Call Bell Requests, Call Bell Response Time, and Patient Satisfaction

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Based in the center of nursing activity, the nurse call system has potential to gather basic data such as the number of calls and the response time. Analyzing this information may shed light on performance and patient satisfaction. This study used a correlational design to examine results from a patient satisfaction survey administered at discharge in relation to the number of call bell requests from the patient’s room and call bell response time. Key words: call bell, patient assessment, performance improvement, patient satisfaction, quality of care

A GROWING BODY OF EVIDENCE indicates that patient satisfaction is a key component of quality of care. Relationships among prompt attention to patient concerns, efficient execution of therapeutic interventions, and patients’ satisfaction with care have been documented. However, patient satisfaction surveys are usually conducted after discharge, and the results are typically reported quarterly, giving little direct feedback to nurses, the frontline caregivers in hospitals. Simple metrics that are available from existing systems could give nurses and other decision makers immediate feedback on performance and outcomes; however, these metrics may not be used to their potential.

The call bell system functions as a fundamental communication tool that connects the nursing staff and their patients. At a push of the button, a patient’s request is transmitted to the nurse’s station, where a unit staff member answers the call bell and sends a message through a cell phone or other device to the caregiver assigned to the patient. The call bell system also generates basic data, such as the number of calls and the response time to calls, that could help managers and caregivers make important decisions about unit performance and patient satisfaction. The purpose of this study was to determine whether call bell response time or number of calls could be used as a tool for obtaining immediate feedback on the status of the nursing unit, specifically on the state of patient satisfaction.

BACKGROUND AND SIGNIFICANCE

Because nursing staff on a patient care unit cannot be in a patient’s room every minute of every day, staff rely on the call bell system to alert them about their patients’ needs. Unfortunately, the call bell frequently becomes a source of frustration for nurses because it interrupts the care priorities of a nurse’s day. Indeed, a nurse’s day often borders on chaos because planned tasks such as patient assessments, treatments, medication administration, and patient teaching are sandwiched between many other demands, and particularly answering call bell requests. Murphy et al reported that in comparison with other occupational classifications, registered nurses
(RNs) are expected to carry out excessive numbers of patient care activities on a given shift. This frenetic work results in a loss of focus on specific nursing care functions and contributes to reduced morale, decreased patient and physician satisfaction with care, and increased healthcare costs. Murphy et al concluded that there is a “need to develop new methods for controlling the complexity of healthcare systems, particularly the complexity of the RN role.” One component in controlling this complexity, they said, is developing better tools for identifying system inefficiencies. Call bell data analysis may be one tool to help uncover systems problems that contribute to nurses’ frustrations.

Arthur observed that an efficient call bell system could help bring order to chaos and contribute to the delivery of high-quality patient care, achievement of desired patient outcomes, and increased patient satisfaction. Many efforts to improve call bells have focused on making it easier for patients to either contact the nurse or convey calls to the nurse. Phones, pagers, bed controls, and badges are among the electronic devices engineered to enhance call bell systems and improve nurses’ responses.

Unfortunately, call bell use has been examined in very few studies. Breslin and colleagues studied a wireless call bell system to quantify the impact of communication systems on the workflow process. They compared two 32-bed surgical units. One used a traditional call system and the other employed an advanced wireless call system. Observing and surveying staff and patients on the units over a 4-day period, they found that the wireless phone system saved nurses’ time, improved workflow, and increased the nurses’ ability to deliver quality patient care.

While conducting a larger study of key aspects of patient satisfaction, Deitrick et al documented a lack of clarity about which staff member should answer the bell. Nurses’ responses to patients’ calls varied, ranging from answering the call bell immediately to waiting for another person to answer the bell. The authors also identified a relationship between call bell use and patient outcomes—especially patient falls—and a need for follow-up by the person who answered the call bell. On the other hand, they also reported that some patients never used the call bell because nurses were in and out of their rooms so frequently.

Responding to low patient satisfaction scores that indicated dissatisfaction with nurses’ responses to call bells, Van Handel and Krug tallied call bell requests as well as frequency and time of occurrence on a 44-bed orthopedic-neurosurgical unit. They found that peak call bell use occurred at change of shift and around meal times; top reasons for calling were toileting, positioning, and pain management. They suggested possible relationships among frequency of calls, response time, and patient satisfaction, and concluded that anticipating patient needs could improve patient satisfaction. Using rapid cycle improvements, Torres analyzed call bell data to quantify the number and nature of requests on “model of care” units that were “outcomes sensitive” and developed nursing strategies for anticipatory care.

In a longitudinal study, Gersch surveyed nurses and patients on a 28-bed surgical unit after hiring a nonprofessional patient service partner who answered call bells and anticipated basic patient needs. In addition to identifying early morning as the time of peak call bell use, Gersch documented faster call bell response time and improved patient satisfaction after the patient service partner was hired. However, Gersch did not examine the potential relationship between call bell response time and patient satisfaction.

