


Do bedside whiteboards enhance communication in hospitals? An exploratory multimethod study of patient and nurse perspectives

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ABSTRACT

Objective To understand patient and nurse views on usability, design, content, barriers and facilitators of hospital whiteboard utilisation in patient rooms.

Design Multimethods study.

Setting Adult medical-surgical units at a quaternary care academic centre.

Participants Four hundred and thirty-eight adult patients admitted to inpatient units participated in bedside surveys. Two focus groups with a total of 13 nurses responsible for updating and maintaining the whiteboards were conducted.

Results Most survey respondents were male (55%), ≥51 years of age (69%) and admitted to the hospital ≤4 times in the past 12 months (90%). Over 95% of patients found the whiteboard helpful and 92% read the information on the whiteboard frequently. Patients stated that nurses, not doctors, were the most frequent user of whiteboards (93% vs 9.4%, $p<0.001$, respectively). Patients indicated that the name of the team members (95%), current date (87%), upcoming tests/procedures (80%) and goals of care (63%) were most useful. While 60% of patients were aware that they could use the whiteboard for questions/comments for providers, those with ≥5 admissions in the past 12 months were significantly more likely to be aware of this aspect ($p<0.001$). In focus groups, nurses reported they maintained the content on the boards and cited lack of access to clinical information and limited use by doctors as barriers. Nurses suggested creating a curriculum to orient patients to whiteboards on admission, and educational programmes for physicians to increase whiteboard utilisation.

Conclusion Bedside whiteboards are highly prevalent in hospitals. Orienting patients and their families to their purpose, encouraging daily use of the medium and nurse–physician engagement around this tool may help facilitate communication and information sharing.

INTRODUCTION

Across US hospitals, bedside whiteboards are highly prevalent, low-cost visual tools that display information between patients, families and medical providers. Whiteboards have been shown to enhance

patients' recognition of their providers, improve communication between patients and their providers and positively impact overall patient satisfaction with care.¹ For all of these reasons, the Institute for Healthcare Improvements *Transforming Care at Bedside* initiative promotes the use of whiteboards as patient-centred tools.²

Despite this endorsement, few studies have systematically examined nursing and patient views of whiteboards as care delivery tools. Sehgal *et al* conducted surveys with nurses, physicians and medical trainees on self-reported whiteboard practices and impact on patient care; however, patient views on whiteboard use were not collected.³ Similarly, Cholli *et al* interviewed families of paediatric patients to assess whiteboard use and recommendations for improvement, while Tan *et al* asked the opinions of adult patients on information to be included on the board, along with residents' views on challenges to use.^{4,5} Yet, neither study included nurses' views on whiteboards, even though in most hospitals, nurses are tasked with updating the board for patients.^{6,7} Furthermore, many studies examining whiteboards are limited by small sample sizes or niche populations, limiting generalisability.

If whiteboards are important in improving patient-centred communication, a better understanding of patients and nurses' expectations and barriers to current use of whiteboards is necessary. Therefore, we conducted a study to: (A) understand patient views on whiteboard usability and design; (B) solicit patient feedback on use of whiteboards to improve communication; and (C) explore

nursing views on whiteboards, including barriers and facilitators to optimal use.

METHODS

Study design and setting

Between July 2017 and June 2018, we conducted an exploratory, multimethod study using both quantitative and qualitative data to assess patient and nursing perspectives regarding whiteboard use at a single quaternary care academic hospital.

Data collection

Data were collected from patients via a survey administered at the bedside. At our hospital, each patient room has a 36 by 24 cm whiteboard located on the wall across each patient's bed. The whiteboards are templated with defined headers for different informational sections (such as name of nurse, nurse assistant, physicians, current date, scheduled tests/procedures, and so on) (online supplementary appendix 1). We chose to perform surveys with hospitalised patients as medical acuity and restrictions with ongoing care coordination make performing focus groups technically challenging. On the other hand, surveying individual nurses is difficult due to active patient workloads and shift changes. Thus, we collected views from nursing using focus groups, from two medical-surgical units, as it allowed for exchange of ideas from multiple participants, at times and locations convenient to them.

