Using Patient Whiteboards to Engage Families in Harm Prevention and Care Planning: A Quality Improvement Study

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ABSTRACT

OBJECTIVES: Whiteboards are a valuable tool used to facilitate communication between families and the care team, but they were underused in our institution. Our aim was to increase families’ knowledge of their child’s plan of care, safety plan, and medical care team names by increasing the use of patient whiteboards with inpatient populations at a freestanding quaternary care children’s hospital.

METHODS: With this quality improvement study, we redesigned the whiteboard template to address the following 4 main barriers to use: (1) not having enough space to explain concepts to families, (2) having too much information to complete, (3) unclear roles of who completes the whiteboard, and (4) forgetting to update the whiteboard. We focused the content of the new template on critical information the family needed to know, assigned roles to make it easy to know who filled out which section, and used plain language.

RESULTS: The use of each whiteboard section on the old templates (n = 92) versus new templates (n = 424) were compared. Use increased for all sections (plan of care [48.9% to 71.6%; P = .008], safety plan [4.3% to 22.8%; P = .001], medical team [85.8% to 87.6%; P = .068], nurse’s name [94.5% to 98.8%; P = .031]). After the template redesign, 85.8% of families knew the plan of care, 32.3% knew the safety plan, 61.5% knew the medical team’s name, and 92.8% knew the nurse’s name.

CONCLUSIONS: After the implementation of a new whiteboard template, we significantly increased the use of patient whiteboards and demonstrated improvement in families’ knowledge of the plan of care with inpatient populations at a freestanding quaternary care children’s hospital.

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Ms Nowacki conceptualized and designed the project, participated in data collection, completed the data analysis, and drafted the initial manuscript; Ms Gonzalez and Ms Mehnert implemented the project, provided project design feedback, and participated in data collection; Ms Jacquemard sponsored the project, implemented the project, and provided project design feedback; Dr Tyler implemented the project, provided project design feedback, assisted in data analysis, and drafted the initial manuscript; and all authors critically reviewed and revised the manuscript and approved the final manuscript as submitted.
The Joint Commission and Agency for Healthcare Research and Quality stresses the importance of effective communication in improving both patient safety and patient experience.1,2 Whiteboards are a method used to help facilitate communication between families and the care team.3–6 Singh et al7 found that using whiteboards facilitated communication by providing a convenient, effective, and durable route for information and concerns to be shared between patients and staff.

In 2008, whiteboards were hung at our pediatric hospital as a recommendation to engage patients and families; however, they were underused.8 In addition, there was a lack of continuity in the design between units and no standard workflow for completion.

Inconsistent use of patient whiteboards may be a missed opportunity to engage families as partners in care planning and harm prevention. Although previous research has revealed the connection between patient whiteboard use and the families’ knowledge of the plan of care, using whiteboards to engage families in safety planning to prevent harm has not been studied.3–6

We conducted a quality improvement study to improve whiteboard use in the inpatient setting hospital-wide. Our primary aim was to increase completion rates for each section of the whiteboard by 10 percentage points in 12 months. Our secondary aim was to increase families’ knowledge of the plan of care, safety plan, and medical care team names by 10 percentage points in 12 months, which aligned with our hospital’s strategy to support a “Speak Up” patient safety culture.9 Our balancing measure was to maintain the care team’s satisfaction with whiteboard use ≥90%.

METHODS

Context

Our hospital is a freestanding, teaching, quaternary care pediatric hospital with 479 licensed beds and 15,070 inpatient admissions in 2016. Four units, including 2 medical units, an oncology unit, and PICU, were selected to participate in the first phase of the study. These selected units represented diverse patient populations, had variation in whiteboard usage, and had engaged champions. After the study, interventions were spread hospital-wide to all inpatient, emergency, and urgent care locations within our network of care. Our inpatient psychiatric units were excluded. Only English-speaking families were included in the study.

The medical care team is defined as follows: providers (physicians, physician assistants, nurse practitioners), nurses, certified nurse assistants, and other nonclinical team members. The whiteboard improvement team included a hospitalist physician champion, nurse managers, the director of patient family experience, unit representatives, parent partners, health literacy experts, and patient safety representatives. Families are defined as the primary guardians for the patient.

