Research

Use of Monitor Watchers in Hospitals: Characteristics, Training, and Practices

Marjorie Funk, Halley Ruppel, Nancy Blake, and JoAnne Phillips

Abstract

Monitor watchers, or personnel whose job it is to watch the central cardiac monitor and alert clinicians of patient events, are used in many hospitals. Monitor watchers may be used to improve timely response to alarms and combat the effects of alarm fatigue. However, little research has been done on the use of monitor watchers, and their practices have not been well described. Therefore, the purpose of our study was to examine the use of monitor watchers and their characteristics, training, and practices. Participants were recruited to complete an online survey on monitor watcher practice via two professional nursing organizations. A total of 413 responded to the survey, including 411 nurses and two non-nurse professionals, and 61% reported that their hospital used monitor watchers. Of these, 60% indicated that their hospitals have been using monitor watchers for more than 10 years, and 62% said that the monitor watchers were located remotely from the patient care unit. Many (68%) reported that monitor watchers worked 12-hour shifts, and a majority said that monitor watchers were required to have a certificate in electrocardiographic monitoring (67%) and be high school graduates (64%). Most (70%) respondents reported that monitor watchers alerted the nurse of an event via a mobile phone carried by the nurse. The results of this survey revealed that monitor watcher practices varied widely. Further research is needed to determine if the use of monitor watchers has an impact on patient outcomes.

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Failure to respond to clinical alarms in a timely fashion is a critical patient safety issue. Hospital personnel are looking for strategies to improve the response to alarms in an effort to ensure that critical events are identified in a timely manner. Various alarm notification strategies have been proposed to ensure that those providing care to patients are notified of true and actionable alarms. These methods include the use of middleware that sends alarms to the bedside clinician's wireless device, as well as the use of monitor watchers.

Monitor watchers, or personnel whose job it is to watch the central cardiac monitor and alert clinicians of patient events, are used in many hospitals. However, little research has been done on the use of monitor watchers and little is known about whether they make a difference in the detection of arrhythmias or in the outcomes of patients. Anecdotal evidence suggests that the practices and responsibilities of these monitor watchers vary across institutions.

The little available research has focused on monitor watcher arrhythmia detection, communication, response times, workload, effect on nurses' electrocardiographic knowledge, and patient outcomes.[1–10] A single-site study from 1997 showed that the presence of dedicated monitor watchers was not associated with lower rates of most adverse outcomes evaluated.[5] However, a 2011 alarm survey conducted by the Health-

care Technology Foundation revealed that 47% of 3,744 respondents worked in hospitals that used monitor watchers.[4]

Discrepancies related to the definition, workload, and methods of communication for monitor watchers have been noted. Monitor watchers may be trained technicians, emergency medical technicians, or nurses.[3,11–13] When monitor watchers are nurses, they may be tasked with watching telemetry monitors in addition to patient care responsibilities.[1,14] Monitor watchers may be located on the unit being monitored, in a different unit in the hospital, or in a centralized area away from the units.[1,3,11–13,15] The number of patients a monitor watcher is responsible for varies, though Segall et al.[7] reported that responsibility for more than 40 patients at a time significantly delays identification of serious arrhythmias. Methods of communication (e.g., telephone, pager) between the monitor watcher and the bedside nurse also differ and may vary in efficacy depending on the location of the monitor watcher.[1,2,16,17]

As a result of the discrepancies in monitor watcher practice described in the current literature, additional research investigating how monitor watchers are used is warranted. Therefore, the purpose of this study was to examine the use of monitor watchers and their characteristics, training, and practices in hospitals across the United States.

Methods

To examine monitor watcher practices, we used an online survey that was available through a link and administered anonymously through Survey Monkey. The study was approved by the Hospital Human Subjects Protection Program at Children's Hospital Los Angeles.