Patient surveys

A 13-question patient survey on whiteboards was created for this study, based on previous published literature on whiteboard designs and contents.³ The survey also collected data on patient age, gender and number of admissions to the hospital in the past 12 months (online supplementary appendix 2). To ensure concision and comprehension, the survey was piloted among the study team and the hospital Patient and Family Advisor Council at the institution. Paper surveys were administered to a convenience sample of patients from adult medical-surgical inpatient units by study researchers (AG, HG, KT, SS). Researchers read the questions to patients and responses were written verbatim by the researcher on the paper survey. Patients were approached if they were in their room, awake and not being evaluated by clinical staff. If a patient was not in the room, researchers did not return to survey them. To be inclusive, patients in isolation precautions (ie, contact and respiratory) were included in the study. Patients were excluded if they: (A) declined to participate, (B) could not complete the survey (eg, not interested or interrupted by staff for medical care), (C) were non-English speaking, (D) were identified as visually impaired or hard of hearing, or (E) seemed cognitively impaired. Patients in the emergency room, intensive care and psychiatry units were also excluded given differences in the nature of care in these areas.

To ensure accuracy, two researchers (AG, HG) independently entered all responses into a study database.

Nurse focus groups

Focus groups were conducted with staff nurses on two inpatient units. We selected nurses over physicians, as a wealth of data regarding physician views on whiteboards (including resident and fellow trainees) are available in peer-reviewed literature.^{3 5} To encourage broad participation, we contacted the nursing 'Unit Based Committee' (UBC) to participate in focus groups. UBC is made up of nurses on the unit who collaborate to identify clinical issues and promote evidence-based nursing practices. UBC nurses were invited to participate via email by the unit nursing directors. All participants received a \$25 gift card as a token of appreciation for their time. Sessions were led by a qualitative methods expert (MQ) using a semistructured interview guide (online supplementary appendix 3), and were recorded, transcribed and deidentified for analysis.

Data analysis

Quantitative

Descriptive statistics (means, percentages) were used to tabulate results. To assess perspectives related to whiteboards, we asked patients how often they read the information on the board (eg, always, never, and so on), who used the board most (eg, physicians, nurses, and so on), whether they knew that they or their family could use the board and (if so) how often they used it, and their views regarding usefulness of the board. We enquired about the type of information (eg, current date, goals of care, and so on) that would be most useful, ergonomics related to use (eg, font size, marker colour, and so on) and inclusion of pictures of providers on the board. To improve clinical relevance, responses related to frequency of whiteboard use were dichotomised (frequently=always and frequently, rarely=rarely and never). Preferences for whiteboards by age and number of hospitalisations were similarly dichotomised (age of ≤ 50 vs ≥ 51 years and number of hospitalisations in the past year as ≤ 4 or ≥ 5). Variation in preferences for board use and content by respondent age, gender and number of admissions were compared using χ^2 tests. A two-sided p value less than 0.05 was considered statistically significant.

Qualitative

Patient surveys

Two of the 13 survey items were open-ended questions and queried patients on type of information they would like to share with their care team on the whiteboard, along with suggestions on other ways to communicate with providers at the bedside. Patient responses to these items, along with open-ended response categorised as 'other' or 'please specify', were independently reviewed by two study team

members (AG, HG). To organise and categorise concepts within the data, and to further explain our findings, we applied the System Engineering Initiative for Patient Safety (SEIPS) framework.⁸ SEIPS is a validated model to understand health system structures/designs that produce work processes and shape outcomes. It is well suited for this analysis as whiteboards are accessed by multiple stakeholders, are strongly influenced by design and human factors (eg, tasks and workloads), physical environment (eg, room layout) and organisational culture (eg, promulgation of use). Open-ended responses from surveys were independently categorised into one of the five SEIPS work system domains: (1) Person (eg, patient, family, nurses); (2) Tools and technology (eg, whiteboard, electronic portal); (3) Tasks (eg, updating information); (4) Organisation (eg, culture); and (5) Environment (eg, room design). Researchers verified each response categorisation to ensure accuracy, and discrepancies were resolved by consensus.

Nurse focus groups

Transcripts from nurse focus groups were independently reviewed by two members of the study team (MQ, HG). Summaries of nurse responses regarding whiteboard utilisation, barriers to use and potential improvements were created by each study team member. Team members then meet to discuss these summaries, come to agreement on key themes and resolve any differences of opinion. A deductive approach using the SEIPS framework was used to characterise the data and a codebook using the five SEIPS domains was created.^{9 10} Using this codebook, transcripts were re-read, and coded using the SEIPS domains. Data were then organised within each SEIPS domain and analysed specifically for: (A) barriers to whiteboard use and (B) suggestions for improvement. By organising the data in this way, we were able to identify barriers and potential interventions among existing work processes. Team members then met to resolve any discrepancies in coding.