Interventions

We used Lean Six Sigma methodology to understand the current state, design our interventions, and track progress over time.10 Measurable goals and a timeframe were established. Twenty-two baseline observations were notable for the following whiteboard completion rates: nurse name was filled out 86%, medical team names 55%, plan of care 55%, and safety plan 0% of the time. Before developing interventions, we used a voice of the customer (VOC) survey to determine what our end users saw as barriers to whiteboard use. Fourteen parent partners from our Family Advisory Council and 150 team members (88 nurses, 22 attending physicians, 19 clinical assistants, 13 resident physicians, 6 advance practice providers, 1 social worker, and 1 inpatient service specialist) were surveyed. Open-ended responses were categorized into themes. A Pareto chart was used to display the frequency of each theme (Fig 1).

The VOC survey revealed the following 4 main barriers: (1) not having enough space to write and explain concepts to families, (2) having too much information to complete, (3) unclear roles of who

![Figure 1: A Pareto chart was used to display the frequency of barriers identified to whiteboard use from end users in our VOC survey of the medical care team and families (88 nurses, 22 attending physicians, 19 clinical assistants, 14 parent partners from the Family Advisory Council, 13 resident physicians, 4 nurse practitioners, 2 advance practice providers, 1 social worker, and 1 inpatient service specialist).](https://example.com/figure1.png)

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To address barriers 1 (not enough available space) and 2 (too much information to complete), we simplified the whiteboard template to include critical information for families. A primary driver of space limitation and information overload was a checklist on the old whiteboard template that was designed for nurses to use during bedside shift report. Used on the checklist were hospital-acquired condition acronyms (eg, “CLABSI” for central line associated blood stream infections), which were not well-defined for families, and the section was underused. This checklist was replaced with “Today’s Safety Plan,” with the aim of engaging families as partners in patient safety by tailoring the harm prevention strategy to the patient by using plain language (ie, words that families can understand at the fifth grade reading level).11 “Today’s Safety Plan” was designed to be flexible and to align with each unit’s patient safety goals. For example, nurses could write “daily bath” under “Today’s Safety Plan” for a patient with a central line to remind the family that a bath was required to help prevent infection, or for a patient with bronchiolitis, the nurse could write “keep side rails of bed up” to reduce the risk of a fall. We added a large “Notes” section for families where they were encouraged by the care team to share what was most important to them, or team members could draw clinical drawings to explain upcoming procedures.

To address barriers 3 (unclear team member roles) and 4 (forgot to update the whiteboard), we first had to understand the current workflow for updating the whiteboard. We used a process map to outline when and how the whiteboard was used and by whom. This revealed that the process was extremely nursing dependent and time consuming. To address this, the team developed a process that incorporated the entire care team, including the medical providers, clinical assistants, and nurses. The template was built with clear expectations regarding who was responsible for filling out each section of the whiteboard. Different colored sections were assigned to different roles. The whiteboard section outlined in blue would be filled out by medical providers (plan of care), the section in red would be filled out by nurses (safety plan), and the section in yellow would be filled out by clinical assistants (medical team names).

The final design of the new template included the following 4 sections: medical care team names, plan of care, safety plan, and notes. Experts from our health literacy program ensured that we used plain language for enhanced comprehension with our families. The final template insert sizes were 25 in (height) by 15 in (width) in a portrait configuration and were printed in English with Spanish translations (Fig 2).

### Study of the Interventions

We used plan-do-study-act (PDSA) cycles to make iterative changes to our new template design on a small scale before implementation (Supplemental Information; Supplemental Table 1). The study team piloted changes to the new template design in 2 PDSA cycles over 30 weeks (Supplemental Fig 6). Family and care team feedback were incorporated into the whiteboard design with each PDSA cycle.

With our first PDSA cycle, we tested the new whiteboard template in 5 patient rooms on each of the 4 units. Thirty-eight in-person family interviews were collected over 9 weeks. This cycle was used to make additional changes to the template design (Supplemental Information). Preliminary results were shared with our study sponsors, key stakeholders, and improvement team.

With our second PDSA cycle, we tested the new template on additional units, including a surgical unit, the emergency department, the neonatal and cardiac ICUs, and 2 urgent care locations. We expanded the number of departments in our second PDSA cycle to ensure the design could work in different environments. We collected 315 in-person family interviews over an additional 14 weeks. This cycle was used to make additional changes to the template design (Supplemental Information).

We presented our findings to our study sponsors and unit leadership, and a decision was made to spread the new whiteboard design to all units and network of care. After this spread, we continued to track our measures and collected another 188 in-person family interviews over an additional 8 weeks.

