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Improving nurse call by evaluating a new technology

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Abstract

Purpose: The purpose of this evidence-based practice Doctor of Nursing Practice (DNP) project was to evaluate a new technology designed to improve the nurse call experience. The goal of the technology pilot was to improve communication and care coordination, enhance patient satisfaction, and improve overall response time.

Background: Today, modern integrated nurse call systems are found in all acute care hospitals in the United States, as mandated by the Joint Commission. These systems continue to become more digital, while the core function stays the same—notifying the care team that the patient needs their assistance. A meta synthesis of the literature reviewed demonstrates that integrated nurse call systems have shown to reduced overall response time to patient requests. Nurse and patient perception of this type of technology is overall positive demonstrating improved communication. A very recent study, concluded integrated nurse call systems are required to help nurses make more informed decisions, improve work efficiency, and care quality.

Methods*:* A northern California academic health system evaluated a new technology named Patient Hub through a 90-day pilot. The pilot was conducted on a 22-bed adult postsurgical unit focused on colorectal, urology, and oncology between June 2022 to September 2022. The response time was to be measured and compared to similar patients using traditional nurse call.

Results: The new Patient Hub technology was not fully integrated. It was determined there is not a reliable or standard way to measure response time. During the pilot period, there were 150 events captured by the Patient Hub systems with 105 requests considered active or not cancelled requests. The feedback from patients throughout the pilot period

on the technology was overall positive while adoption was low. Of the 35 patients observed 11, or 32%, were too lethargic or not oriented enough to utilize the technology and three, or 9%, were not interested in learning about the technology. Seven of the devices were not working properly. Twenty-two of the devices, or 65%, were not set up. For future pilots, the recommendation would be to pilot on a unit where the patients are more alert and oriented. There were some patients that thought it was easier to use the pillow speaker to place a nurse call compared to the new Patient Hub technology. Many patients explained the value of communicating directly with their nurse through the technology.

Evaluation: This pilot provided some insight further reinforcing that technology plays a large role in the overall patient experience. It also highlighted the need for integration into existing systems for data analysis and outcome collection, as well as the requirement to reduce bedside nurse responsibility for onboarding and education of technology to the patient.

Keywords: Nurse call, Patient experience, Patient call response time

Improving Nurse Call by Evaluating a New Technology

Clinical Problem

"A system of call bell," described by Florence Nightingale (1990) in the mid-19th century, may be one of the earliest patient care or nurse call system concepts (p.3). Today, modern integrated nurse call systems are found in all acute care hospitals in the United States, as mandated by the Joint Commission (The Joint Commission, 2023). These systems continue to become more digital, while the core function stays the same—notifying the care team that the patient needs their assistance. These systems can increase timeliness of patient care and improve communication and coordination of care (Meade et al., 2006).

Integrated nurse call systems also play an important role in improving patient safety from the perspective of both nurses and patients. For example, patient falls are a significant issue in clinical settings. The Centers for Medicare and Medicaid Services stopped paying for preventable hospital falls in 2008, which has raised more awareness of and efforts toward fall prevention in hospitals (Florence et al., 2018). The modern integrated nurse call system consists of a bed-exit alert that is automatically launched when a patient at risk of falling leaves the bed, so that nurses can provide assistance when necessary.

Another measure of effective communication and timely staff responsiveness to address patient needs, comes from the patient through the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) patient survey. This survey includes the patient's perception of staff responsiveness, call button help, and communication with the nurse. There are various interventions to promote communication, such as hourly

rounding, bedside handoff, use of a communication board located in patient rooms, and call light system technology. Factors such as alarm system fatigue, the perceived overuse of call lights by some patients, and staffing shortages contribute to decreased call light responsiveness and lower HCAHPS scores. These factors may lead to decreased quality outcomes and a discrepancy among patient and staff expectations related to call light responsiveness (Lee et al., 2016).