RESULTS

Quantitative findings

Patient surveys

A total of 523 patients were approached for the survey. Of those, 49 patients declined to participate, 24 were confused, 7 had visual or hearing impairment that precluded participation and 5 respondents were non-English speaking, resulting in 438 included surveys (response rate of 84%) (figure 1). Most respondents were male (55%), and over 51 years of age (69%). A total of 391 respondents were admitted to the hospital ≤ 4 times (90%) compared with 46 (10%) who were admitted ≥ 5 times in the past 12 months.

A majority of patients (92%) responded that they read the information on the whiteboard ‘frequently’. Patients indicated that the nurse/nurse assistant used the whiteboard most often (93%); use by physicians and ‘others’ (eg, care managers, physical therapists, and so on) was rare (9% and 6%, respectively). Approximately 60% indicated that they knew they could use the whiteboard to pose questions/comments to the care team and 53% of all respondents indicated they had done so during a hospital stay. The majority (95%) of patients reported that the information on the whiteboard was helpful to them and their family members. While 45% of respondents did not have a preference over the colour of markers used on the board, almost half (42%) preferred black.

When asked what information was most useful to have on the whiteboard, the name of the members on their care team (95%), current date (87%), upcoming tests/procedures (80%) and goals of care (63%) were cited as most useful. Less than half of all respondents (43.7%) agreed that listing medications on the board would be beneficial. When patients were asked if it would be helpful to have provider pictures on the board, 45% answered affirmatively (table 1). Compared with those with less frequent admissions, patients with ≥ 5 admissions in the past 12 months were more often aware that the whiteboard could be used by them and family members ($p < 0.001$).

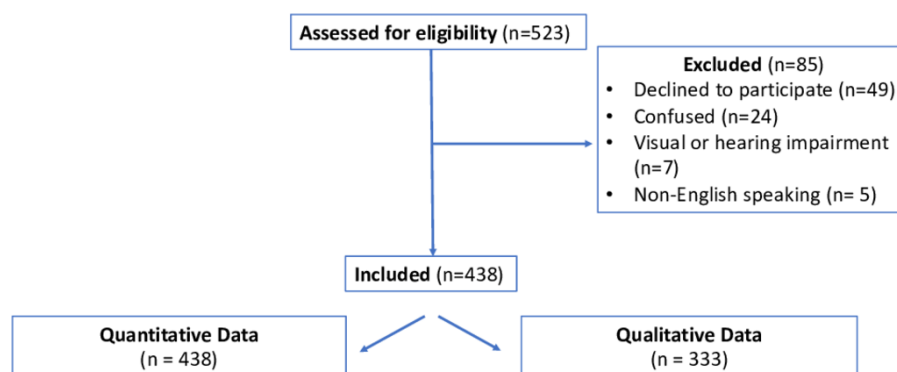


Figure 1 Consolidated Standards of Reporting Trials (CONSORT) diagram of patient flow.

Table 1 Patient characteristics and responses to survey items

	Total number of responses n (%)
Gender	n=436
Female	196 (44.95)
Male	240 (55.05)
Age (years)	n=437
18–30	42 (9.6)
31–50	95 (21.7)
51–70	215 (49.2)
71+	85 (19.5)
Number of hospital admissions in the past 12 months	n=437
1	221 (50.6)
2–4	170 (38.9)
≥5	46 (10.5)
Do you read the information on the whiteboard in your room?	n=437
Always	268 (61.3)
Frequently	133 (30.4)
Rarely	30 (6.9)
Never	6 (1.4)
Which member on your medical team uses the whiteboard most frequently (select all that apply)?	n=435
Nurse/nurse assistant	406 (93.3)
Physician	41 (9.4)
Other	26 (6.0)
Are you aware that you/your family can use the whiteboard for questions/comments for the care team?	n=438
Yes	261 (59.6)
No	177 (40.4)
Have you or a family member used the whiteboard during your stay?	n=261
Yes	137 (52.5)
No	124 (47.5)
Is the whiteboard easy for you to read?	n=438
Yes	407 (92.9)
No	31 (7.1)
If no, please specify (select all that apply):	n=29
Distance from you	7 (24.1)
Size	6 (20.7)
Heading font size	3 (10.3)
Number of headings	2 (6.9)
Other	21 (72.4)
What colour markers can you read easily (select all that apply)?	n=438
Black	185 (42.2)
Blue	79 (18.0)
Red	25 (5.7)
Green	21 (4.8)
All colours listed	197 (45.0)
Others	18 (4.1)
What information is helpful to include on your hospital room whiteboard (select all that apply)?	n=437