### Measures

We collected data in the following 3 ways: conducted audits of the whiteboard completion (primary outcome), conducted qualitative interviews with families (secondary outcome), and conducted qualitative interviews with the care team (balancing measure). Data were collected weekly and ranged from 7 to 30 audits per week collected by unit representatives. Our testing phase was completed over 14 weeks and postimplementation data were collected for 8 weeks. In total, 516 audits were conducted on whiteboard use, including 424 audits on the new template design and 92 audits on the old template design. During the testing and postimplementation phases, 428 interviews from families and 115 interviews from the care team were collected. Families were chosen by using convenience sampling, and auditors were instructed not to audit the same family twice. Auditors worked with families to conduct interviews at a convenient time for the family and did not interview during the night shift or weekends. Interviews occurred at any point during the patient’s admission.

Our primary outcome measures were the percentage of completion of the following 3 whiteboard sections: plan of care, safety plan, and medical care team names. The notes section was excluded from the audit because we did not have a reliable method for auditing notes. The medical care team section was subdivided into the medical team (ie, providers) and nurse names. Whiteboard completion was tracked by the same auditors conducting the in-person interviews with families. At the time of the family interview, auditors recorded which whiteboard sections were filled out. Our secondary outcome measures, collected from a brief in-person interview, were families’ knowledge of the plan of care.
safety plan, and medical care team names. For our balancing measure, team members were interviewed regarding satisfaction to completing the whiteboard template during the study. Auditors would interview the care team after they spoke with families.

Analysis

Completion rates of the old and new whiteboard templates were collected in adequate numbers for comparison, but these data were sporadically collected during the PDSA cycles rather than continuous intervals throughout the study. This lack of data over time limited our ability to effectively analyze these data on a control chart. Therefore, a Fisher’s exact test in Minitab 17 was used to compare whiteboard use rates of the old template to the use rates of the new template.\textsuperscript{12} Data on our secondary outcomes were collected continuously during the testing and postimplementation phases of our study to see if the new template changes from the PDSA cycles were impacting families’ knowledge. We used statistical process control charts to monitor our progress over time and distinguish special cause variation for our secondary outcomes of families’ knowledge of the plan of care, safety plan, and medical team.\textsuperscript{13} Data from the testing and postimplementation phase were included in our p-chart. Where special cause was noted, control limits were recalculated. Finally, qualitative answers from family and care team interviews were categorized into themes, and bar charts were used to display the frequency of each theme.

Ethical Considerations

The study was approved for nonhuman subject research and qualified as quality improvement by our hospital’s Organizational Research Risk and Quality Improvement Review Panel.

RESULTS

For our primary outcome of whiteboard use, completion rates for measured sections of the whiteboard were higher with the new template than the old template.\textsuperscript{12} Data from the testing and postimplementation phase were included in our p-chart. Where special cause was noted, control limits were recalculated. Finally, qualitative answers from family and care team interviews were categorized into themes, and bar charts were used to display the frequency of each theme.
71.6% of the time on the new template ($P = .008$). The safety plan was filled out 4.3% of the time on the old template and 22.8% of the time on the new template ($P \leq .001$). The nurse name was filled out 94.5% of the time on the old template and 98.8% of the time on the new template ($P = .031$). The medical team name or doctor in charge completion rates did not improve. The medical team name or doctor in charge was filled out 85.8% of the time on the old template and 87.6% on the new template of the time ($P = .068$) (Figs 3 and 4).

After the implementation of the new template, there was special cause in families’ knowledge of the plan of care. The mean shifted from 72.2% to 85.8%. The other measures did not change with the new template (the family knew the safety plan 32.3% of the time, the medical team name or doctor in charge 61.5% of the time, and the nurse’s name 92.8% of the time).

Most of the 295 comments collected from families during the in-person interviews were positive (87%; $n = 258$) (Fig 5). Many families mentioned in their feedback that they liked the extra space to write in the notes section. Families reported using the notes space to remember medication schedules, write a list of questions for the medical team, or list important information they needed to remember like the spelling of a diagnosis, procedure, or medication.

Results collected from 115 care team interviews revealed that 90% ($n = 104$) of care team members could fill out the whiteboard during their shift, 92% ($n = 105$) said the whiteboard was easy to fill out, 88% ($n = 102$) said they had enough space to write, 89% ($n = 103$) said they understood their role in filling out the whiteboard, and 1.7% ($n = 2$) said they experienced unintended consequences for filling out the whiteboard (Supplemental Information). The unintended consequences were related to the families’ disappointment to changes in the plan of care.