Meade et al examined patterns of call bell use in relation to care management, patient safety, and patient satisfaction. They incorporated particular nursing actions into a work protocol and found that the protocol, which included hourly rounding, significantly reduced the number of patient call bell requests and patient falls while increasing patient satisfaction.

After evaluating a patient satisfaction initiative, Cardoso and Martin concluded that the relationship between prompt call bell
response and patient satisfaction was complex. In their research, nurses used increased awareness, scripting, and hand-held phones to decrease call bell response time. However, patients who did not even use the call bell responded to survey questions regarding response time, suggesting that patients have preconceived ideas about the speed of nurses’ responses. Cardoso and Martin found that, surprisingly, there was no significant relationship between response times that exceeded 3 minutes and patient satisfaction ratings. Contrary to what one might expect, often the longest initial waiting time occurred with the highest rating for call bell promptness.

Managers typically look to patient satisfaction results as information that can be used in performance improvement. If it is available, they often focus on patients’ satisfaction with call bell response time because promptness in responding to calls is a major priority for patients and an activity that can be easily addressed. Also, call bell response time rates sixth among priority items in the Press-Ganey Health Care Satisfaction Report. Yet, no research has examined the relationships between patient satisfaction and the number of call bell requests or the response time of nurses to patient call bell requests. The aim of this study was to see whether call bell data could be used to gain instant feedback on patient satisfaction. Thus, this study of the nurse call bell system may provide new insights into patient satisfaction, an important nursing-sensitive outcome.

METHODS AND PROCEDURES

This pilot study used a correlational design to examine the relationship between the number of call bell requests and call bell response time and patient satisfaction. Results from a patient satisfaction survey administered at discharge were examined in relation to the number of call bells from the patient’s room and call bell response time. The university’s institutional review board approved the study. No patient health information or medical record numbers were collected. Because patient satisfaction scores were based on the patient’s entire experience on the unit without nurse-specific questions and no nurse-specific call bell data were collected, nurses did not need to provide consent; patients received an information sheet with documentation of consent waived.

Setting and sample

The study was conducted on a 32-bed surgical unit at a major academic medical center in the southeastern United States, with a staff of 30 RNs and 11 nursing assistants (NAs). The nurse-to-patient ratio during the study was 1:5 or, occasionally, 1:6.

The call bell system consisted of a central processing display unit and patient room controls that included 2 buttons on the patient’s bed as well as a hand-held device with a red button, any of which a patient could use to initiate a call. When the bell rang at the nurses’ station, the display indicated the patient room and bed and a staff person (typically a unit clerk) at the desk answered and talked with the patient via an intercom system. This person decided whether the patient required the attention of an NA or RN, and then forwarded the call to the appropriate person’s phone or relayed the message verbally. RNs and NAs used individual cell phones to facilitate communication.

Variables and their measurement

The number of calls was measured as the number of times per day a call was initiated from a patient room as recorded by the Responder IV call management software. This number was averaged over a patient’s length of stay to determine the number of calls per day. The call bell response time was measured as the length of time between activation of the call bell request and the time the call was answered and the patient’s call bell was turned off, as measured by the call system software.

The call bell management software, a call-reporting tool developed by Rauland to maximize the efficiency of the Responder IV call bell system, was used to collect, track, and analyze patient call activity. This software
enables call bell activity to be sorted by hour, date, staff member, unit, patient, number of calls, average response time, and specific response time. If a call bell request is relayed via the call bell system, the software records how long it takes the staff member to answer the cell phone. However, one limitation of the software is that the person answering a call may relay the information verbally to the nurse or an appropriate staff member, and, in that case, the call is registered without an associated nurse response time. For this study, the software was enabled to count the number of calls and the response time per patient for a period of 10 consecutive days, 24 hours a day. Data from the Rauland system were corrected for excessive repeated rings, indicating a call bell or a bed was unplugged.

The measurement of patients' evaluation of the quality of care was offered to every adult patient older than 18 years on the unit who had the ability to answer questions in English. Patients' evaluation of the care received was measured by the Patient Assessment of Quality Service—Acute Care Version (PAQS-ACV). The PAQS-ACV tool was designed and tested by Lynn et al16 and has been shown to be reliable and valid for assessing the quality of care from the patient’s perspectives. The PAQS-ACV, a 44-item tool with a traditional Likert-type response scale, has 5 empirically derived factors: caring, environment, nurse characteristics, individualism, and responsiveness. The advantage of this tool over others is that it was developed from qualitative research during which individual patients were asked what they thought defined quality nursing care. Most other tools measuring patients' perceptions of quality of care have been developed from providers' perspective. Factor loadings for the PAQS-ACV ranged from 0.42 to 0.78 and reliability estimates (coefficient α) ranged from .83 to .94 for 4 of the 5 factors, with the environment factor, a 2-item factor, having an α value of .68. The instrument does not include call bell response time because when the survey was developed, patients did not identify response time as a component of quality care. However, the responsiveness factor does address the overall timeliness and awareness of the nurse.