The sample consisted primarily of nurses who were members of the American Association of Critical-Care Nurses (AACN) or the National Association of Clinical Nurse Specialists (NACNS). We chose to survey nurses because we believed that they would be most familiar with the use of monitor watchers and why some hospitals do not use them. AACN and NACNS members were recruited to participate in the study through announcements in the associations' electronic newsletters (*CriticalCare eNewsline* and *CNS Communique*, respectively). Both newsletters contained a link to study information and the survey. Participation in the survey was voluntary, and no compensation was provided.

Data Collection

The survey was designed to obtain information on the use of monitor watchers in hospitals across the United States. "Monitor watchers" were defined as personnel who assisted the nurse by watching the cardiac monitor, and who also may be responsible for applying the electrocardiogram (ECG) electrodes and other duties associated with cardiac monitoring. Depending on how respondents answered certain questions, the survey contained from 35 to 39 questions for respondents who work in hospitals that employ monitor watchers. It contained only 13 questions for respondents who work in hospitals that do not employ monitor watchers. Most questions were multiple choice, except for two that elicited the maximum and average number of patients monitored. The survey also contained space for free-text comments. Information was collected via Survey Monkey, which did not track participant information or IP address. The opportunity to complete the survey was open for 10 weeks, and a total of 413 participants completed the survey. It contained six questions on basic demographic information. The survey diverged when participants were asked about the use of monitor watchers. If the participant answered "yes," the questions for hospitals with monitor watchers were presented for completion. If the participant answered "no," questions for hospitals that did not use monitor watchers were presented for completion.

Data Analysis

Survey data were downloaded from Survey Monkey and analyzed using SPSS version 22 (IBM Corp., Armonk, NY). We used descriptive statistics, including frequencies and measures of central tendency and dispersion.

Results

We received 413 responses to the survey. Respondent and hospital characteristics are

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shown in Table 1. All but two respondents were nurses (n = 411). The other two respondents were a "biomedical engineer" and a "patient safety specialist." The majority of the nurse respondents were staff nurses (65%). The respondents primarily reported working at hospitals with fewer than 500 beds (68%), and most worked at not-for-profit hospitals (55%).

Characteristic	No. (%)
Profession	
Nurse	411 (99.5)
Biomedical engineer	1 (0.25)
Patient safety specialist	1 (0.25)
Total	413 (100)
Position	
Staff	268 (64.9)
Educator	45 (10.9)
Manager	39 (9.4)
Advanced practice nurse (e.g., clinical nurse specialist, nurse practitioner, nurse midwife)	36 (8.7)
Director	14 (3.4)
Other (e.g., informatics, regulatory/ compliance, quality/safety)	11 (2.7)
Total	413 (100)
No. of licensed hospital beds	
<100	36 (8.9)
100–299	125 (30.8)
300–499	114 (28.1)
500–699	69 (17.0)
700–899	35 (8.6)
>899	27 (6.7)
Total*	406 (100)
Type of hospital†	
Not for profit	228 (55.2)
Academic medical center	122 (29.5)
Community within a health system	107 (25.9)
Tertiary medical center	44 (10.7)
For profit	42 (10.2)
Children's hospital	41 (9.9)
Critical access	39 (9.4)
Community (independent)	38 (9.2)
Federal government (military, veterans, Indian)	23 (5.6)
Other (safety net)	2 (0.5)

Table 1. Characteristics of survey respondents. *Seven respondents who answered "don't know" were excluded from the analysis. †Respondents (n = 413) could select more than one type.

Use of Monitor Watchers

Respondents were asked whether their hospital had performed an analysis of the impact of using monitor watchers (Table 2). Approximately one-half of the respondents did not know, but of those who knew, 75% reported that their hospital had not performed such an analysis. Nearly 61% of respondents reported that their hospital used monitor watchers on any unit. Those who said that their hospital did not use monitor watchers were asked to indicate the reason(s). The most commonly reported reasons were "There is no need because bedside alarms can be heard at the nurses' station or they are connected to the nurse call system" (57%) and "It is too expensive" (34%).

