scores for "familiarity with the patient cares a nurse performs" and "understanding of nurses' workflow," improved from 3.1 to 1.9 and 3.63 to 2.14, both statistically significant [$p<0.0001$, 95% CI [0.78, 1.11]; $p<0.0001$, 95% CI [1.27, 1.73], respectively (Table 3)]. All participating residents (35/35) felt the experience was "very or somewhat useful" to their education and 94% (33/35) felt the shadow experience was "very or somewhat likely" to change their communication with nurses. When asked what they would do differently go-

Resident Pre-Survey	Resident Post-Survey
How familiar are you with the patient cares nurses perform? (Likert scale)	How familiar are you with the patient cares nurses perform? (Likert scale)
How would you rate your understanding of the workflow of a nurse's day? (Likert scale)	How would you rate your understanding of the workflow of a nurse's day? (Likert scale)
What time are "morning labs" drawn? (multiple choice)	What time are "morning labs" drawn? (multiple choice)
If a formula is not available on the floor, what time(s) is it delivered? (multiple choice)	If a formula is not available on the floor, what time(s) is it delivered? (multiple choice)
What is the default time for administering new medications ordered without a start time? (multiple choice)	What is the default time for administering new medications ordered without a start time? (multiple choice)
Which tasks do you think you have the least understanding of (check the top 3)? (ranking based on nurse checklist of tasks)	Which nursing care did you find most helpful to learn about? (open-ended)
How often do you feel your lack of knowledge regarding general nursing responsibilities adversely affects patient care? (Likert scale)	Did you learn anything surprising about nursing responsibilities? If so, what specifically? (open-ended)
Please give a specific example of one of these situations: (open-ended)	How likely do you think this activity will change the way you and the nurses communicate with each other? (Likert scale)
How comfortable are you with communicating with a nurse when you have a concern about a patient? (Likert scale)	What is one change you will make in your working relationship with nurses as a result of this shadowing experience? (open-ended)
How often do you feel miscommunications between residents and nurses adversely affects patient care? (Likert scale)	Overall, do you feel like this experience was useful to your education? (Likert scale)
Please give a specific example of one of these situations: (open-ended)	What is something you wanted to learn today, but didn't get a chance to? (open-ended)
Which are you most looking forward to learning about today? (open-ended)	What was something that was less helpful and we could switch out in the future? (open-ended)
	Any additional comments or suggestions to improve the overall experience? (open-ended)

Table 2. *Resident and nurse pre- and post-shadow experience survey questions (cont'd)*

Nurse Pre-Survey	Nurse Post-Survey
How many patients does a resident take care of on average? (multiple choice)	How many patients does a resident take care of on average? (multiple choice)
How long does a resident (on average) stay on the same team? (multiple choice)	How long does a resident (on average) stay on the same team? (multiple choice)
How many months does an intern rotate through inpatient wards at PCH? (multiple choice)	How many months does an intern rotate through inpatient wards at PCH? (multiple choice)
How familiar do you think new intern residents are with nursing cares?	How familiar do you think new intern residents are with nursing cares? (Likert scale)
How many nursing cares do you think an intern resident should be familiar with performing? (Likert scale)	Which nursing cares did you find particularly informative or eye-opening for better resident understanding of your role? (open-ended)
Why do you feel this way? (open-ended)	How would you rate your understanding of the workflow of a new intern resident's day? (Likert scale)
How would you rate your understanding of the workflow of a new intern resident's day? (Likert scale)	Did you learn anything surprising about the resident's responsibility or workflow? If so, what specifically? (open-ended)
How often do you feel the resident's lack of knowledge regarding general nursing responsibilities adversely affects patient care? (Likert scale)	How likely do you think this activity will change the way you and the intern residents communicate with each other? (Likert scale)
Please give a specific example of one of these situations: (open-ended)	What is one change you will make in your working relationship with residents as a result of this shadowing experience? (open-ended)
How comfortable are you with communicating with a new intern resident when you have a concern about a patient? (Likert scale)	Overall, do you feel like this experience was useful to improving resident understanding of your daily workflow? (Likert scale)
How often do you feel miscommunication between residents and nurses adversely affects patient care? (Likert scale)	What was something you wanted to teach today, but didn't get a chance to? (open-ended)
Please give a specific example of one of these situations: (open-ended)	What was something on the checklist that was less helpful, and we could switch out in the future? (open-ended)
Which areas do you feel residents have the greatest misunderstandings or misconceptions about the responsibilities of a nurse? (check the top 3) (ranking based on nurse checklist of tasks)	Any additional comments or suggestions to improve the overall experience? (open-ended)
What is the one item on the checklist you are most excited to teach? (open-ended)	

Table 2 (cont'd). *Resident and nurse pre- and post-shadow experience survey questions*

ing forward, residents offered general strategies such as "Message nurse if I put a new order in" and "Cluster care and [prepare] patient of expectations."