Meta synthesis of the literature reviewed for this project and discussed in detail under the review of literature section, demonstrates that integrated nurse call systems have shown to reduce overall response time to patient requests (Kuruzovich et al., 2008). Nurse and patient perception of this type of technology is overall positive demonstrating improved communication (Galinato et al., 2015). In a recent study, Wen et al. (2022) concluded integrated nurse call systems are required to help nurses make more informed decisions, improve work efficiency, and improve care quality.

An academic medical center in Northern California is piloting a technology aiming to enhance the patient nurse call experience. This technology called “Patient Hub” allows the patient to make specific requests and allows the care team member to triage the request and communicate directly with patient through technology. The purpose of the technology pilot is to improve communication and care coordination, enhance patient satisfaction, and improve overall response time.

The nurse call Patient Hub project includes providing the patient an integrated software and hardware experience. This technology will be deployed on a specific inpatient unit for 90 days. Evidence-based research shows the use of integrated nurse call technologies reduces response time and improves overall patient satisfaction.

The objective for the proposed project is for this health system to improve efficiency of nursing workflows and request handling as well as advance the patient experience. The expectation is that the new integrated nurse call experience would replace the current nurse call patient pillow speaker long term if proven effective.

PICO Question

Will implementing an integrated nurse call patient application compared to traditional nurse call, result in a decreased response time for a population of adult hospitalized patients in postsurgical care units over a 90-day period compared to those who did not have access to the application?

Table 1

Review of Literature

Author year, journal	Level of evidence	Purpose	Research design	Sample size and characteristic	Results	Relevance to practice
Kuruzovich, J et al., 2008, CIN: Computers, Informatics, Nursing	III	Examine if the use of Vocera NCI affect nurse call response time	15-month evaluation after implementing new integration between Vocera and nurse call	N = 174 nurse call events	51% reduction in overall mean time for attending to patients requests.	
Galinato, J et al., 2016, CIN: Computers, Informatics, Nursing	III	Examine the usefulness, effectiveness, and appropriateness of Eloquence™ in acute inpatient care units as perceived by patients and nurses.	4 month evaluation after implementing new technology	N = 18 patients, 18 nurses	Positive feedback from both patients and nurses.	Nursing perception was positive including liking the ability for system to prioritize different nurse calls. Overall concerns with technology. Patients found software easy to use and liked being able to specify requests.

Bonomi, J et al, 2020, Nursing Management	IV	Evaluating the effects of a high-tech call system on patient-staff communication	1 year evaluation	N = 144, staff and patient survey; HCAHPS scores	No change to patient satisfaction or HCAHPS.	Staff perception more face-to-face and open communication styles are needed to improve communication practices among team members.
Wen, M et al., 2022, BMC Health Services Research	IV	Describe the implementation and experience of an innovative smart patient care system	Nurse surveys from 2 countries and 2 healthcare organizations.	N = 57 nurses	Smart patient care system is required.	A smart patient care system is needed to help nurses make more informed prioritization decisions between responding to alarms and ongoing tasks and finally assist them in adjusting their work in various situations to improve work efficiency and care quality. In this study, we found that 30.91% of alarms using SPCS were processed because nurses received and responded to the alert via mobile phone.

Summary of Evidence

Integrated nurse call systems have shown to reduced overall response time to patient requests (Kuruzovich et al., 2008). Nurse and patient perception of this type of technology is overall positive demonstrating improved communication (Galinato et al., 2015).

Some studies revealed that integrated nurse call systems did not significantly improve patient-staff communication or patients' perception of responsiveness to call lights (Bonomi et al., 2021).

In a recent study, Wen et al. (2022) concluded integrated nurse call systems are required to help nurses make more informed decisions, improve work efficiency, and care quality.

In 2008, Kuruzovich et al. (2008) published foundational work on the reduction of response time experienced when nurse call systems are integrated into the communications system. The results showed a reduced overall mean time for completing a patient request by 51% across all observations when controlling for observation type. Also, analysis of clinicians' usage of the system for different types of patient requests revealed that it enables the clinician to have more control in prioritizing and responding to requests according to the seriousness of the event.

