Scientific Research Publishing

American Journal of Industrial and Business Management, 2025, 15(2), 423-444
https://www.scirp.org/journal/ajibm
ISSN Online: 2164-5175
ISSN Print: 2164-5167

Patients and\or Family Member Perspectives on the Use of Bedside White Board and Its Implication to Patient Satisfaction: A Pilot Survey in General and Tertiary Hospitals in Makkah, Saudi Arabia

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How to cite this paper: Al-Nafea, A., Alshargi, O. Z., & Algethami, M. M. (2025). Patients and\or Family Member Perspectives on the Use of Bedside White Board and Its Implication to Patient Satisfaction: A Pilot Survey in General and Tertiary Hospitals in Makkah, Saudi Arabia. *American Journal of Industrial and Business Management, 15,* 423-444.
https://doi.org/10.4236/ajibm.2025.152020

Received: January 8, 2025
Accepted: February 25, 2025
Published: February 28, 2025

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Abstract

Effective communication between the members of the healthcare team and the patient and families is essential components for patient-centered care, and it improves patient outcomes. Likewise, poor communication between healthcare team members and the patient and families is associated with poor patient outcomes. Due to several communication challenges, the use of visual tools such as bedside WB to enhance communication has been widely implemented; however, the exact benefit of its use from patient perspective is still understudied. Thus, this study aims to determine the impact of bedside WB use in facilitating patient's involvement in achieving the day's goal, adherence to pain medication schedule and use, tests and procedures schedule, patients and family engagement with the healthcare team, and discharge planning. This study is a descriptive cross-sectional study conducted among 335 patients and/or family members admitted in six hospitals in Makkah city: Al Noor hospital, Hera hospital, King Abdul-Aziz hospital, King Abdullah Medical City, King Faisal specialist hospital, and Maternity and Children hospital. The survey questionnaire used was adapted from previous studies and revalidated to ensure its suitability to the study subjects. Data collection was performed from August 1 to 31, 2020 and data analysis was done with SPSS software. Of the 335 participants, the majority were satisfied to bedside white board for its use (4.36), and they recommend it to be used in hospitals because they perceived that through this medium of communication, their connection with the healthcare team will be easier (4.35). In regression analysis, the day's goal and patient and/or family

member engagement are found to be the significant predictors of patient's satisfaction level. Therefore, WB is a useful tool to help patients achieve their daily goals and to improve their engagement with the healthcare team which also impacts on patient satisfaction.

Keywords

Patient Satisfaction, Healthcare Quality, Patient Involvement, Healthcare Process Improvement, Patient Satisfaction Determinants

1. Introduction

Effective communication is vital in providing patient-centered care. Studies show that poor communication between healthcare providers and patients and their families affects patient outcomes and satisfaction (McCabe, 2004; Amoah et al., 2019; Anoosheh et al., 2009; Vuković et al., 2010; Kwame & Petrucka, 2021).

There are several factors that might contribute to the poor communication between the healthcare team members and patients as well their family members, including but not limited to patients' medical condition, anxiety, pain, medication and level of comprehension or misunderstanding. The health providers use of technical jargon or medical/clinical language to patient, insufficient explanations given to patient and lack of details or inaccurate instructions given to patient related to time constraints and competing demands faced by health providers. In result, patients misunderstood their illness or the treatments that are being recommended that impacts patients outcomes.

Due to the numerous communication challenges, the use of visual tools such as bedside WB to enhance communication has been widely implemented (Tan et al., 2013; Sehgal et al., 2010; Goyal et al., 2017), however, the exact utility of its use from patient perspective is still understudied. Although various studies have examined different aspects that related to bedside white boards use and patient satisfaction (Singh et al., 2011; Tse et al., 2014; Gonzalez-Shalaby, 2016; Goyal et al., 2017), evidence of the use of bedside WB in facilitating effective involvement of the patient in various aspects of care and related decision-making process is also lacking.

Thus, this study aims to determine the impact of bedside WB use in facilitating patient's involvement in achieving goal for the day, adherence to pain medication schedule and use, schedule tests and procedures, engagement of patients and family with the health care team, and discharge plan of care. Through this initial pilot survey, recommendation about the bedside WB use to hospitals in Saudi Arabia can be drawn and its implementation may improve the quality of communication between health providers and patient as well their family and increase patient satisfaction.

2. Hypothesis

- There is a statistically significant correlation between the goal of the day and

patient and/or family member satisfaction.

- There is a statistically significant correlation between the pain medication schedule and patient and/or family member satisfaction.

- There is a statistically significant correlation between the Patient and/or family member engagement by raising their concerns or question to the healthcare team members and patient and/or family member satisfaction.

- There is a statistically significant correlation between the discharge date and patient and/or family member satisfaction.

- There is a statistically significant correlation between the scheduled test/procedure and patient and/or family member satisfaction.

3. Literature Review

Several studies highlight the use of bedside WBs in improving patient satisfaction by communicating the GFD, scheduling of PMs, and engaging patients in their care.

The theme "Goal for the Day" was observed from three studies (Menefee, 2014; Dunn, 2017; Jerofke-Owen & Bull, 2018). GFD enables the patient to determine what they need on this day and to be actively engaged in planning their care and thus providing patient-centered care. For instance, Ofori-Atta et al. (2015) and Dunn (2017) present evidence that involving patients in the identification of their GFD enhances PS and overall outcomes. For instance, recording GFD on bedside WBs ensures that these goals are discussed during nursing handoffs, as outlined by Burk (2016) and Ofori-Atta et al. (2015). According to Menefee's study (Menefee, 2014), the alignment of healthcare team goals with patient GFD improves engagement, decreases readmission rates, and enhances satisfaction. These gains included increased patient involvement and PS, which were also commented on by Dunn (2017); similarly, Jerofke-Owen and Bull (2018) stressed how this kind of GFD detection emboldens patients. However, several of these studies had some limitations-data from only one center was collected; there was purposive sampling-which make generalizability difficult.

Another important domain where research was conducted is the scheduling of pain medication (PM). Dearmon et al. (2013) demonstrated that the use of bedside whiteboards to communicate pain medicine schedules improved patient compliance and pain satisfaction. Parker and Mowry (2015) noted that whiteboards facilitated timely communication between health care providers and their patients with personalized pain goals and easily updated care plans. Gonzalez-Shalaby (2016) and Alaloul et al. (2015) also reported improved patient satisfaction and therapeutic results after adding PM information to WBs. However, generalization was limited as data was collected from only one center.

Another important theme was the involvement of patients and their families in health planning. Such involvement has been related to better outcomes and a lower utilization of resources (Laurance et al., 2014; Sherman & Hilton, 2014). Studies highlighted that bedside WBs are methods to engage patients and their

families in decision-making, especially during nursing shift handoffs. According to the Agency for Healthcare Research and Quality (2013), including the voices of patients in decisions about their care can result in better clinical and patient-centered outcomes. On the other hand, bedside reporting, which Ofori-Atta et al. (2015) recommend for engaging patients, Sherman & Hilton (2014) strengthen the collaboration of patients, their families, and healthcare personnel in improving overall care.

Effective discharge planning is one of the important nursing practices that should involve a patient. According to Ou et al. (2011), there is a need to inform patients an estimated date of discharge and goals that should be attained before discharge. O'Brien et al. (2015) described the estimated date of discharge as an approximate number of days to readiness for discharge. This is meant to be an estimate to ensure continuity of care and readiness of the patient for recovery outside the confines of the hospital. Chen, Brennan, and Magrabi (2010), and Kripalani et al. (2007) also noted poor communication of the dates of discharge contributing to unfavorable results. Effective communication of the date of expected discharge enhances the possibility of timely completion of necessary activities and avoids unnecessary extension of hospital stay (Iversen et al., 2014).