Of 410 respondents, 249 (61%) reported that their hospitals used monitor watchers and therefore were prompted to answer subsequent questions about monitor watchers at their hospitals (Table 2). Adult intermediate telemetry units (79%) and adult medical-surgical units (66%) had the highest frequency of using monitor watchers. Approximately 28% reported that monitor watchers were used in adult intensive care units (ICUs). About 22% of respondents said that the percentage of their units with electrocardiographic monitoring capability using monitor watchers was less of 25%. The majority of respondents reported that their hospitals had been using monitor watchers for more than 10 years (60%), and 68% reported that monitor watchers worked 12-hour shifts. The survey also elicited the maximum (38 [range 8–100]) and average (29 [4–80]) number of patients for whom monitor watchers were responsible.

Location of Monitor Watchers

A total of 62% of respondents (41.6% + 14.7% + 5.6%) reported that monitor watchers were located remotely for non-ICU areas (defined as "located in an area off the patient care unit") (Table 3). For those who reported that monitor watchers were located remotely, 88% said that monitor screens also were located on the unit for nurses to see and 87% said that no licensed person (e.g., physician or registered nurse) was required to be in the remote monitoring area.

Monitor Watcher Job Requirements

Most respondents reported that monitor watchers were required to have a certificate in electrocardiographic monitoring (66%) and be high school graduates (64%). In 82% of cases, respondents indicated that monitor watchers were not required to have any national certification (e.g., advanced cardiac life support [ACLS]) (Table 4). Many respondents did not know the hourly pay rate for entry-level monitor watchers, but of those who did, 88% reported that monitor watchers were paid $10 to $19 per hour.

Monitor Watcher In-Service Education

Participant-reported electrocardiographic in-service education requirements for monitor watchers, both at initial hire and on an ongoing basis, are shown in Table 5. An initial electrocardiographic course for monitor watchers was reported by 71% of respondents. Almost all (99%) indicated that the course included rhythm interpretation, 98% measurement of heart rate and intervals, and 81% operation of the monitor. Only 77% indicated that the course included management of alarms. Although many did not know, of those who did, the majority reported that the course was shorter than 20 hours in length (67%). All reported that the initial education session was followed by a mandatory test, with 51% saying that it was both a written and performance-based test. No ongoing electrocardiographic education was reported by 26% of respondents, while 63% said that ongoing education occurred annually. A mandatory ongoing ECG test was reported by 73%.

Monitor Watcher Practice

Components of monitor watcher practice are presented in Table 6. Respondents reported that the primary job responsibilities for monitor watchers were interpreting rhythms and responding to alarms (77%), while 10% said that the monitor watchers were responsible for responding to alarms only. Most respondents (83%) indicated that monitor

Question/Characteristic	No. (%)
Has your hospital performed an analysis of the impact of using monitor watchers?*	
No	159 (75.4)
Yes	52 (24.6)
Total	211 (100)
Use of monitor watchers on any unit in hospital†	
Yes	249 (60.7)
No or don't know	161 (39.3)
Total	410 (100)
Reasons for not using monitor watchers‡	
There is no need because bedside alarms can be heard at the nurses' station or they are connected to the nurse call system.	66 (56.9)
It is too expensive.	39 (33.6)
We use a direct-to-clinician alarm delivery model (e.g., pager, text, smart phone).	25 (21.6)
We are in the process of creating a monitor watcher system.	3 (2.6)
We tried and it didn't work well.	2 (1.7)
Units using monitor watchers§,‖	
Adult intermediate telemetry	185 (79.1)
Adult medical-surgical units	154 (65.8)
Adult intensive care	66 (28.2)
Adult 24-hour observation care units	62 (26.5)
Adult emergency department	28 (12.0)
Maternity	26 (11.1)
Pediatric intermediate telemetry unit	21 (9.0)
Pediatric intensive care unit	15 (6.4)
Pediatric medical-surgical units	12 (5.1)
Pediatric emergency department	6 (2.6)
Pediatric 24-hour observation care units	4 (1.7)
Other (e.g., mixed acuity unit, rehabilitation)	3 (1.3)
Percent of ECG-capable units using monitor watchers§, ¶	
<25	43 (21.9)
25–75	87 (44.4)
>75	66 (33.7)
Total	196 (100)
Length of time (in years) hospital has used monitor watchers§, **	
<3	17 (10)
3–10	51 (30)
>10	102 (60)
Total	170 (100)
Monitor watcher shift length (in hours)§, ††	
4	1 (0.6)
8	57 (31.8)
12	121 (67.6)
Total	179 (100)
No. of patients for whom monitor watcher is responsible§	Mean ± SD (range)
Maximum no. of patients for whom monitor watcher is responsible (115 missing responses; n = 134 respondents)	37.9 ± 18.0 (8–100)
Average no. of patients for whom monitor watcher is responsible (103 missing responses; n = 146 respondents)	29.2 ± 13.8 (4–80)