Continued

Table 1 Continued

	Total number of responses n (%)
Name of members on care team	415 (95.0)
Current date	380 (87.0)
Upcoming tests/procedures	351 (80.3)
Medications	191 (43.7)
Goals of care	275 (62.9)
Others, please specify	67 (15.3)
Is the information on your whiteboard helpful to you/ your family?	n=438
Yes	417 (95.2)
No	21 (4.8)
Would it be helpful to have pictures of your providers on the whiteboard?	n=435
Yes	194 (44.6)
No	241 (55.4)

Qualitative findings

Patient open-ended questions

Patient responses to open-ended items categorised by SEIPS domains identified common themes and barriers to optimal use (figure 2). Apart from writing family contact details on the board, some patients reported that whiteboards were also used for writing ‘thank you’ notes to staff or notes of encouragement from family, along with personal ‘to do lists’ (eg, walk in the hall, urinary outputs, and so on) (Tool). Some patients reported difficulty reading the whiteboard as it was either blocked by a computer (Environment), writing was illegible (Person), whiteboard size or heading fonts were too small (Tool), or the board had too much information on it (Task). Patients noted that lack of up-to-date current information on the whiteboard (Task) rendered it unhelpful.

Patients’ suggestions regarding ways to improve the whiteboards included: adding day of the week, personal information such as allergies, new medication name, medication due times or pain score and colour-coding sections for easier viewing (Tool). Suggestions in the ‘Task’ category included consistency in the daily use of the board with updated information. One respondent suggested educating the patient and family on purposes of the whiteboard (Organisation).

Of the 112 responses on ways to communicate at the bedside other than the whiteboard, verbal communication (24.8%) was recognised as the best method for sharing information, followed by use of notepad/paper-pen (19.6%) and electronic devices with access to patient portals (19.6%). Instant text messaging and direct phone access to providers (14.2%) were also suggested for improving communication.

Nurse focus groups

A total of 19 nurses from two UBCs were invited to participate in the focus groups; of these, 13 agreed to