Sehgal et al. (2010) investigated the use of WB for discharge communication and noted that nurses primarily used WBs to communicate the date of expected discharge. Similarly, Chaboyer et al. (2009) reported that WBs reminded the patients and health teams about the date of discharge and preparation required for discharge. Similarly, O'Brien et al. (2015) developed a new approach to the use of bedside WB for discussing date of discharge and reported that 82% of the staff members perceived the approach as easy to use and practical. Tan et al. (2013) realized an increase in patients' knowledge on time of discharge and satisfaction with care, while Hesselink et al. (2012), reiterated that the patients and their families had to be involved in planning their discharge in order to identify their needs and preferences. The studies have limitations: their sample sizes were small, their biases were limited, and the studies focused less on the patients themselves.

For instance, Goyal, Tur, and Mann (2017) stated that bedside visual tools such as WB enhance communication to improve patient satisfaction in regard to scheduled tests and procedures. However, the study did not provide concrete evidence linking WBs to satisfaction among patients undergoing scheduled tests and procedures. Brandenburg et al. (2015) indicated that the process of scheduling tests requires engagement from the patient and family in order to promote timely completion and cooperation with the healthcare team. Cordasco (2013) noted that healthcare providers have a duty to inform patients adequately so that patients can make informed decisions that may prevent legal problems from a lack of information.

Notwithstanding these highlights, there is a further understanding of knowledge gaps related to the bedside WB application concerning the display of test and procedure information for patients at home. Indeed, Favela et al. (2004) shared

communicating surgery schedules between the healthcare team and the patients themselves using WBs and had not included in this communication the investigation into patients' satisfaction, whereas Kendall et al. explored information delivery yet did not discuss the tool of interest. These studies reinforce the call for future studies to determine the efficacy of bedside WBs in improving patient engagement and awareness regarding all scheduled tests and procedures.

4. Theoretical Framework

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Donabedian's Quality of Care Framework focuses on three key components of healthcare quality, including structure, process, and outcomes (Botma & Labuschagne, 2017).

Structure refers to the environment and resources available for care, process emphasizes the actions taken to deliver care, and outcomes highlight the results of care provided, including patient satisfaction. In our research, structure would relate to such issues as test scheduling and discharge planning, whereas process encompasses matters like the establishment of a goal of the day and pain management; outcome relates to differences in patient satisfaction. This model fits well because it looks at satisfaction based on some processes and how these processes relate to an outcome.

The Quality of Care Framework by Donabedian is more relevant to this study, as it assesses the processes of healthcare and the impacts created on patient outcomes.

The dependent variable for this study is the perceived satisfaction of the patient and/or family member with the use of bedside whiteboards (WB) as an implementation tool for the treatment plan and in the achievement of desired outcomes. For the purpose of this paper, the bedside WB is effective by how much it improves the communication between healthcare providers and the patient and their family members and facilitates the patient's involvement in the care management process.

Independent variables for this study included several aspects of communication and engagement facilitated by the bedside WB. First, the patient's goal of the day is communicated to the patient and/or family member through the WB. This study determines whether the display of the patient's daily goal on the bedside WB improves the communication of the treatment plan between the healthcare provider, the patient, and the family member, and subsequently whether this improves adherence to the plan. The pain medication schedule is displayed on the WB to inform the patient and/or family member when the patient will next receive pain medication. It assesses how well the healthcare team communicates with the patient and family through writing the schedule of pain medication on the WB. Third, patient

and/or family member involvement through allowance of their raising of concerns or asking of questions on the WB is assessed in the study. These questions will be answered by the healthcare team on the WB, and the study will measure if this interaction enhances communication between the patient, family member, and the healthcare team. The fourth independent variable is the date of discharge. This is communicated in advance to the patient and/or family member through the bedside WB. The project measures whether writing the date of discharge on the WB improves the communication of the health team and the patient and family about their knowledge of the discharge plan well in advance. Finally, the WB shows the schedule for tests or procedures as a way of informing the patient and/or family member about scheduled medical interventions. This is an intervention measure to test if writing the schedule of tests or procedures on the WB in advance would improve the healthcare team's communication for the patient and family member.

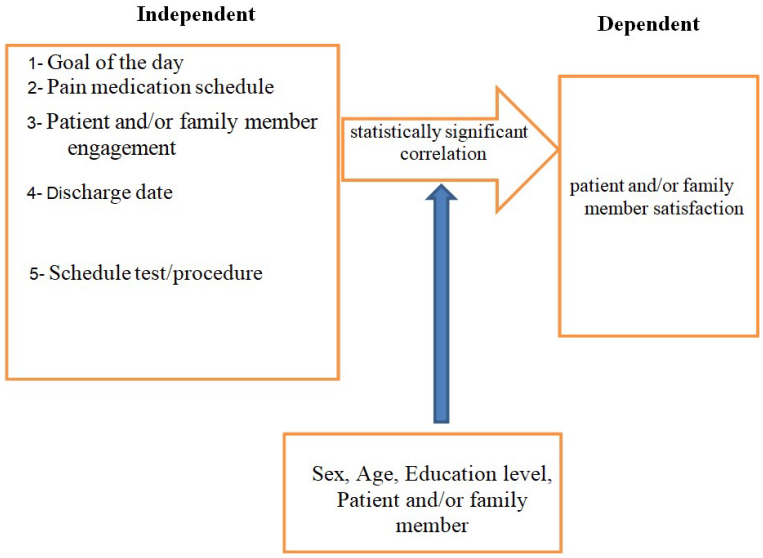

Figure 1. Conceptual model.

5. Methodology

The patients' and relatives' views about using the WB and its impact on managing the care for attaining the above-named daily goals, time-scheduling for pain medicines, completion of tests or investigations, communicating with the treating teams, discharge planning, and overall satisfaction-have been elicited through this cross-sectional quantitative study.

The study targeted patients who were admitted to six general hospitals in Makkah City, with a calculated sample size of 335 participants based on a population of approximately 46,580 patients. The inclusion criteria included those aged 18 years and above, with a minimum stay of three days in the hospital, and willing to participate voluntarily. Patients to be excluded were those below 18 years of age, newly admitted patients, those whose stay was less than three days, and patients who were in critical care or emergency units.

The patient and family member perceptions of bedside WB were assessed using a questionnaire comprising six sections, 45 items, and addressing daily goals, pain medication schedules, procedures, engagement, discharge planning, and satisfaction. Items were adapted from previous studies, translated into English and Arabic, and their consistency checked by experts. Validity was tested by healthcare experts, while reliability was measured on a five-point Likert scale. A pilot test showed Cronbach's alpha to range from 0.56 to 0.949, reflecting moderate to high reliability (Table 1).

Table 1. The questionnaire reliability test results *first pilot* (n = 8).