Table 2. Use of monitor watchers. *A total of 202 respondents answered "don't know" and therefore were excluded from the analysis. †Three missing responses. ‡Respondents (n = 116) could select more than one answer. A total of 66 responses were missing, while 180 respondents indicated "not applicable; we do use monitor watchers" and 51 indicated "don't know" and therefore were excluded from the analysis. §The 249 participants indicating that their hospital used monitor watchers were prompted to provide this information. ‖Respondents (n = 234) could select more than one answer; 15 responses were missing. ¶A total of 15 responses were missing. Of the 234 respondents, 38 indicated "don't know" and therefore were excluded from the analysis. **A total of 15 responses missing. Of the 234 respondents, 64 indicated "don't know" and therefore were excluded from the analysis. ††A total of 43 responses were missing. Of the 206 respondents, 27 indicated "don't know" and therefore were excluded from the analysis. Abbreviation used: ECG, electrocardiogram.

Question/Characteristic	No. (%)
Location of monitor watchers for non-ICU areas (52 missing responses; n = 197 respondents)	
Centralized location off the patient care unit (remote)	82 (41.6)
Open centralized location on the patient care unit	35 (17.8)
It varies by unit. Some monitor watchers are located on the unit and others are located remotely.	29 (14.7)
Separate room on the patient care unit	26 (13.2)
In a separate building (remote)	11 (5.6)
In an ICU separate from the patient care unit	10 (5.1)
Other	4 (2.0)
Total	197 (100)
If located remotely, are there monitor screens on the unit that the nurses can see? (50 missing responses; n = 149 respondents)	
Yes, at the central station	78 (52.3)
Yes, at the bedside, at the central station and/or in the hallways	37 (24.8)
Yes, at the bedside	10 (6.7)
Yes, in the hallways	6 (4.0)
No	18 (12.1)
Total	149 (100)
If located remotely, is an RN, MD, or other licensed person required to be in the remote monitoring area? (50 missing responses and 61 "not applicable; we don't have remote monitor watchers" responses; n = 138 respondents)	
No	120 (87)
Yes	18 (13)
Total	138 (100)

Table 3. Location of monitor watchers. The 249 participants indicating that their hospital used monitor watchers were prompted to provide this information. Abbreviations used: ICU, intensive care unit; MD, medical doctor; RN, registered nurse.

watchers interpreted the rhythm strip associated with the alarm condition. A majority (67%) also indicated that monitor watchers silenced or paused alarms, but fewer turned on alarms (43%), turned off alarms (37%), or changed alarm limits (41%). Respondents said that the monitor watcher's job description included reporting problems to the nurse (99%), changing batteries on portable devices (41%), documenting in the medical record (40%), and activating a code response (31%). Of note, 22% reported that monitor watchers also have unit clerk responsibilities.

Monitor watcher documentation practices also are shown in Table 6. Respondents indicated that 59% of monitor watchers documented a rhythm strip with a rhythm change, 40% documented a rhythm strip every 8 hours, and 37% documented a rhythm strip every 12 hours. Although not provided as a response option in the survey question, many respondents also commented that monitor watchers documented a rhythm strip as frequently as every 4 or 6 hours. More than one-half (58%) reported that monitor watchers were responsible for documenting the rhythm in the patient record. Respondents indicated that monitor watchers documented their interpretation of the rhythm (90%), heart rate (80%), and various electrocardiographic intervals (26–82%) in the patient record.