Within 36 hours prior to discharge, a packet containing an information sheet plus the PAQS-ACV was given to each patient on the unit who met study criteria. Patients had the choice of filling out a written survey or having it administered verbally. A survey was given to those patients who chose to complete a written survey, and the researcher returned the next day to pick up the completed survey. For those who chose to have the survey administered verbally, it was read to them and their responses were recorded. A tracking number for the patient, not the patient’s name, was entered on each survey, which reflected a part of the room number and the date. The coding was such that a 6-digit number was assigned to each patient; the first 3 digits reflected the room number and the last 3 digits reflected the month and the discharge date. Call metrics were matched with the identifiers of all patients who turned in satisfaction surveys. Data were protected on a laptop that was password secured.

Data analysis

Data were analyzed using the SPSS, Version 14. Descriptive statistics were calculated for all study variables—the number of call bells per patient per day, call bell response time, and patient satisfaction scores—as well as patient gender, age, days in hospital, and diagnosis. Relationships between the number of call bells per patient per day and the call bell response time and patient satisfaction subscores were analyzed using Pearson correlation statistics. The level of significance was set at an α value of .05.

Findings

Patient satisfaction surveys were given to 43 patients; 41 surveys were returned, for a response rate of 97%. Responses were received from 21 males and 20 females. Patient length of stay ranged from 1 to 35 days, with a mean of 7.4 (SD = 8.4) hospital days. The number of call bells per patient per day during the study ranged from 1 to 35, with a mean of
12 requests (SD = 7.8) and a median of 10 requests. The unit had an average of 320 call bell requests a day (range, 258–396). Not surprisingly, call bell requests increased prior to meals when patients needed help with eating and in the early morning when patients were awakened for the measurement of vital signs and toileting needs. Although nurse response time was a metric of interest in this study, this measure could not be used because staff who handled patient requests often bypassed the call bell system by contacting nursing staff directly via telephone. Consequently, the software-recorded response times measured the time it took for any staff member to communicate verbally with the patient via the intercom system versus the time of a nursing staff’s response to the call bell request. Call bell response time ranged from 2 seconds to 5 minutes, with a mean of 11 (SD = 5.7) seconds.

Factor reliability estimates (coefficient \(\alpha\)) for the PAQS-ACV ranged from .55 to .95 for 4 of the 5 factors (Table 1). The reliability of 2 of the PAQS-ACV factors (environment and responsiveness) was suboptimum. The environment factor with only 2 items has previously been reported to have reliability estimates just below the commonly accepted minimum of .70. However, in this study, it was .55, suggesting results from this factor are not sufficiently reliable to warrant further analysis. The reliability of the responsiveness factor, although below .70, is not so low as to be of concern. The Pearson product-moment correlation (\(r\)) between call bell requests and patient satisfaction scores ranged from −.18 to 0.54, so it was not significant for any subgroup (Table 2).

**DISCUSSION**

This study explored the relationship between the number of call bells and call bell response time, and patient satisfaction. Although it would seem that high call bell response time and number of calls would reflect patients’ dissatisfaction, the study did not show such a correlation. All of the correlations were both low and nonsignificant. This is probably at least partially caused by the small sample size and the low variability of call bells.

**Study limitations**

One major limitation of this pilot study was its small sample size and that data were collected from only 1 patient care unit. In addition, it was impossible to control for patient acuity, unit census, staffing ratios, or other staffing concerns during the days when call bell requests were tracked. Hildman and Ferguson found that surgical patients perceived a slow response time, possibly due to their high state of uncertainty and low level of comfort. Such situations may influence the use of call bells and response times. The

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**Table 1.** Mean (SD) and reliability estimates for PAQS-ACV factors (\(n = 41\))

<table>
<thead>
<tr>
<th>PAQS-ACV factor</th>
<th>Mean (SD)</th>
<th>(\alpha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caring</td>
<td>25.0 (3.9)</td>
<td>.95</td>
</tr>
<tr>
<td>Environment</td>
<td>8.1 (1.4)</td>
<td>.55</td>
</tr>
<tr>
<td>Individualism</td>
<td>58.6 (8.6)</td>
<td>.92</td>
</tr>
<tr>
<td>Nurse characteristics</td>
<td>48.6 (5.6)</td>
<td>.91</td>
</tr>
<tr>
<td>responsiveness</td>
<td>23.7 (2.7)</td>
<td>.68</td>
</tr>
</tbody>
</table>

Abbreviation: PAQS-ACV, Patient Assessment of Quality Service—Acute Care Version.