Scale Name	Mean Scale Score	Standard Deviation	Variance	Min-Max	Cronbach's Alpha
Goal of the day	1.48	0.39	0.154	(1 - 2)	0.560
Pain Medication Schedule	1.64	0.51	0.270	(1 - 2.25)	0.884
Patient and/or family member engagement	1.46	0.40	0.164	(1 - 2)	0.746
Discharge date	1.26	0.39	0.160	(1 - 2)	0.941
Schedule test and procedure	1.57	0.59	0.357	(1 - 2.25)	0.949
Satisfaction	1.66	0.48	0.233	(1 - 2.29)	0.701
Total	69.8	17.18	295.2	(48 - 95)	0.944

Second Pilot test was carried out to determine the suitability of the questionnaire after some correction from first polit feedback. The findings presented in Table 2 indicate that the six measurement scales had high reliability as shown by Cronbach's alpha that was greater than 0.895 with the overall reliability being 0.975 (Table 2).

Table 2. The questionnaire reliability test results *second pilot* (n = 8).

Scale Name	Mean Scale Score	Standard Deviation	Variance	Min-Max	Cronbach's Alpha
Goal of day	34.61	4.59	21.14	(15 - 40)	0.917
Pain	34.54	4.68	21.99	(18 - 40)	0.920
Family engagement	34.19	4.69	22.05	(18 - 40)	0.908
Discharge date	29.89	4.26	18.19	(15 - 35)	0.909
Schedule test procedure	34.74	4.45	19.80	(22 - 40)	0.925
Satisfaction	30.08	4.17	17.39	(17 - 35)	0.895
Total	198.07	23.11	534.48	(134 - 230)	0.975

6. Results

The findings presented in Table 2 indicate that mean score for the Goal of Day scale was 34. 61 (Standard deviation (SD) = 4.59), pain (mean = 34.54, SD = 4.68), patient and/or family member engagement (mean = 34.19, SD = 4.69), Discharge date (mean = 29.89, SD = 4.26), Schedule test procedure (mean = 34.74, SD = 4.45), and Satisfaction (mean = 30.08, SD = 4.17) (See Table 3 and Figures 1-5).

Table 3. Statistics for the measurement scales.

Scale Name	Mean Scale Score	Standard Deviation	Variance	Min-Max
Goal of day	34.61	4.59	21.14	(15 - 40)
Pain	34.54	4.68	21.99	(18 - 40)
Patient and/or family member engagement	34.19	4.69	22.05	(18 - 40)
Discharge date	29.89	4.26	18.19	(15 - 35)
Schedule test/procedure	34.74	4.45	19.80	(22 - 40)
Satisfaction	30.08	4.17	17.39	(17 - 35)
Total	198.07	23.11	534.48	(134 - 230)

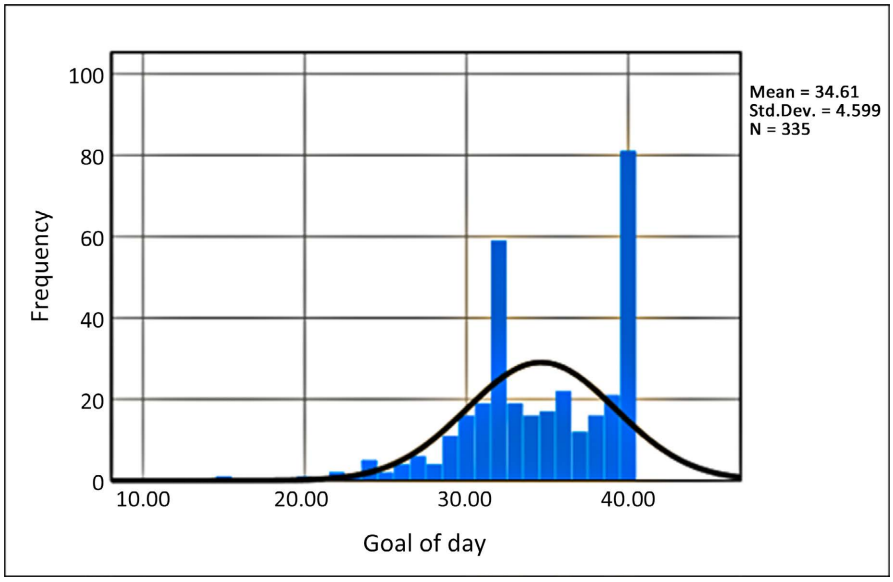

Figure 2. Frequency distribution for the goal of day responses.

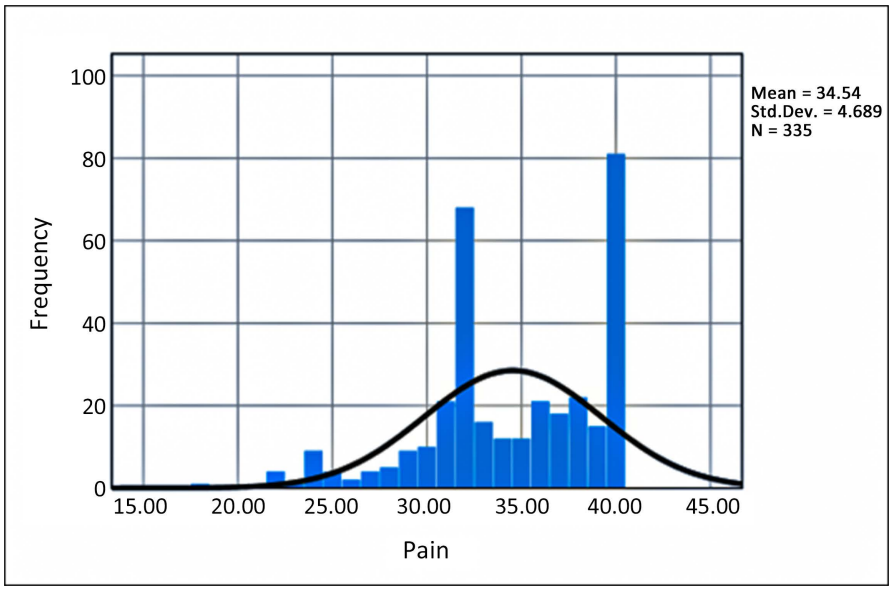

Figure 3. Frequency distribution for the pain medical schedule responses.

Participants in the study were 335 selected from six hospitals. Males accounted for 50.1%. Saudi nationals made up 86% of the participants. The majority of them (56.7%) were aged between 31 to 50 years. Table 4 also indicates the majority of the participants (54.3%) had an undergraduate education level. All patients were admitted for a period of more than three days. High proportion of the participants were from the general surgery (20.9%) and internal medicine ward (29%).

The findings presented in Table 5 show that the mean scores for each of the question items ranged between 4.12 (SD = 0.862) and 4.44 (SD = 0.644). The median score was four for all the question items except questions 21, 35, 36 that had a median score of five.

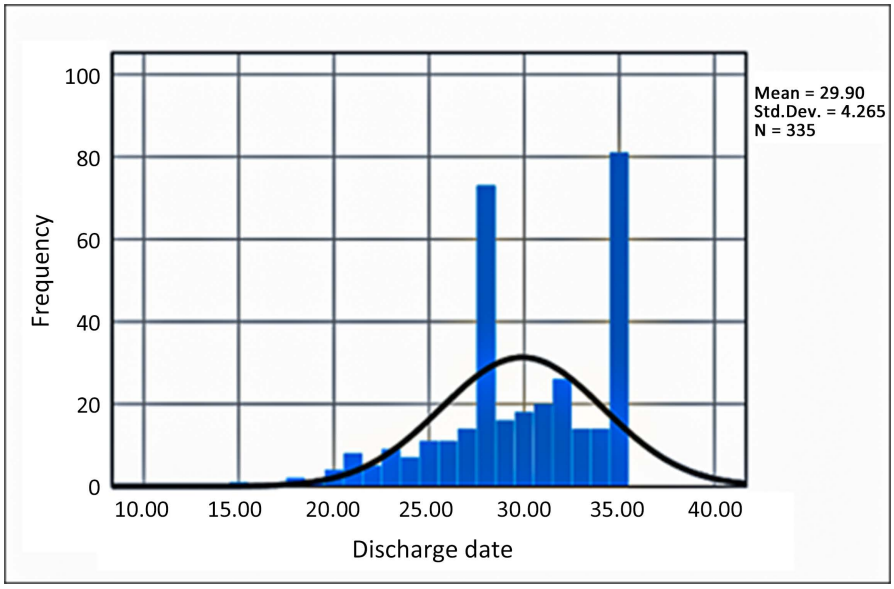

Figure 4. Frequency distribution for the Discharge date responses.