Regarding notification of rhythm change or alarm signal, respondents indicated that 70% of monitor watchers contacted the nurse via mobile phone. Notifying the charge nurse was the most commonly reported escalation strategy if monitor watchers were unable to reach the patient's nurse (85%).

Electrocardiographic Monitoring Practice Issues

Survey participants, both from hospitals that did and did not use monitor watchers, responded to questions related to general electrocardiographic monitoring practice issues (Table 7). Slightly more than one-half (53%) reported having a telemetry battery change protocol. Approximately 60% reported that batteries were only changed as needed, while 32% said that they were changed every 24 hours. Electrode change protocols were reported by 65% of respondents, and of those, 70% reported that electrodes were changed every 24 hours. Respondents also were asked about middleware (defined as a "system that automatically notifies staff via pager or phone of an alarm signal"), with 77% reporting that their hospitals did not use middleware.

Monitor Watchers and Nursing Workflow

Of the 413 respondents, 83 provided free-text comments. Most comments were related to respondents' perception of the effect of monitor watchers on nursing workflow. Respondents had both negative and positive comments about their experience with monitor watchers.

A number of comments reflected that monitor watchers called the nurse to report all alarms, did not or could not interpret

rhythms, were not useful, and hindered nurses' work:

- "I have had to educate [the monitor watchers] many times that the rhythm they identify [is] NOT fatal or dangerous (i.e., noise). I receive about 10 calls during a typical shift. They do receive a basic rhythm class, but so many times they call over false rhythms."
- "A problem noted is that the monitor techs are inconsistent in reporting problems; overt alarm issues are usually called but trends and subtle changes are usually missed."
- "We have taken away ability of the monitor watchers to 'interpret' the rhythms they report, they just call. ... Not allowing the monitor tech to 'think' about whether an alarm is real or false results in alarm fatigue of numerous notifications overwhelming the RN."
- "I have had patients go into a lethal rhythm multiple times and they do not call, but the phone rings the second I take the batteries out of the box to change them, so they can alert me that the box has died."

Several respondents reported concern over the negative effect monitor watchers have had on nurses' ability to interpret rhythms:

- "Using monitor watchers drastically decreased my own comfort with interpreting alarms and cardiac rhythms. Although it is helpful to have someone else notify you when an alarm of note goes off, I always felt a step behind since I wasn't exposed to checking my own alarms or strips as much."
- "RNs are losing their skills of measuring and interpreting rhythms because they rely on [monitor techs]. They start seeing documenting the strip as a task rather than the rhythm being an essential part of their assessment and medication administration."
- "I believe the knowledge and skills in arrhythmia interpretation and management has significantly improved among nurses [since we stopped using monitor watchers]. When we had monitor watchers, the nurses often didn't accurately interpret rhythms and depended so much on the monitor watchers."
- "I think monitor watchers ... provide a false sense of security. I've taken care of multiple patients in our cardiac ICU after arrests where resuscitation was delayed because no one was paying attention."

Others felt that monitor watchers were very helpful, or could have been helpful, in preventing adverse patient events or reducing noise:

- "One of my patient's monitors stopped working and through a fault in the system that was supposed to send an alarm to my phone, I was unaware that his portable monitor had stopped. I talked to him at 0630 to tell him 'bye' before I gave report but when the day shift nurse went in at 0700 he was dead. ... I had no alert from the monitor. If we had monitor watchers someone would have seen when he went off monitor."
- "I like the system of having a person whose job it is to watch the monitors. As a staff RN, I am much too busy to be checking the monitor as frequently as I think it should be checked."
- "I served as a monitor watcher in an adult ICU while in nursing school. It was an amazing experience for me to learn the various alarms, and it cut down on the overall noise level on the unit."