Only 4 of 9 nurses completed the three questions on the pre-survey specifically about residents' workload and schedule, and none completed these questions on the post-survey. We were, therefore, unable to compare pre-post responses to measure knowledge and awareness nurses gained about resident roles from shadowing. The few open-ended nurse responses about the experience, however, were positive, including "This was an amazing experience that improved the working environment between disciplines…" When asked what they would change following the experience, one nurse said, "[I will be] more clear [to identify] each patient and [make] sure [the residents] know which patient I am talking about.

In 2019, pre-post surveys measured knowledge and retention of specific system-wide standards that affect nursing workflow. The percentage of residents who correctly knew when morning labs were drawn increased significantly from 50% to 85% after the shadow experience and was maintained by year-end [$p<.01$, 95% CI [21-48%], $p=0.22$, 95% CI [-0.8%-21%], respectively] (Figure 1). Knowledge of default time for administering new medications also increased significantly from

Survey question		Item choices Likert 1-5: Number (%) endorsing each response choice					Avg Likert score	P value
		1	2	3	4	5		
Familiarity with nursing care		Familiar with all tasks	Familiar with most tasks	Familiar with some tasks	Unfamiliar with most tasks	Unfamiliar with all tasks		
	Resident Pre-shadow (N=44)	1 (2.2)	0 (0)	36 (81.8)	6 (13.6)	1 (2.2)	3.09	
	Resident Post-shadow (N=35)	19 (54)	1 (2.9)	15 (42.9)	0 (0)	0 (0)	1.91	<.00001
Understanding of nursing workflow		Fully understand	Mostly understand	Neutral	Understand a limited amount	No understanding		
	Resident Pre-shadow (N=44)	0 (0)	4 (9.1)	11 (25.0)	26 (59.1)	3 (6.8)	3.63	
	Resident Post-shadow (N=35)	3 (8.6)	26 (74.2)	4 (11.4)	2 (5.7)	0 (0)	2.14	<.00001
As a result of this shadow experience, what is one change you will make when working with nurses?	Sample responses from residents: *"Clarify confusing orders and continue to communicate especially at change of shifts"* *"When ordering new tests or medications, let the nurses know so they can adjust their workflow accordingly"* *"Try not to order labs until I know all the labs needed"* *"Message nurse if I put a new order in"* *"Cluster care and [prepare] patient of expectations."* *"Try to communicate my thought process for why I'm answering a question a certain way or asking for something in particular"*							

Table 3. *Pediatric resident physician responses to select survey questions pre- and post-shadow experience indicate that the shadow program resulted in statistically significant improvement (p<.00001) in resident familiarity with nursing cares and resident understanding of nursing workflow*

36% to 75% and was maintained by year-end [p<.01, 95% CI [25-53%], p=0.05, 95% CI [10-40%], respectively]. Knowledge of when dietary formula was delivered to the floor was poorly retained, recalled, and statistically insignificant [p=0.11, p=0.22 respectively].

Discussion

Our structured resident/nurse shadow program successfully met several goals. It gave residents a sense of the unique challenges nurses face and post-surveys demonstrated improved resident understanding of nursing responsibilities and workflow. While these findings are similar to other shadowing experiences, previous studies have been limited to using the experience to improve awareness of one another's roles and to consider ways to change practices. To our knowledge, we are the first to take transforming practices to the next step.

Our novel approach used the shadow experience as a needs assessment tool to identify, educate, and assess knowledge on specific resident practices that may consume nurses' time, overutilize hospital resources, and negatively affect the patient experience. We focused on discreet actionable items, specifically educating residents on three system-wide standards identified through