A study very similar to this evidence-based project examined the perception of nurses and patients on the use of a new call communication solution, in the acute care inpatient setting. Eighteen patients were recruited for the study and participated in individual semi-structured interviews during their hospital stay. Eighteen nurses were recruited and participated in focus groups for this study. Qualitative descriptive methods

were used to analyze the data. Results revealed themes of usability and improved communication. After a demonstration of the use and capability of the new nurse call application, nurse and patient participants welcomed advancement in nurse call technology that has the potential to improve workflow and patient outcomes. In addition, the participants also proposed ideas on how to further develop the technology to improve its use (Galinato et al., 2015).

Another similar but more recent study was conducted over a year with 144 staff members participating in pre and post surveys. Staff members were asked to rate their opinion of organizational communication and team communication and their perception of patient satisfaction with call light response and teamwork on a scale of 1 to 5, with 1 indicating needs improvement and 5 indicating excellent. HCAHPS scores were compared pre and post implementation of the call light system, specifically examining patients' rating of staff response time to call lights and call button help as soon as the patient wanted. The results indicated that more face-to-face and open communication styles are needed to improve communication practices among team members. Implementing a high-tech call system did not significantly improve patient-staff communication or patients' perception of responsiveness to call lights (Bonomi et al., 2021).

The strengths of this evidence-based research include that two of the studies were conducted a year or longer in length with good samples sizes. Limitations could include the opposite; the research was of a short duration 4 months and the sample size was small. Other factors to be considered were the consensus that an interdisciplinary effort

and integration of hospital personnel yielded better results. And some studies revealed a decrease in response time but were conducted on earlier technologies.

Wen et al. (2022) designed a study to describe the implementation and experience of an innovative smart patient care system or nurse call system similar to one utilized for this evidence-based project. The study concluded a smart patient care system is needed to help nurses make more informed prioritization decisions between responding to alarms and ongoing tasks and finally assist them in adjusting their work in various situations to improve work efficiency and care quality. This further validates the technology is fundamentally required in an acute care setting.

Nursing Theory

The nursing theory that would be appropriate for the focus of this project would be Jean Watson's theory of transpersonal caring. This nursing model focuses on health promotion as well as the treatment of diseases. According to Watson (2011), caring is central to nursing practice, and promotes health better than a simple medical cure. Watson believes that a holistic approach to health care is central to the practice of caring in nursing (Watson, 2011). This theory is mainly concerned with how nurses care for their patients, and how that caring progresses into better plans to promote health and wellness, prevent illness and restore health. This theory fits well with focus on patient experience through technology.

Evidence-based Practice Model

Implementation of this project followed the Iowa Model. The Iowa model is based on Rogers' Diffusion of Innovations theory, application of implementation science, and is widely recognized for its applicability and ease of use by interprofessional

healthcare teams. This model is intended to strengthen evidence-based decision making and help clinicians implement an evidence-based change in practice (Iowa Model Collaborative, 2017). The Iowa Model emphasizes the importance of thinking about the entire healthcare system from the infrastructure to the care team, and to the patient while utilizing research to guide practice decisions. This Model applies very well to this nursing informatics project as it considers the entire health system, which is imperative to successful implementation of technology (Moran et al., 2019).

The first step in the Iowa Model is to identify a problem or objective. The objective identified for this project aims to improve efficiency of nursing workflows and request handling as well as advance the patient experience and reduce response time. The next step is to review and critique relevant evidence-based literature and to determine if there is sufficient evidence to support the change in clinical practice. Finally, the next steps are to implement a change and to monitor the outcomes (Iowa Model Collaborative, 2017).

Implementation

To achieve the project objectives to improve efficiency of nursing workflows and patient request handling, as well as advance the patient experience and reduce response time a new technology named Patient Hub was piloted.

The pilot was run on a 22-bed adult postsurgical unit. All patient rooms were private including two negative pressure isolation rooms. This unit focuses on colorectal surgery, urology surgery, and oncology patients. The average length of stay for patients is approximately 4–5 days. Typical nurse staffing ratios for the unit are 4:1.

During the 90-day pilot, each patient was provided the new Patient Hub technology in addition to the traditional pillow speaker for nurse call or patient request. During the pilot, every care team member had a smartphone where they would receive alerts from the patient through the Patient Hub technology.