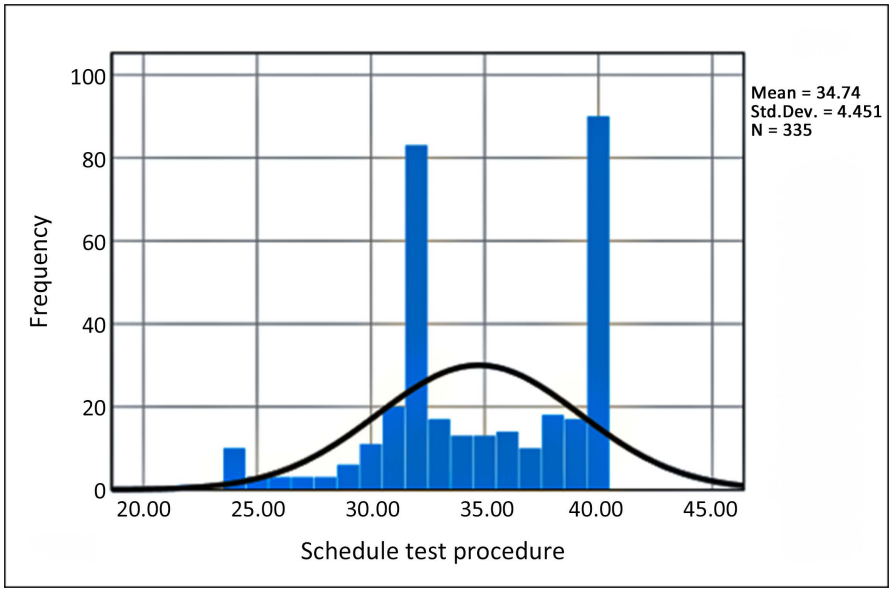

Figure 5. Frequency distribution for the Schedule test procedure responses.

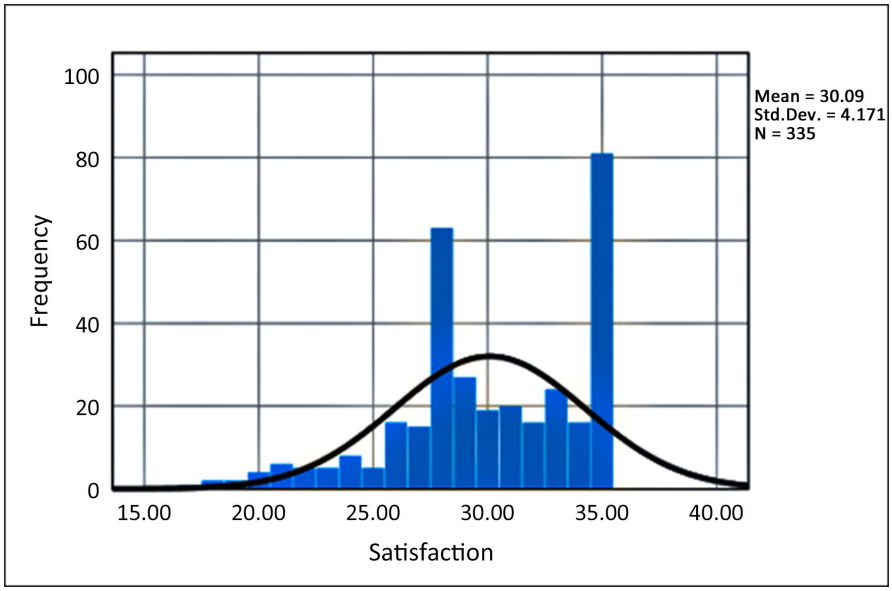

Figure 6. Frequency distribution for the patient satisfaction responses.

Table 4. Sociodemographic characteristics of responses.

Variables	Participants (n = 335)
Gender	
1. Male	168 (50.1%)
2. Female	167 (49.9%)
Nationality	
1. Saudi	288 6%)
2. Non-Saudi	47 (14%)
Age	
1. 18 - 30	92 (27.5%)
2. 31 -50	190 (56.7%)
3. >50	53 (15.8%)
Education Level	
1. High school or less	36 (10.7%)
2. Diploma	40 (11.9%)
3. Undergraduate	182 (54.3%)
4. Postgraduate	77 (23%)
Type of PT	
1. Patient	105 (31.3%)
2. Family member	230 (68.7%)
Accompanying patient during admitted in the hospital	
1. Yes	164 (49%)
Name of Hospital	

Continued

1. King Abdullah medical city	176 (52.5%)
2. Al Noor hospital	78 (23.3%)
3. Hera hospital	33 (9.9%)
4. King Abdul-Aziz hospital	16 (4.8%0
5. King Faisal hospital	13 (3.9%)
6. Maternity and children hospital	19 (5.7%)
Ward of admitting	
1. Internal Medicine Ward	97 (29%)
2. Cardiac Ward	48 (14.3%)
3. Cardiac Surgery Ward	18 (5.4%)
4. Neurology ward	21 (6.3%)
5. Neurosurgery Ward	15 (4.5%)
6. Oncology Ward	35 (10.4%)
7. Hematology Ward	10 (3%)
8. General Surgery Ward	70 (20.9%)
9. Pediatric Ward	15 (4.5%)
10. Maternity	6 (1.8%)

Table 5. Participants level of agreement to five elements.

Item No.	Variables	Mean	Median	SD
	Patient Goals of the Day			
1	If my goals will be written on the bedside white board, it will be easy to monitor them and commit to healing.	4.28	4	0.750
2	The healthcare team should develop clear and achieve patient goals and write them on my health board.	4.26	4	0.804
3	The health care team will improve communication with their patients and help them achieve their goals if they used my health board.	4.31	4	0.722
4	Patient goals will be easy to implement and track if they are outlined in my health board.	4.35	4	0.738
5	My health board will ensure that there are no patient goals ignored and all goals have been considered during the healing process.	4.27	4	0.722
6	I think that communication about patient goals of the day will be smooth when using my health board features.	4.25	4	0.813
7	Writing beside speaking rather than speaking alone, would be a better measure to let the patients and family members know the goal of the day.	4.36	5	0.765
8	I think your engagement in the goal for the day helps in reducing hospital readmission rate.	4.39	4	0.661
	Pain Medication Schedule			
9	Writing pain medication schedule on my health board will enhance compliance.	4.42	4	0.647
10	I will prefer experience of using my health board in managing my pain.	4.32	4	0.727
11	It will be easy to follow if the healthcare team effectively wrote the pain medication schedule on my health board.	4.30	4	0.747