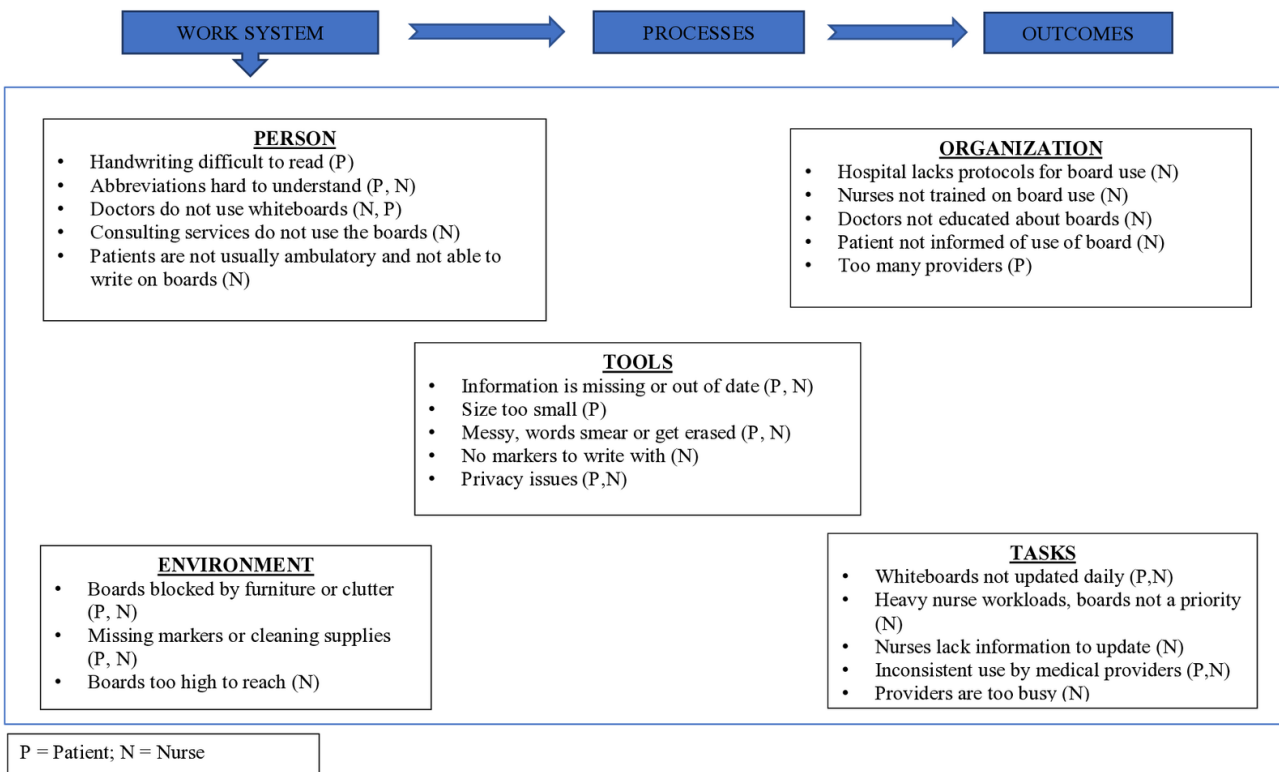


Figure 2 Barriers to whiteboard use identified by patients and nurses organised using the System Engineering Initiative for Patient Safety framework.

participate. Five nurses participated in the first session and eight in the second. Participants included two nurse supervisors, two nurse educators, one clinical nurse specialist, and eight bedside nurses. Participants' work experience ranged from 18 months to 9 years.

Overall, nurses reported that they try to use the whiteboards daily and feel responsible for updating and maintaining their content. However, several barriers to whiteboard use consistent with patient feedback in the survey were voiced. These barriers included: the need for constant updating (Task); lack of ready access to necessary information such as discharge plans, names, photos of care team members or scheduled procedures (Task); general lack of use by doctors and consulting services (Person); illegible or complex information displayed on the boards (Person); and difficulty accessing boards due to physical obstacles (Environment) (figure 2).

Nurses offered several suggestions for improving whiteboard use (table 2). Suggestions related to the SEIPS 'Person' domain included encouraging use among doctors and consultants and assisting or engaging patients in adding information and questions to the whiteboards. Suggestions related to 'Organizational' improvements included implementing educational and awareness programmes for doctors and nurses, and creating a curriculum that nurses could use to orient patients to whiteboards at the time of admission. 'Tool' category suggestions included standardising whiteboard design throughout the hospital, including designated areas for physicians on the board,

use of magnetic boards to facilitate hanging of markers/erasers and access to clinically useful data such as fall risk for board display. Suggestions related to the 'Task' domain included designating one person to be responsible for whiteboard maintenance, explicitly making it part of their job responsibilities and developing a process to ensure nurses have the information to update whiteboards. Lastly, suggestions related to the 'Environment' included decluttering areas near the whiteboards and positioning them for ease of access.

Comparisons between patient and nursing surveys

Both patients and nurses had similar views regarding the design and usability of whiteboards. Like patients, nurses noted that providers' names (especially nurses' names) and tests/procedures were useful. Nurses and patients also identified that whiteboards may not be useful for everyone, such as patients who cannot get out of bed due to their medical condition. Both groups agreed on several suggestions to improve the design of whiteboards, including enhancing legibility by either increasing the size of the board/headings and colour-coding sections/headings. Improving easy access/view, encouraging daily use by physicians and avoiding medical jargon also represented areas of patient and nursing overlap.

Patients and nurses varied on whether including pictures of providers would be useful. Of the 55% of patients who stated that adding pictures would not be useful, barriers such as multiple providers on care teams and increased turnover of providers were raised as concerns. While nearly

Table 2 Suggestions for Improving whiteboard use from nurse focus groups: organised by SEIPS framework components