**Table 2.** Pearson correlations between patients’ evaluations of care and call bell variables (\(n = 41\))

<table>
<thead>
<tr>
<th>PAQS-ACV factor</th>
<th>Number of call bells</th>
<th>Call bell response time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caring</td>
<td>0.54</td>
<td>0.13</td>
</tr>
<tr>
<td>Environment</td>
<td>0.27</td>
<td>0.01</td>
</tr>
<tr>
<td>Individualism</td>
<td>0.06</td>
<td>0.10</td>
</tr>
<tr>
<td>Nurse characteristics</td>
<td>−0.18</td>
<td>0.11</td>
</tr>
<tr>
<td>Responsiveness</td>
<td>0.04</td>
<td>0.11</td>
</tr>
</tbody>
</table>

Abbreviation: PAQS-ACV, Patient Assessment of Quality Service—Acute Care Version.
way the unit used the call bell system was another limitation. To adequately capture response time, the person answering the central processing unit needed to call the nurse phone through the central unit, not through the telephone. Despite educating staff on the importance of using this feature prior to the study, this step was bypassed.

Even with these limitations, this pilot study provides insight into ways a follow-up study could be conducted. Further education of staff on call system phone capabilities, changing callback software options to eliminate 3-minute callbacks, increasing the sample size, and incorporating other outcome measures such as nurse satisfaction, patient falls, and other performance indicators are recommended for a future study.

Call bells and communication

Hospitalized patients want prompt, effective, and personal care, and nurses need a tool for immediate feedback on patient satisfaction. The call bell system has potential to bridge these 2 requirements. Nurses and call bell systems engineers have focused on the communication angle and used response time as a means for attaining patient satisfaction. Patient satisfaction survey development teams, such as Press Ganey, have found that call bell response time is pertinent, but it is not clear that call bell response time per se influences satisfaction. It may be communication problems, not the response time itself, that affect patient satisfaction. For example, dropped patient calls, failure of the answering person to pass on requests, and a patient’s inability to get help in urgent situations may be more important than general response times. A call bell system that supports these special situations is worthy of consideration by electronics engineers and purchasing agents.

Call bells and satisfaction

Although call bell response has been included in surveys, no clinical nursing research supports the claim that short response time increases satisfaction. This study asked whether the data generated by the system could be used as a feedback mechanism for patient satisfaction. However, the study did not show a correlation between the number of call bell requests or response time and patient satisfaction. This suggests that focusing on reducing nurses’ response time to call bell requests or the number of call bell requests, as a means of achieving patient satisfaction, may not accurately capture the complex relationship between patient satisfaction and nurse responsiveness. Many factors affect patient satisfaction; call bell response time and the total number of call bells per day may not be the important factors.

Call bell and performance improvement

The call bell system is helpful in focusing performance improvement initiatives. However, managers can also examine daily patterns of call bell use to address staffing concerns. In this study, it was apparent that the call bell system could capture patterns such as repeated callbacks, absence of personnel at the desk, and peak unit needs. The call bell system may be a useful tool for alerting the unit manager to problems in workflow that need attention. If nurses and managers receive immediate feedback and a snapshot of the state of call bell responses on the nursing unit or patient satisfaction, they can alter their work patterns or address issues before the patient goes home. Measuring call bell frequency and response times as outcomes with differing staffing ratios may also be an important area of future study. It may be that administrators could use call data and graphs to support staffing decisions and increase staffing levels at high call times, especially during lunch and morning change of shift.

Future studies should also examine whether there is a relationship among unit workload, staffing needs, and call bell use. Looking for correlations with other measures such as those on human resource management, software programs may prove to be an interesting area of study. The one troublesome problem in this study—that of lost nurse response time due to bypassing the software system—can be corrected by
reengineering the software. It is clear that the 2 factors, measuring nurse response and regenerating a call after a set period of time, should be distinct, programmable items in any call bell software system. Further study of the yet untapped call system metrics holds promise for analyzing aspects of nursing care on the hospital unit.

Nurses want tools to help “cut through” the complexity of nursing care, make data-based decisions, and improve both communication and performance. In the center of nursing activity is a system that is generating data every minute of the day. As such, the call bell system can help link nursing needs with the data. One use of call bell data is to analyze patterns of activity, but, perhaps, the call system can provide a quick look at the state of the unit or a link to nursing-sensitive indicators such as falls or nurse satisfaction.

REFERENCES

10. Torres SM. Rapid-cycle process reduces patient call bell use, improves patient satisfaction, and antici-