The nurses and unit clerks on the pilot unit were onboarded and trained on the new technology at the Innovation Center prior to start of the pilot. The nursing informatics team trained a shared leadership representative and nurse educators on the unit to be subject matter experts on the technology. Nursing informatics and the project team attended huddles during the first two weeks of go-live to showcase the technology. The project team also rounded the unit frequently to address questions and provide education.

To ensure open communication and ongoing collaboration with the unit a dedicated whiteboard was utilized in a centrally located area to document positive experiences and issues with technology.

Results

The nurse call and real time location services (RTLS) systems collect data on call response times. After evaluation of the nurse call, RTLS, and Patient Hub data sets it was determined there was not a reliable or standard way to measure response time. The new Patient Hub technology was not integrated into these systems, so response time was not included in the results. During the pilot period, there were 150 events captured by the Patient Hub systems with 105 requests considered active or not cancelled requests.

During the pilot, unit observations were made during rounding including 34 unique patient observations over 2 days. The feedback from patients throughout pilot

period on the technology was overall positive. Of the patients observed two, had used the device before. Of the patients observed 11, or 32%, were too lethargic or not oriented enough to utilize the technology and three, or 9%, were not interested in learning about the technology. Seven of the devices were not working properly. Twenty-two of the devices, or 65%, were not set up at all. For future pilots, the recommendation would be to pilot on a unit where the patients are more alert and oriented. There were some patients that thought it was easier to use the pillow speaker to place a nurse call compared to the new Patient Hub technology. Many patients explained the value of communicating directly with their nurse through the technology.

The size and weight of the Patient Hub technology was mentioned by many patients as not being easy to hold onto while in bed or stabilize on the bedside table. This was observed by the informatics team as well. The new Patient Hub device did not have a place at the bedside, so often would get placed on the wall mount, which was too far from the patient to be utilized. For future pilots, it will be critical to have the device secured and stable at the bedside to ensure access which could facilitate greater adoption.

Limitations

The project was limited by the technology systems integration. This incomplete integration to the existing nurse call and real time location system did not allow for the response time to be calculated. The incomplete integration with the Patient Hub technology and the nurse call dome light was a limitation in functionality from the patient and clinical workflow perspective.

Implications for Clinical Practice

The feedback from the nursing and ancillary staff interviews was focused on the burden of onboarding and teaching the patient how to use the Patient Hub. The nursing staff communicated they did not have time to onboard patients, so often patients were not introduced to the technology during their stay. Some nurses provided feedback they liked understanding the specificity of the nurse call including the ability to call the patient back directly through the technology. In the future, the set up and onboarding of the device should not be the responsibility of the primary nurse.

The feedback from the nursing informatics team focused on the need for complete system integration between systems to facilitate improved data and outcome analysis. It also highlighted the gaps in Patient Hub functionality including nurse call dome light and patient portal integration. The ability for the Patient Hub device to reset over the air was also mentioned as a technology barrier.

Conclusion

Integrated nurse call systems play an important role in improving patient safety and experience. They also can have an impact on overall nursing efficiency, communication, and care coordination. Review of the literature demonstrates that integrated nurse call systems have shown to reduced overall response time to patient requests while helping nurses make more informed decisions, improve work efficiency, and improve care quality.

Between June 2022 and September 2022, this northern California academic medical center launched a 90-day pilot on integrated nurse call technology called Patient Hub. The purpose of this project was to improve efficiency of nursing workflows and

request handling as well as advance the patient experience and reduce response time. The expectation was that the new integrated nurse call experience would replace the current nurse call patient pillow speaker long term if proven effective.

Given this health system's focus on innovation and technology, the Patient Hub project has provided some further insight on using technology to enhance the patient experience. This pilot reinforced that technology plays a large role in the overall patient experience. It also highlighted the need for patient bedside technologies integration into existing systems for data analysis and outcome collection, as well as the requirement to reduce bedside nurse responsibility for onboarding and education of technology to the patient.

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