SEIPS components	Suggestions for improvement and exemplary quotes
Person	<p>Increase whiteboard use by doctors and consulting services. <i>'Doctors don't really use it.'</i> (Nurse, FG 1) <i>'It would be nice if they would maybe write their plan of care up there.'</i> (Nurse, FG 1)</p> <p>Engage/assist patients in writing on whiteboards. <i>'I try to make it [the whiteboard] theirs [patients] for the time they are there.'</i> (Nurse, FG 2) <i>'If we are doing pain control, then we try and ask something like, okay, what is a possible level for you? Let's put it up there... I try to guide them [patients] in their goals.'</i> (Nurse, FG 2)</p> <p>Expand use of whiteboards for clinician-to-clinician communication. <i>'It might help with care management because ... if they could update the board it would help us to know where the patient is in the process for discharge.'</i> (Nurse, FG 1) <i>'...that [using for clinician to clinician communication] would eliminate some of the pages... and relieve the frustration between teams.'</i> (Nurse, FG 1)</p>
Organisation	<p>Increase awareness and education programmes for doctors and nurses about whiteboard use. <i>'We could probably incorporate more whiteboard education into [nurse] orientation.'</i> (Nurse, FG 2) <i>'Some people just forget to update the boards.'</i> (Nurse, FG 2)</p> <p><i>'Education—just letting [doctors] know that we ... want them to be part of the whiteboard. They probably think that's a nurse's thing ... especially when you have new interns or residents, they may not understand that they can touch it.'</i> (Nurse, FG 2)</p> <p>Create curriculum nurses can use to orient patients to whiteboard.</p>
Tools	<p>Redesign whiteboards and standardise the format, size and location within patient room. <i>'The thing is, the whiteboards are not standardized, so they are in different locations [in the room], different types, different ... sizes. And I think that makes a difference because I think with physicians, they are going so many different places. I don't think they claim it in any way, when they should.'</i> (Nurse, FG 1)</p> <p>Create a designated space on the board for physicians to use and maintain. <i>'... if there were dedicated spaces for each type of information [on the board] that might help.'</i> (Nurse, FG 1)</p> <p>Make whiteboards larger and magnetic. <i>'I feel like for some patients or the patients that are there a very long time, it's almost not big enough.'</i> (Nurse, FG 2) <i>'... use a magnet for the eraser and the marker.'</i> (Nurse, FG 2)</p> <p>Colour-code information on board. <i>'I think it helps visually to see, like ... the goals are different, so you can keep it separate in your mind.'</i> (Nurse, FG 1)</p> <p>Replace whiteboards with electronic smartboards. <i>'...a touch screen, I mean you could go in and have patient education stored in there...you could pull up drawings.'</i> (Nurse, FG 2)</p> <p>Use common/understandable language. <i>'I would like to see the jargon [changed to] understandable lay person's terms. A lot of the things that are up there... the verbiage ... I don't know that everybody understands it ... like NPO or SBA.'</i> (Nurse, FG 2)</p> <p>Add important information to whiteboards, including: <ul style="list-style-type: none"> ▶ Patient-centred goals. ▶ Discharge information/date. ▶ Plan for the day (eg, tests, procedures). ▶ Caregiver(s) names and contact information. ▶ Patient room and phone numbers. ▶ Photos of care team. ▶ Diet, medication information. ▶ Fall risk, wound information. </p> <p>Do not include private patient information. <i>'... like lab results for Hep C, I wouldn't put that on the board and there are a lot of people that will say 'don't put my weight on the board,' which I feel like happens a lot.'</i> (Nurse, FG 1)</p>
Tasks	<p>Designate one person to update whiteboards daily.</p> <p>Assure that nurses have access to necessary information to update the board (eg, discharge plan, scheduled procedures, pictures). <i>'We are often the last person to hear about discharge.'</i> (Nurse, FG 1) <i>'It's hard to keep track of all the pictures, who puts them up and takes them down, where they go ...'</i> (Nurse, FG 1)</p>
Environment	<p>Declutter area by whiteboards to increase ease of access. <i>'The way the rooms are configured [is challenging] ... like one of my rooms today, the computer is in front of the whiteboard... or you have a chair beneath it ... I can't even get to it.'</i> (Nurse, FG 2)</p> <p>Position boards low enough on wall to reach. <i>'In most rooms I can [reach them] but there are some where it's too hard for me to reach.'</i> (Nurse, FG 2)</p>

FG, focus group; SEIPS, System Engineering Initiative for Patient Safety.

all nurses felt that pictures would be helpful to patients, they acknowledged that maintaining correct pictures is time consuming and would benefit from designated unit

personnel. Nurses acknowledged that placing pictures of providers on the board would help nurses and physicians recognise each other.