Question/Characteristic	No. (%)
Minimum education/licensing requirement*	
Certificate in electrocardiographic monitoring	109 (66.5)
High school graduate	105 (64.0)
Paramedical (e.g., EMT)	11 (6.7)
Licensed practical/vocational nurse	7 (4.3)
RN	7 (4.3)
Associate degree	2 (1.2)
Other (e.g., certified nursing assistant, physician assistant/nursing students, MD in E-ICU)	6 (3.7)
Certification requirement?†	
No	102 (81.6)
Yes, ACLS	9 (7.2)
Yes, EMT	4 (3.2)
Other (e.g., BLS, BART)	11 (8.8)
Hourly pay rate (in $) at entry level‡	
<10	6 (4.7)
10–19	112 (88.2)
20–29	7 (5.5)
>29	2 (1.6)
Total	127 (100)

Table 4. Monitor watcher job requirements. The 249 participants indicating that their hospital used monitor watchers were prompted to provide this information. *Respondents (n = 164) could select more than one answer. A total of 15 responses were missing, while 70 respondents indicated "don't know" and therefore were excluded from the analysis. †Respondents (n = 125) could select more than one answer. A total of 15 responses were missing, while 109 respondents indicated "don't know" and therefore were excluded from the analysis. ‡Respondents (n = 127) could select more than one answer. A total of 15 responses were missing, while 107 respondents indicated "don't know" and therefore were excluded from the analysis. Abbreviations used: ACLS, advanced cardiac life support; BLS, basic life support; BART, basic arrhythmia recognition training; E-ICU, electronic intensive care unit; EMT, emergency medical technician; MD, medical doctor; RN, registered nurse.

Less than 25% reported using middleware. One respondent expressed concerns:

- "Senior leadership at the hospital believes it is safe to have the central monitor send a notification to the nurses'

Question/Characteristic	No. (%)
Initial electrocardiographic education*	
Initial course for monitor watchers? (17 missing responses; n = 232 respondents)	
Yes	165 (71.1)
No or don't know	67 (28.9)
Total	232 (100)
Content of initial course†	
Rhythm interpretation	131 (99.2)
Measurement of heart rate and intervals	129 (97.7)
Operation of monitor	107 (81.1)
Management of alarms	101 (76.5)
Other (escalation procedure, documentation of rhythm strips)	2 (1.5)
Length (in hours) of initial course‡	
<10	33 (33.3)
10–19	33 (33.3)
20–29	14 (14.1)
30–39	4 (4.0)
>39	15 (15.2)
Total	99 (100)
Mandatory test after initial education§	
Yes	141 (100)
No	0
Total	141 (100)
Type of test‖	
Written	60 (46.9)
Performance	3 (2.3)
Both written and performance	65 (50.8)
Total	128 (100)
Ongoing electrocardiographic education¶	
Frequency of ongoing education**	
Yearly	89 (63.1)
Every other year	3 (2.1)
Other (e.g., every 6 months, quarterly)	13 (9.2)
No ongoing education	36 (25.5)
Total	141 (100)
Mandatory ongoing test††	
Yes	99 (72.8)
No	37 (27.2)
Total	136 (100)

Table 5. Monitor watcher in-service education. *The 249 participants who indicated that their hospital used monitor watchers were prompted to answer the first question under "initial electrocardiographic education." Survey settings allowed only respondents who reported an initial electrocardiographic course to respond to the subsequent questions in this section. †Respondents (n = 132) could select more than one answer. A total of nine responses were missing, while 24 respondents indicated "don't know" and therefore were excluded from the analysis. ‡Nine responses were missing, while 57 respondents indicated "don't know" and therefore were excluded from the analysis. §Nine responses were missing, while 15 respondents indicated "don't know" and therefore were excluded from the analysis. ‖Nine responses were missing, while 28 respondents indicated "don't know" and therefore were excluded from the analysis. ¶The 249 participants who indicated that their hospital used monitor watchers were prompted to answer the questions under "ongoing electrocardiographic education." **A total of 27 responses were missing, while 81 respondents indicated "don't know" and therefore were excluded from the analysis. ††A total of 27 responses were missing, while 86 respondents indicated "don't know" and therefore were excluded from the analysis.

cordless phone. The nurses cannot visualize the rhythm on their phones, just a text notification with another noisy alarm. Having another device (phone) added that alarms to notify the nurse of something is only contributing to more alarm fatigue and not adding to patient safety. The response to the phone notifications is now met with complacent irritation and not with a sense of urgency."