Continued

12	My health board will be helpful in administering the pain medication.	4.33	4	0.737
13	When my health board is implemented, I will be able to communicate with the nurses about my pains to help with pain management.	4.26	4	0.758
14	Patient satisfaction is affected by how effectively the pain medication schedule is communicated to the patient and/or family member.	4.39	4	0.682
15	Writing as way communicating the pain medication schedule to patient will be better than verbal communication.	4.21	4	0.807
16	My health board will be a good platform to let the patients be aware of their pain medication schedule.	4.36	4	0.741
	Patient and/or family member Engagement			
17	Frequent addressing of the concerns and issues of the patients and their family members increases patient satisfaction.	4.34	4	0.772
18	Patient satisfaction increases with high engagement of health care members in answering the concerns of patient and/or family member.	4.32	4	0.728
19	I believe that some other things patient and/or family member might like to say or share it for emphasize desire information to treatment team could be observed better if they were outline on my health board.	4.33	4	0.697
20	I think that having a patient and/or family member space in my health board to communicate with the treatment team will help raise a patient concern?	4.35	4	0.696
21	I think having a patient and/or family member space in my health board will improve on nurse's quality care to the patients?	4.41	5	0.664
22	I think the concerns about patient/family engagement in my health board space will be addressed immediately to allow for effective collaboration?	4.33	4	0.715
23	Writing as mode of communication and answering concerns of patients and/or family members would be better than verbal communication.	4.29	4	0.728
24	Answering patient's concern by writing on the WB can be a practical solution to address the concerns effectively.	4.29	4	0.756
	Estimated Date of Discharge			
25	I think that writing the expected date of discharge on my health board will contribute to avoiding increasing the number of unnecessary Hospital stay days.	4.20	4	0.799
26	The discharge date should be made available when the patient starts making positive improvements.	4.13	4	0.847
27	My health board will be effective in understanding the reason of the change in discharge date when is decide by the Doctor.	4.12	4	0.862
28	I think writing the patient discharge date on my health board will motivate the patients to stick on their medication schedule and treatment plans?	4.28	4	0.801
29	I think that writing the expected date of discharge from the hospital on my health board contributes to speeding up activities and providing the necessary supplies to leave the scheduled date?	4.31	4	0.726
30	Written mode of communication is better than verbal communication in regard to letting know the patient and/or family member about the discharge date.	4.29	4	0.719
31	Presenting discharge date ahead of time by writing on my health board is adequate and effective for patients and/or family to be made aware of.	4.32	4	0.759
	Schedule Test/Procedure			
32	I think that writing the work times of the tests or x-rays on health board helps to communicate between members of the treatment team at the appropriate time for the procedure.	4.30	4	0.724

Continued

33	The patients need to know their test procedures time so that they can prepare for the processes and aid in achieving success.	4.14	4	0.839
34	Change on the test procedures schedule will be communicated right on time to allow for reorganization and proper planning if written in my health board.	4.25	4	0.723
35	The healthcare team should plan any medical intervention through outlining the time on my health board.	4.43	5	0.639
36	I think writing the test procedures on my health board will increase collaboration between patients and the treatment team at individual levels.	4.44	5	0.644
37	It is important for patients to know about their scheduled tests/procedures significantly ahead of time.	4.37	4	0.657
38	Scheduled procedures can be better communicated in writing rather than verbal communication.	4.26	4	0.750
39	Patients can be made aware of the scheduled test ahead of time by writing on my health board.	4.31	4	0.709
	Patient and/or Family Member Satisfaction			
40	I think the health board makes it easier to communicate with the treatment team	4.35	4	0.679
41	I will be more satisfied if the healthcare team responses would be done through a bedside white board.	4.23	4	0.768
42	I will be generally satisfied if the health care team will present information on the bedside WB.	4.36	4	0.636
43	I think the information on my health board will increase my experience and satisfaction.	4.31	4	0.709
44	I find the information on the health board is useful.	4.35	4	0.679
45	I recommend using the health board to your family and friends	4.23	4	0.768
46	I recommend using the health board in the hospitals.	4.36	4	0.636

Regression analysis was carried out to evaluate how the goal of the day, pain, patient and/or family member engagement, discharge date, and schedule test procedure predict satisfaction. As shown by the r-squared value, the developed regression model made up of the five independent variables predicted a 61.9% variation in satisfaction. The statistically significant F-value of 106.9 ($p = 0.00$) indicates that the model was a good fit for the data. The findings shown in Table 6 indicate that except for patient and/or family member engagement and the goal of the day, the other predictor variables had no statistically significant relationship with satisfaction. For the goal of day, the findings indicate that a unit increase in the goal of day results in a 0.428 increase in satisfaction ($p = 0.00$). Regarding patient and/or family member engagement, the findings indicate that a unit increase in patient and/or family member engagement results in a statistically significant increase in satisfaction by 0.337 units ($p = 0.00$).

Table 6. Regression results.

Dept. var.	Indept. var.	R	R2	F value	F sig.	B	t	Sig	VIF
	Goal of day					0.428	8.09	0.000	2.93
	Pain					0.008	0.160	0.873	2.78
Satisfaction	Patient and/or family member engagement	0.787	0.619	106.9	0.000	0.337	6.75	0.000	2.72
	Discharge date					0.019	0.316	0.752	3.21
	Schedule test procedure					−0.029	−0.543	0.588	2.86

Findings presented in Table 7 indicate the outcome of the Pearson correlation between study variables. Table 7 indicates that satisfaction had a statistically significant and strong positive correlation with the goal of the day ($r = 0.741$, $p < 0.005$), pain ($r = 0.602$, $p < 0.005$), patient and/or family member engagement ($r = 0.713$, $p < 0.005$), discharge date ($r = 0.607$, $p < 0.005$), and schedule test procedure ($r = 0.574$, $p < 0.005$). The goal of the day had a statistically significant and strong positive correlation with pain ($r = 0.746$, $p < 0.005$), family engagement ($r = 0.711$, $p < 0.005$), discharge date ($r = 0.695$, $p < 0.005$), and schedule test procedure ($r = 0.681$, $p < 0.005$). Pain had a statistically significant and strong positive correlation with patient and/or family member engagement ($r = 0.657$, $p < 0.005$), discharge date ($r = 0.705$, $p < 0.005$), and schedule test procedure ($r = 0.688$, $p < 0.005$). Patient and/or family member engagement had a statistically significant and strong positive correlation with discharge date ($r = 0.732$, $p < 0.005$), and schedule test procedure ($r = 0.694$, $p < 0.005$). Discharge date had a statistically significant and strong positive correlation with schedule test procedure ($r = 0.760$, $p < 0.005$).

Table 7. Correlation.

Variables	Satisfaction	Goal of day	Pain	Patient and/or family member engagement	Discharge date	Schedule test procedure
Satisfaction	1	**0.741**	**0.602**	**0.713**	**0.607**	**0.574**
Significance (2-tailed)		0.000	0.000	0.000	0.000	0.000
Goal of the day	**0.741**	1	**0.746**	**0.711**	**0.695**	**0.681**
Significance (2-tailed)	0.000		0.000	0.000	0.000	0.000
Pain	**0.602**	**0.746**	1	**0.657**	**0.705**	**0.688**
Significance (2-tailed)	0.000	0.000		0.000	0.000	0.000
Patient and/or family member engagement	**0.713**	**0.711**	**0.657**	1	**0.732**	**0.694**
Significance (2-tailed)	0.000	0.000	0.000		0.000	0.000
Discharge date	**0.607**	**0.695**	**0.705**	**0.732**	1	**0.760**
Significance (2-tailed)	0.000	0.000	0.000	0.000		0.000
Schedule test/procedure	**0.574**	**0.681**	**0.688**	**0.694**	**0.760**	1
Significance (2-tailed)	0.000	0.000	0.000	0.000	0.000	

Friedman test was used to assess if there was difference in the patient satisfaction associated with the different elements of WB including the goal of the day, pain, patient and/or family member engagement, discharge date, schedule test procedure (Table 8). Patient satisfaction was statistically significantly different for patient and/or family member engagement showed (mean rank = 4.20, $p = 0.000$), goal of the day (mean rank = 4.41, $p = 0.000$), pain (mean rank = 4.33, $p = 0.000$), discharge date (mean rank = 1.75, $p = 0.000$), and schedule test procedure (mean rank = 4.45, $p = 0.000$).