DISCUSSION

In this study of nurses and patients, we found that patients view the whiteboard as a valuable bedside tool. Almost all patients read the whiteboard frequently (>90%) and found the information to be helpful (>95%). Similarly, our nurses appreciated the value of the whiteboard and indicated that they felt responsible for updating the information, even though our institution does not have a formal policy that identifies nurses as providers responsible for maintaining the whiteboards. Our data suggest that while the whiteboard is a patient-centred tool for communication, important aspects must be addressed for their full potential to be realised. Some examples include: (A) use of larger sized boards with larger more eligible fonts for templates can provide more space for providers to complete whiteboards, (B) removing equipment that block the whiteboards to improve visibility of the boards, and (C) colour-coding information on the board to highlight important information to patients.

Cholli *et al* reported that families who did not use whiteboards were not oriented to the boards' bidirectional nature and assumed the tools were for staff use only.⁴ In contrast, while patients in our hospital are not formally introduced to the whiteboard as a communication tool, 60% were aware that they or their family member could use the board for questions/comments for the care team. As awareness of whiteboards increased with admissions, we suspect families with healthcare experience become cognisant of the board as a resource. Importantly, nurses suggested instructing patients/families on the purpose of the whiteboards using educational materials. This simple intervention may enhance whiteboard use and patient engagement. Future studies that assess the feasibility and impact of such educational materials on use of whiteboard by patient/family are needed.

Both nurses and patients shared important concerns related to whiteboards. One concern was the lack of updated clinical information from physicians. Tan *et al* demonstrated increased awareness of important updated information such as 'estimated date of discharge' with the addition of pretemplated whiteboards on their inpatient units.⁵ Similarly, Singh *et al* demonstrated improved Press Ganey Patient Satisfaction Survey questions such as: 'physician kept you informed' and 'staff included me in decision', with use of whiteboards.⁶ Thus, to make whiteboards an ideal bedside tool for communication, timely and accurate information is needed. Simply put, whiteboards will not serve as a band-aid for poor doctor:nurse communication; rather, they may make the deficiencies more apparent to patients and their families.

When we asked our patients for suggestions on other modalities to improve data sharing, the majority preferred verbal communication over technology. Even though suggestions varied from patient portals

to instant messaging, our data suggest that preferences for their use did not differ by age. Although previous studies on use of electronic inpatient portals have suggested overall improved patient outcomes,¹¹⁻¹³ variance in results based on age of patient was not evaluated and is needed to assess technological application in inpatient settings.^{14 15}

Our study has limitations. First, this was a single-centre study of adult medical-surgical patients; thus, our findings may not be generalisable to other healthcare settings. Second, given our survey-based design, we excluded a very small proportion of patients who could not participate either due to cognitive, language or visual impairment barriers. Future studies should consider including families or contacts for these patients as whiteboards might be a particularly valuable resource for information exchange for patients with such limitations. Third, we did not collect data on patients' education level, acuity or complexity of care, factors that we acknowledge may positively or negatively impact a patient's ability to understand whiteboard's purpose and use.^{16 17} Fourth, we did not audit the information on the whiteboards for completeness or accuracy as this was outside the scope of this study. Lastly, we did not survey physicians as this group has been well represented in previous studies.^{3 5}

Despite these limitations, our study has strengths. To our knowledge, this is the only study that has surveyed hundreds of patients on their views related to whiteboards. By also including nurse perspectives, we were able to better understand and pair challenges faced by front-line clinicians charged with whiteboard maintenance and posit solutions related to improving whiteboard usability and design. Lastly, by using the SEIPS model for both open-ended patient questions and nurse focus groups, we were able to identify and compare individual and work system barriers influencing optimal use of the board.

Our findings have important policy and care delivery implications. First, institutional policies to increase whiteboard utilisation that include development of educational materials for patients/families on the purpose of whiteboards appear necessary. Second, a curriculum for nursing and physician staff on best practices for whiteboard use with integration into daily rounds is needed. Third, ensuring data flow and sharing of information between nurses and physicians to enhance patient knowledge is needed to improve whiteboard use.

In conclusion, our findings suggest that patients and nurses view whiteboard design and usability as beneficial to bedside communication. Orienting patient and family to the whiteboards, encouraging daily use and collaborative information sharing between physicians and nurses are needed to improve their value in healthcare.

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