Discussion

In this national survey, we gathered descriptive data on the use of monitor watchers. The purpose of the survey was to examine monitor watcher characteristics, training, and practices. The majority of respondents reported that their hospitals use monitor watchers. The most frequently cited reason for not using monitor watchers was that nurses could hear alarms at the nurses' station or alarms were connected to a nurse call system. According to respondents, monitor watchers observed a varying number of patient monitors at one time, from as few as 8 to as many as 100, and most worked 12-hour shifts. Most respondents noted that monitor watchers were located remotely (not on the patient care unit) and were primarily responsible for both interpreting rhythms and responding to alarms. A certificate in electrocardiographic monitoring and a high school diploma were the most commonly reported minimum education requirements for monitor watchers. Almost one-third reported that their hospital did not provide an initial electrocardiographic education for monitor watchers and one-quarter reported a lack of ongoing electrocardiographic education.

In this survey, 61% of respondents reported that their hospital used monitor watchers. This demonstrates an increase from the findings reported by Funk et al.,[4] in which 47% of respondents to a 2011 survey on alarms reported that their hospital used monitor watchers. This may represent a true increase in monitor watcher use over this time period because alarm fatigue has become a high-profile patient safety issue[18] and monitor watchers present a potential solution to missed critical event alarms. However, it also is possible that this does not reflect a true increase in the number of

Question/Characteristic	No. (%)
Components	
Primary job responsibilities (36 missing responses; n = 213 respondents)	
Interpret rhythms and respond to alarms	164 (77.0)
Interpret rhythms only	28 (13.1)
Respond to alarms only	21 (9.9)
Total	213 (100)
Alarm management tasks*	
Interpret rhythm strips related to alarm conditions	163 (83.2)
Silence and pause alarms	131 (66.8)
Turn alarms on	85 (43.4)
Change alarm limits	80 (40.8)
Document alarm limits	77 (39.3)
Turn alarms off	72 (36.7)
Verify orders related to alarm limits	49 (25.0)
Other	3 (1.5)
Elements of job description†	
Alert nurse of problems	205 (99.0)
Change batteries on portable telemetry devices	85 (41.1)
Document in medical record	82 (39.6)
Activate code response	64 (30.9)
Change ECG electrodes	46 (22.2)
Perform unit clerk responsibilities	46 (22.2)
Other (e.g., process/performance improvement activities)	9 (4.4)
Documentation	
Frequency of rhythm strip documentation‡	
With a rhythm change	115 (58.7)
Every 8 hours	79 (40.3)
Every 12 hours	73 (37.2)
Once a day	2 (1.0)
Other (e.g., every 4 hours, every 6 hours)	52 (26.5)
Do monitor watchers document the rhythm in the patient record?§	
Yes	110 (57.9)
No	80 (42.1)
Total	190 (100)
Parameters documented in patient record‖	
Rhythm interpretation	120 (89.6)
PR interval	110 (82.1)
QRS interval	108 (80.6)
Heart rate	107 (79.9)
QT interval	85 (63.4)
QTc interval	35 (26.1)
SpO_2	16 (11.9)
Blood pressure	10 (7.5)
Temperature	3 (2.2)
Other parameters (e.g., ST elevation/ depression, ICP)	7 (5.2)
Notification	
How does the monitor watcher notify the nurse of a rhythm change or an alarm signal?¶	
Mobile phone (that the nurse carries)	142 (69.6)
Dedicated land line phone	63 (30.9)
Voice badge	29 (14.2)
Pager	16 (7.8)
Other (e.g., in-person, overhead page)	33 (16.2)
If the monitor watcher is unable to reach the patient's nurse, what is the escalation strategy?**	
Charge nurse	159 (84.6)
Another specified nurse	16 (8.5)
A specified group of nurses	7 (3.7)
Other (e.g., nursing desk, call MD)	6 (3.2)
Total	188 (100)