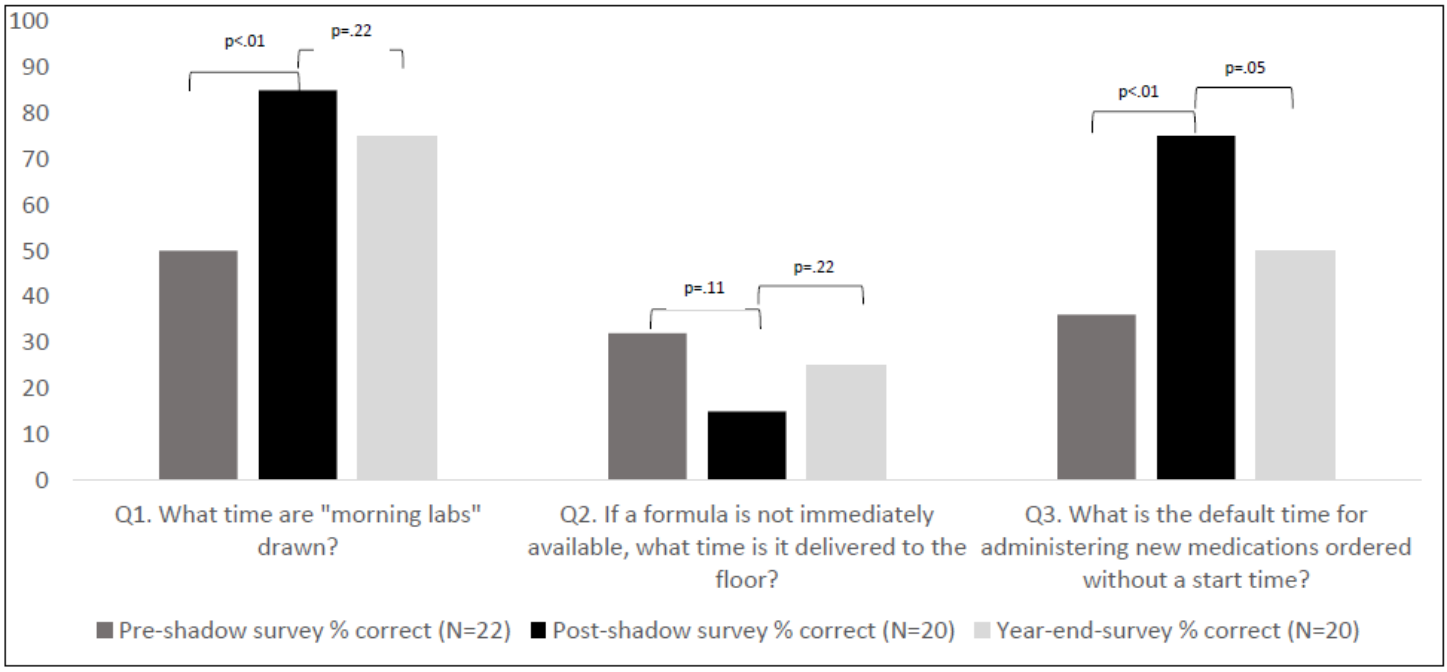

Figure 1. *Pediatric resident physician knowledge of key nursing workflow responsibilities before, after, and at year-end of the resident-nurse shadow experience; p<.01 indicates statistical significance*

shadowing, and documented significantly improved knowledge and retention in two standards: timing of morning lab draws and default timing of new medications ordered without a start time. The third question about delivery times of dietary formula to the unit required an exact response and we speculate residents did not retain this information during shadowing since it has less relevance to their workflow.

There were several project limitations. First, our surveys were not validated. Interestingly, only one study referenced in the introduction, Monroe et al. (2021), reported using a validated tool; their Interprofessional Collaborative Competency Attainment Survey, however, is not specific to physician/nurse collaboration and may be too general for our purposes. The development of a specific validated tool to assess physician/nurse interprofessionalism may further progress the study of shadow programs. One of our major barriers for attainment of a true interprofessional experience with bidirectional learning was the small pool of nurse preceptors. Each only completed the survey the first time they were shadowed, and not in its entirety. In addition, the nurse surveys had fewer questions about their understanding of the resident role since this experience was designed to emphasize the nurses' role. Consequently, we were unable to draw conclusions about nurses' understanding of residents' workflow. Residents suggested the program goals could be enhanced by having nurses also shadow residents, which is a more direct way to promote the bidirectional objective. We plan to explicitly create and measure true interprofessional learning in the next iteration of the resident/nurse shadow program. Another limitation is the shadow experience was only four-hours which limited access to more diverse nursing responsibilities. Finally, our program encompassed a single specialty and setting and may lack generalizability to other training programs.

Two major external factors impacted sustainability of our shadow program. The Severe Acute Respiratory Syndrome Coronavirus-2 pandemic disrupted the program in 2020 due to fluxing census, shifting resident assignments, and reduced elective experiences. In 2021, the hospitalist division restructured their staffing model and eliminated the resident admission shift where the experience occurred. The shadow program has since paused; however, based on past success, current interest, the end of the pandemic, and new scheduling opportunities, we are exploring restarting the resident/nurse shadow program.

Moving forward, we will use this project as a catalyst to study residents' transformation of practice. The nursing care with the greatest potential for structured quality improvement (QI) is blood draws. After shadowing, residents intended to be more cognizant of ordering all required labs for a single draw. We expect that a QI study to promote bundling of lab draws in our inpatient units will benefit patients' experiences, protect resources, decrease infection risk, improve cost savings, and streamline nursing tasks. This type of experiential learning and engagement in QI is vital for residency programs as well as for maintenance of certification following training.

Conclusions

Our resident/nurse shadowing program has evolved from shadowing to increasing interprofessional awareness to identifying QI domains within the clinical setting. Focusing on specific areas such as resident lab ordering practices, with the updated shadow experience that includes bidirectional interprofessional shadowing, shows promise to improve collaboration between physicians and nurses during training and beyond.

Acknowledgements

The authors wish to thank the nurses at our institution who served as preceptors for this valuable experience.

Disclosures

The authors have no competing interests to declare.

Author Contributions

CA: Conceptualization, Investigation, Methodology, Writing – Original Draft, Writing – Review & Editing

LD: Conceptualization, Investigation, Methodology, Writing – Review & Editing

AK: Investigation, Methodology, Writing – Review & Editing

SW: Investigation, Methodology, Writing – Review & Editing

VB: Formal analysis, Data Curation, Writing – Original Draft, Writing – Review & Editing, Visualization, Supervision

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