**DISCUSSION**

Effective communication is key to patient safety and experience, and patient whiteboards are ubiquitous communication tools across inpatient settings. To be effective communication tools, whiteboards must be used by the end users. Therefore, we aimed to redesign the whiteboard template to increase use by end users. By increasing whiteboard use, we aimed to demonstrate an increase in families’ knowledge of the plan of care, safety plan, and medical care team names.

The whiteboard redesign was guided by our end users and targeted common process failures. The template redesign created a more sustainable process for completion of the whiteboard by distributing roles across the entire care team. Assigning dedicated boxed sections for content owners helped to reduce the assumption that the nurse was the sole user of the whiteboard and identified the other team members (eg, providers and clinical assistants) responsible for contributing information.

If families do not understand health information, they cannot take necessary actions for their child’s health or make appropriate health decisions. We focused the content of the whiteboard template to critical information that families needed to know and used plain language. Making the whiteboard easier to understand was critical in increasing its use. The old template used the words “attending” and “providers” to mean a doctor. Many families did not know what an “attending” was, and the word “provider” often meant a health insurance carrier. In our new design, we changed “attending” and “providers” to “Medical Team/Doctor in Charge” which gave families a clearer understanding of who oversaw their child’s care for the day.

In our study, we increased whiteboard use and improved families’ knowledge of the plan of care. No improvement was identified in the percent of families that knew the safety plan, nurse name, and medical care team names. Although this may indicate that whiteboards were not effective in communicating this information, it more likely reflects the inadequate baseline data that existed before the implementation of the new templates. Baseline data on families’ knowledge was collected during the testing phase of the new template rather than before starting our study. However, it was possible that whiteboards may not be effective for communicating medical care team names to families because of the large size of our medical teams (attending, advance practice provider, fellow, senior resident, intern, and medical student). Authors of previous studies have shown that patients in teaching hospitals may be overwhelmed by the size and structure of large medical teams.
FIGURE 4 P-charts reveal the percent of in-person interviews with families who knew the plan of care, safety plan, and medical team names while we tested the new templates (July 31, 2016–October 31, 2016) and implementation of the new template in 4 units (November 6, 2016–January 8, 2017). A, P-chart of family knew care plan. B, P-chart of family knew safety plan. C, P-chart of family knew medical team and/or doctor in charge. D, P-chart of family knew nurse. LCL, lower control limit; UCL, upper control limit.
Our data reveal that families’ knowledge of nurse name declined in the implementation of the new template. This may be due to the nurse no longer being the sole user of the whiteboard and disrupting the process for writing on the whiteboard.

Our study had important limitations. First, we had a small number of baseline data points for our primary outcome, and these data were collected over the PDSA cycles limiting our ability to analyze change over time. Second, we collected data on our secondary outcome after we began tests of change. This may have limited our ability to identify significant change in these outcomes compared with the baseline. When the new whiteboard template design was final, we did not randomize patients to receive the new verses old whiteboard template, limiting our ability to compare knowledge of the plan of care, safety plan, and medical team between the new and old templates. Third, family interviews in the presence of the whiteboard may have influenced their answers. Fourth, care team interviews were done after the auditors interviewed families, and recall bias could have influenced the care team members’ responses. Finally, only English-speaking families were included and cannot be generalized to all families.

CONCLUSIONS

After the implementation of a new whiteboard template, we significantly increased whiteboard use and demonstrated improvement in families’ knowledge of the plan of care in the inpatient setting. Hospitals that want to increase the use of patient whiteboards can learn from our study. Our hospital has used whiteboards since 2008; however, with our intervention we were able to increase both whiteboard use and families’ knowledge of the plan of care, pointing to the importance of an appropriately designed template to meet the family’s needs. With our study, we add to published literature by demonstrating that the whiteboard can be used to communicate the safety plan to families. Partnering with families on safety by using words and phrases that the family understands builds trust and helps create a shared care plan. Our next steps will be to compare different communication methods in a randomized study to understand what methods work best to improve families’ knowledge. In addition to whiteboards, factors used to encourage families to speak up and ask questions could include multidisciplinary team and family-centered rounding, leader rounding, discharge paper work, and targeted culture work.

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