Table 8. Non-parametric test (Friedman).

Variables	Mean Rank	Sig
Goal of day	4.41	0.000
Pain	4.33	0.000
Patient and/or family member engagement	4.20	0.000
Discharge date	1.75	0.000
Schedule test procedure	4.45	0.000
Satisfaction	1.86	0.000

7. Discussion

The findings of this study show that patients and/or family members perceived bedside WB as a useful tool to improve communication with healthcare team member and essential to deliver the treatment plan effectively.

In terms of patient and/or family member engagement with the treatment plan, the study findings showed that WB can help to improve the quality of nursing care, the patient and/or family member can communicate their concerns and issues with healthcare team effectively and thus increases patient satisfaction to care. A systematic mixed method review conducted by Tobiano et al (2018), noted that WB is useful in encouraging patients to contribute to their plan of care for the upcoming shift or discharge which is essential in enabling patients' participation to the plan of care. Several studies also reported that bedside WB in useful to improve patient's knowledge, involvement in decision making and helps to increase the satisfaction with the communication to hospital staff such as nurses and physicians (Pimentel et al., 2018; Singh et al., 2011; Goyal et al., 2019). Through this medium of communication, it also reported that nurses' adherence to interventions such as pain-management related interventions increase (Alaloul et al., 2015). In the study conducted by Sherman & Hilton (2014) indicate that an increase in patients and/or family engagement have a better impact on the clinical and patient outcome, thus increases patients' satisfaction. Our study findings indicate that the use of WB provides great opportunity for patient and/or family members to share their concerns and issues with the health providers enabling them to engage in the plan of care, thus impacts quality of care and patient satisfaction.

The use of bedside WB was perceived to increase patient awareness and compliance to pain medication schedule, which impacts patients' satisfaction as revealed in this study. This is in concordance with the study of Alaloul et al. (2015) which noted that bedside WB use will increase adherence to patients' pain management-related intervention. The use of this medium allows to document patient up-to-date pain scores, pain medication schedules, pain management options and pain goals. The authors found that the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHP) score related to patient

satisfaction with pain management improved after intervention implementation. In the study of Dearmon et al. (2013), WBs considered as an exceptional innovation that could improve patients' outcome. For instance, recording pain medication schedule in WB received positive feedbacks from patient and/or family member. Our study findings suggest that WB could help patient and/or family member to adhere with the patient pain medication and other related pain managements.

Our study also found that bedside WB increases collaboration between patient and the treatment team in terms of scheduled test/procedures. Patients and family member confer the importance of having a plan and schedule ahead of time to help them to be aware of the scheduled tests/procedures to be performed. In the study of Goyal et al. (2019), both nurses and patients identified upcoming tests/procedures as an important information to have on the WB. However, the use of WB may not be useful for some patients who are unable to move due to their medical condition and suggested to improve presentations of information to WBs. Improving easy access/view, encouraging daily use by physicians and avoiding medical jargon also represented areas of patient and nursing misunderstanding. Although there is lack of literature about the impact of bedside WB use in the communication of the scheduled test and procedure to patients, however, several literature indicates that effective collaboration between the patients, family and the health care team is indeed important to ensure that the patient have sufficient information and have the awareness on the scheduled test and procedures to make the decision and for the health care team to execute scheduled test and procedures effectively (Brandenburg et al., 2015). Although this study supports the conclusions made by Parker and Mowry (2015) that the use of WBs for schedule test procedures is associated with patient satisfaction, however, the study noted in regression analysis that the latter did not predict satisfaction.

Another finding of this study shows that patients and family members perceived bedside white board use encourages engagement in the goal for the day and helps in reducing readmission rate. Also, the communication between patients, their family and health care team will be improved, and this will help them to achieve their daily goals. Evidence suggests that documenting patients' goal for the day on the bedside WB enhances patients' engagement in the treatment process (Burk, 2016; Ofori-Atta et al., 2015). Menefee (2014) noted that the practice of determining the patient GFD and aligning the team's goals with patient goal of the day increases the PS and patient engagement and reduces the rate of readmission. However, in the study of Hesselink et al. (2012) found that poor information exchange, poor coordination of care and poor communication between hospital and primary care providers, and between care providers and patients during endorsement lead to patient readmissions. Dunn (2017) also noted that obtaining the patient GFD at the bedside by asking the patient what their goals were and what they needed to accomplish in the given day enhances patient engagement and positively influenced PS. Thus, this activity proposed to be prioritized in

setting and addressing the patient's treatment plan and meeting the goals for the day (Burk, 2016; Ofori-Atta et al., 2015). This study also supports the conclusions made by previous researchers regarding the positive influence that goal of the day has on patient satisfaction (Frazee, 2011; Ofori-Atta et al., 2015; Dunn, 2017). However, the outcome of this study is significant since it focused on how the use of WB for the patient goal of the day influenced patient satisfaction.

Patients and their family perceived bedside WB as an effective tool in improving their awareness about the scheduled discharge date. This will help to speed up activities and provide necessary supplies to leave the scheduled discharge date. Iversen et al. (2014) argued that identifying the expected date of discharge and communicating it to the patients increases the chance there would be no delays in accomplishing of activities required for discharge, which results in no unnecessary prolonging of the length of hospital stay. Hesselink et al. (2012) carried out a study that focused on the analysis of whether patients are discharged with care. The researchers concluded that the involvement of the patients and their families in the preparation for discharge is important in ensuring that the patient's needs are met. Hesselink et al. (2012) noted that the satisfaction of the patients with the discharge process is influenced by the level of involvement in the planning phase and whether their capabilities, needs and preferences are taking into consideration in deciding the discharge date and associated activities.

Furthermore, the findings of this study provide insights into how the use of WBs influences patient and/or family member satisfaction. According to the study, satisfaction is strongly positively correlated with the five elements of WBs, which suggests that an increase in any of the five elements is associated with increase in satisfaction. However, in terms of their ability to predict satisfaction, this study noted that of the five elements of WB, goal of the day, and patient and/or family member engagement significantly predict satisfaction, with an increase in any of the two elements resulting in subsequent increase in satisfaction.

From the above, the results reflected a strong positive correlation between the documentation of GFD on WBs and patient/family member satisfaction. Writing daily goals in a bed sheet enhances engagement, clarifies communications, and aligns healthcare team objectives with the priorities of patients. Previous studies, such as Menefee (2014) and Burk (2016), confirm these findings by demonstrating that GFD documentation increases satisfaction and reduces readmission rates. These results also indicate that GFD documentation enhances the patient experience as a whole. This proves hypothesis 1 "*Association of the Goal of the Day (GFD) with Patient/Family Member Satisfaction*".

It was noted in the study that the tracking of pain medication schedules on WBs significantly raises patient adherence to pain management plans, thus having a positive impact on satisfaction. The clear communication of pain medication schedules reduces confusion and engenders trust in care. This is in agreement with the findings of Alaloul et al. (2015), who noted that WBs enhance patient satisfaction by providing the necessary information on pain management options,

schedules, and goals. Evidence supports this because WBs aid greatly in making communicative pain management possible. This proves hypothesis 2 "*Relationship Between Pain Medication Schedule and Patient/Family Member Satisfaction*".

Bedside whiteboard documentation has been substantiated as one of the proven methods of patients and their family being effectively engaged in their care by voicing their concern and questioning the healthcare staff. Such active engagement will also satisfy them and feel they are heard, and their views are considered as important. Sherman & Hilton (2014) revealed the same discoveries, indicating active patients are likely to show more satisfaction. These findings indicated the use of the WBs on enhancing collaboration, as well as effective communication among patients, families and care providers. This proves hypothesis 3 "*The Relationship Between the Engagement of a Patient/Family-Raising Concerns/Questions and Their Satisfaction*".

The research indicated that there is a significant statistical relationship showing the actual date of discharge on the WBs and the patient's and his family's level of satisfaction. Clear communication of plans for discharge keeps the patient better prepared and reduces delays. In this regard, Iversen et al. (2014) and Hesselink et al. (2012) have also pointed out that timely communication of discharge plans improves satisfaction and allows a smoother transition to post-hospital care. It has become clear how embedding discharge information within bedside WBs will help in improving the patient experience. This proves the hypothesis 4 "*Relationship Between the Appearance of the Actual Discharge Date and Patient/Family Satisfaction*".

The study confirms that the hypothesis, associating documented scheduled tests and procedures on WBs with increased patient and family satisfaction, as this enhances awareness and teamwork. Patients appreciate being informed about what will be done to them; this decreases anxiety and increases trust in the care process. Goyal et al. (2019) similarly reported that both nurses and patients appreciated having such information on the WBs. However, this practice needs to be supplemented by addressing the challenges of the medical jargon and inaccessible patients to become very effective. This proves hypothesis 5 "*Association of Documenting Scheduled Tests/Procedures with Patient/Family Member Satisfaction*".

8. Limitations

There are various limitations that need to be taken into consideration when interpreting the outcome of the study. One of the limitations relates to limited generalizability that is associated with the sampling of the patients using convenient approach. The convenience sampling may introduce some degree of selection bias, this approach is particularly fitted for exploratory studies in healthcare. In this context, the research was focused on assessing the association between bedside whiteboard use and patient/family satisfaction in a very specific context of

Makkah hospitals. These findings represent some very valuable locally specific insights, which is a very important first step in considering the broader applicability of such tools.

While it is valid to acknowledge the potential for recall or reporting bias in self-reported measures, it is important to recognize that self-reported data are often the most direct and relevant method for assessing subjective experiences like patient satisfaction and engagement. Patient and family member satisfaction is inherently subjective, and their perceptions, feelings, and experiences are central to evaluating the effectiveness of bedside whiteboards. Self-reported measures provide an authentic lens into these lived experiences, which cannot be captured through purely objective metrics.

The study may not fully explore potential confounding variables or control for other factors influencing patient satisfaction, such as staff interaction dynamics. However, controlling for all possible confounding variables in a real-world healthcare setting is inherently challenging and often impractical. Patient satisfaction is a complex and multifaceted construct influenced by numerous interrelated factors, including staff interactions. These dynamics are not independent of the bedside WB intervention. In fact, WBs may enhance these dynamics by improving communication, fostering collaboration, and providing a shared platform for patient-centered care.

While the terminology may appear dense to lay audiences, it is appropriate for its intended audience, who are equipped to interpret such analyses.

9. Conclusion

The use of bedside white board is perceived by the patients and/or family as an effective tool for communication and collaboration with the healthcare team. As revealed in this study, it is beneficial in achieving patients' daily goals, adherence to scheduled pain medication, adherence to scheduled laboratory test and procedures, engagements with the healthcare team, and involvement in discharge plan of care. Specifically, white board encourages patients and/or family members to be actively involved in the treatment management. In terms of communication, patients perceived WB as a tool that they can use to share their concerns and issues which are considered important to them, and for them to be aware and be informed of all information and instruction about the treatment process. In terms of collaboration, the use of white board is considered an effective way to inform patients and be aware of the interventions to be implemented such as pain medications and test/procedures schedules which are essential to their compliance and adherence. Moreover, the use of WB was found to be associated with patient satisfaction which can be predicted by 2 main variables; patients' daily goal and patients and/or family engagement with the healthcare team. Therefore, WB is a useful tool to help patients to achieve their daily goals and to improve their engagement with the healthcare team which will also impact on patient satisfaction.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

Agency for Healthcare Research and Quality (2013). *Nurse Bedside Shift Report Implementation Handbook*. https://ahrq.gov/sites/default/files/wysiwyg/professionals/systems/hospital/engaging-families/strategy3/Strat3_Implement_Hndbook_508.pdf

Alaloul, F., Williams, K., Myers, J., Jones, K. D., & Logsdon, M. C. (2015). Impact of a Script-Based Communication Intervention on Patient Satisfaction with Pain Management. *Pain Management Nursing, 16,* 321-327. https://doi.org/10.1016/j.pmn.2014.08.008

Amoah, V. M. K., Anokye, R., Boakye, D. S., Acheampong, E., Budu-Ainooson, A., Okyere, E. et al. (2019). A Qualitative Assessment of Perceived Barriers to Effective Therapeutic Communication among Nurses and Patients. *BMC Nursing, 18,* Article No. 4. https://doi.org/10.1186/s12912-019-0328-0

Anoosheh, M., Zarkhah, S., Faghihzadeh, S., & Vaismoradi, M. (2009). Nurse-Patient Communication Barriers in Iranian Nursing. *International Nursing Review, 56,* 243-249. https://doi.org/10.1111/j.1466-7657.2008.00697.x

Botma, Y., & Labuschagne, M. (2017). Application of the Donabedian Quality Assurance Approach in Developing an Educational Programme. *Innovations in Education and Teaching International, 56,* 363-372. https://doi.org/10.1080/14703297.2017.1378587

Brandenburg, L., Gabow, P., Steele, G., Toussaint, J., & Tyson, B. J. (2015). Innovation and Best Practices in Health Care Scheduling. *NAM Perspectives*. https://nam.edu/wp-content/uploads/2015/06/SchedulingBestPractices.pdf

Burk, K. (2016). *Improving Communication in the Clinical Environment through Bedside Shift Report (BSR): A Quality Improvement Project*. https://www.sigmarepository.org/dnps/266/

Chaboyer, W., Wallen, K., Wallis, M., & McMurray, A. M. (2009). Whiteboards: One Tool to Improve Patient Flow. *Medical Journal of Australia, 190,* S137-S140. https://doi.org/10.5694/j.1326-5377.2009.tb02621.x

Chen, Y., Brennan, N., & Magrabi, F. (2010). Is Email an Effective Method for Hospital Discharge Communication? a Randomized Controlled Trial to Examine Delivery of Computer-Generated Discharge Summaries by Email, Fax, Post and Patient Hand Delivery. *International Journal of Medical Informatics, 79,* 167-172. https://doi.org/10.1016/j.ijmedinf.2009.12.006

Cordasco, K. M. (2013). Obtaining Informed Consent from Patients: Brief Update Review. In: *Making Health Care Safer II: An Updated Critical Analysis of the Evidence for Patient Safety Practices* (pp. 461-470). Agency for Healthcare Research and Quality.

Dearmon, V., Roussel, L., Buckner, E. B., Mulekar, M., Pomrenke, B., Salas, S. et al. (2013). Transforming Care at the Bedside (TCAB): Enhancing Direct Care and Value-Added Care. *Journal of Nursing Management, 21,* 668-678. https://doi.org/10.1111/j.1365-2834.2012.01412.x

Dunn, A. S., Reyna, M., Radbill, B., Parides, M., Colgan, C., Osio, T. et al. (2017). The Impact of Bedside Interdisciplinary Rounds on Length of Stay and Complications. *Journal of Hospital Medicine, 12,* 137-142. https://doi.org/10.12788/jhm.2695

Favela, J., Rodriguez, M., Preciado, A., & Gonzalez, V. M. (2004). Integrating Context-Aware Public Displays into a Mobile Hospital Information System. *IEEE Transactions*

on Information Technology in Biomedicine, 8, 279-286.
https://doi.org/10.1109/titb.2004.834391

Frazee, S. (2011). Goal of the Day: Initiating Goal of the Day to Improve Patient- and Family-Centered Care. *Dimensions of Critical Care Nursing, 30,* 326-330.
https://doi.org/10.1097/dcc.0b013e31822faa50

Gonzalez-Shalaby, M. S. N. (2016). *Use of the Patient WB to Improve Communication of Pain Medication Schedule*. https://repository.usfca.edu/capstone/327/

Goyal, A. A., Tur, K., Mann, J., Townsend, W., Flanders, S. A., & Chopra, V. (2017). Do Bedside Visual Tools Improve Patient and Caregiver Satisfaction? A Systematic Review of the Literature. *Journal of Hospital Medicine, 12,* 930-936.
https://doi.org/10.12788/jhm.2871

Goyal, A., Glanzman, H., Quinn, M., Tur, K., Singh, S., Winter, S. et al. (2019). Do Bedside Whiteboards Enhance Communication in Hospitals? An Exploratory Multimethod Study of Patient and Nurse Perspectives. *BMJ Quality & Safety, 29,* 1-2.
https://doi.org/10.1136/bmjqs-2019-010208

Hesselink, G., Flink, M., Olsson, M., Barach, P., Dudzik-Urbaniak, E., Orrego, C. et al. (2012). Are Patients Discharged with Care? A Qualitative Study of Perceptions and Experiences of Patients, Family Members and Care Providers. *BMJ Quality & Safety, 21,* i39-i49. https://doi.org/10.1136/bmjqs-2012-001165

Iversen, C., Johansson, L., Sandén, L., Vosough, T., Widerberg, V., & Jacobsson, T. (2014). Increasing Patient Accessibility to a Surgery Department through Operations Management Principles. In *The 6th Swedish Production Symposium*.

Jerofke-Owen, T., & Bull, M. (2018). Nurses' Experiences Empowering Hospitalized Patients. *Western Journal of Nursing Research, 40,* 961-975.
https://doi.org/10.1177/0193945917701395

Kripalani, S., LeFevre, F., Phillips, C. O., Williams, M. V., Basaviah, P., & Baker, D. W. (2007). Deficits in Communication and Information Transfer between Hospital-based and Primary Care Physicians: Implications for Patient Safety and Continuity of Care. *JAMA, 297,* 831-841. https://doi.org/10.1001/jama.297.8.831

Kwame, A., & Petrucka, P. M. (2021). A Literature-Based Study of Patient-Centered Care and Communication in Nurse-Patient Interactions: Barriers, Facilitators, and the Way Forward. *BMC Nursing, 20,* Article No. 158.
https://doi.org/10.1186/s12912-021-00684-2

Laurance, J., Henderson, S., Howitt, P. J., Matar, M., Al Kuwari, H., Edgman-Levitan, S. et al. (2014). Patient Engagement: Four Case Studies That Highlight the Potential for Improved Health Outcomes and Reduced Costs. *Health Affairs, 33,* 1627-1634.
https://doi.org/10.1377/hlthaff.2014.0375

McCabe, C. (2004). Nurse-Patient Communication: An Exploration of Patients' Experiences. *Journal of Clinical Nursing, 13,* 41-49.
https://doi.org/10.1111/j.1365-2702.2004.00817.x

Menefee, K. S. (2014). The Menefee Model for Patient-Focused Interdisciplinary Team Collaboration. *JONA: The Journal of Nursing Administration, 44,* 598-605.
https://doi.org/10.1097/nna.0000000000000132

O'Brien, L., Bassham, J., & Lewis, M. (2015). Whiteboards and Discharge Traffic Lights: Visual Management in Acute Care. *Australian Health Review, 39,* 160-164.
https://doi.org/10.1071/ah14131

Ofori-Atta, J., Binienda, M., & Chalupka, S. (2015). Bedside Shift Report: Implications for Patient Safety and Quality of Care. *Nursing, 45,* 1-4.

https://doi.org/10.1097/01.nurse.0000469252.96846.1a

Ou, L., Chen, J., Young, L., Santiano, N., Baramy, L., & Hillman, K. (2011). Effective Discharge Planning—Timely Assignment of an Estimated Date of Discharge. *Australian Health Review, 35,* 357-363. https://doi.org/10.1071/ah09843

Parker, M. L., & Mowry, J. L. (2015). *Impact of a Student and Faculty Collaboration on PS with Pain Management*.

Pimentel, V. M., Sun, M., Bernstein, P. S., Ferzli, M., Kim, M., & Goffman, D. (2018). Whiteboard Use in Labor and Delivery: A Tool to Improve Patient Knowledge of the Name of the Delivery Provider and Satisfaction with Care. *Maternal and Child Health Journal, 22,* 565-570. https://doi.org/10.1007/s10995-017-2425-6

Sehgal, N. L., Green, A., Vidyarthi, A. R., Blegen, M. A., & Wachter, R. M. (2010). Patient Whiteboards as a Communication Tool in the Hospital Setting: A Survey of Practices and Recommendations. *Journal of Hospital Medicine, 5,* 234-239. https://doi.org/10.1002/jhm.638

Sherman, R. O., & Hilton, N. (2014). The Patient Engagement Imperative. *American Nurse Today, 9,* 1-4.

Singh, S., Fletcher, K. E., Pandl, G. J., Schapira, M. M., Nattinger, A. B., Biblo, L. A. et al. (2011). It's the Writing on the Wall: Whiteboards Improve Inpatient Satisfaction with Provider Communication. *American Journal of Medical Quality, 26,* 127-131. https://doi.org/10.1177/1062860610376088

Tan, M., Hooper Evans, K., Braddock, C. H., & Shieh, L. (2013). Patient Whiteboards to Improve Patient-Centred Care in the Hospital. *Postgraduate Medical Journal, 89,* 604-609. https://doi.org/10.1136/postgradmedj-2012-131296

Tse, Y., Miller-Grossett, C., Stout, J., & Moghal, N. (2014). G208(P) Improving Communication of Care Plans with Patients and Carers Using Whiteboards. *Archives of Disease in Childhood, 99,* A100-A100. https://doi.org/10.1136/archdischild-2014-306237.229

Vukovic, M., Gvozdenovic, B., Stamatovic-Gajic, B., Ilic, M., & Gajic, T. (2010). Development and Evaluation of the Nurse Quality of Communication with Patient Questionnaire. *Srpski Arhiv za Celokupno Lekarstvo, 138,* 79-84. https://doi.org/10.2298/sarh1002079v