Table 6. Monitor watcher practice. The 249 participants who indicated that their hospital used monitor watchers were prompted to answer the questions in this table. *Respondents (n = 196) could select more than one answer; 53 responses were missing. †Respondents (n = 207) could select more than one answer; 42 responses were missing. ‡Respondents (n = 196) could select more than one answer. A total of 43 responses were missing, while 10 respondents indicated "don't know" and therefore were excluded from the analysis. §A total of 43 responses were missing, while 16 respondents indicated "don't know" and therefore were excluded from the analysis. ‖Respondents (n = 134) could select more than one answer. A total of 44 responses were missing, while 16 respondents indicated "don't know" and 55 "not applicable" and therefore were excluded from the analysis. ¶Respondents (n = 204) could select more than one answer. A total of 43 responses were missing, while two respondents indicated "don't know" and therefore were excluded from the analysis. **A total of 43 responses were missing, while 18 respondents indicated "don't know" and therefore were excluded from the analysis. Abbreviations used: ECG, electrocardiogram; ICP, intracranial pressure; MD, medical doctor; SpO_2, peripheral capillary oxygen saturation.

Question	No. (%)
Telemetry battery change protocol*	
Yes	141 (52.8)
No	126 (47.2)
Total	267 (100)
If yes, how often are batteries changed?†	
Every 24 hours	62 (32.3)
Every 48 hours	15 (7.8)
Only as needed	115 (59.9)
Total	192 (100)
Electrode change protocol?‡	
Yes	203 (65.1)
No	109 (34.9)
Total	312 (100)
If yes, how often are electrodes changed?§	
Every 24 hours	181 (69.9)
Every 48 hours	11 (4.2)
Only as needed	62 (23.9)
Other (e.g., "every shift," Monday/Wednesday/Friday)	5 (1.9)
Total	259 (100)
Use of middleware?‖	
No	255 (77.3)
Yes	75 (22.7)
Total	330 (100)

Table 7. General electrocardiographic monitoring practice issues. These questions were asked of all survey participants, regardless of whether monitor watchers were used in their hospital (n = 413). A total of 66 participants left these questions blank (missing); therefore, 347 participants responded to these questions. *A total of 80 respondents indicated "don't know" and therefore were excluded from the analysis. †A total of 79 respondents indicated "not applicable" and 76 indicated "don't know" and therefore were excluded from the analysis. ‡A total of 35 respondents indicated "don't know" and therefore were excluded from the analysis. §A total of 59 respondents indicated "not applicable" and 29 indicated "don't know" and therefore were excluded from the analysis. ‖A total of 17 respondents indicated "don't know" and therefore were excluded from the analysis.

hospitals using monitor watchers but rather is a reflection of those who responded to the current survey. Most respondents reported that their hospitals have used monitor watchers for more than 10 years. Those who used monitor watchers in their hospitals may have been more interested in responding to this survey, which was marketed as a study on monitor watchers. Therefore, response bias may explain the apparent increase in use of monitor watchers. Last, even if monitor watchers were used on only one or two units, respondents indicated that they were used in their hospitals.

Several findings in this survey are concerning about the potential effectiveness of monitor watchers. First, the survey results indicated that requirements for monitor watcher education and certification are not uniform and vary from a minimum of a high school diploma to being a registered nurse. Most were not required to have any national certification (e.g., ACLS). About one-quarter of the respondents reported that no initial or ongoing electrocardiographic education was provided for monitor watchers. The lack of education and certification requirements is concerning for the monitor watchers' ability to interpret rhythms and alert the nurse when a true event is occurring. Without this training, monitor watchers may provide little additional benefit over possibly less costly methods of alerting nurses to alarms, such as middleware.

In addition to inconsistent requirements and training for monitor watchers, this survey revealed substantial variation in the number of patient monitors for which monitor watchers were responsible for observing at one time. Research has indicated that monitor watchers responsible for 48 patients had significantly delayed response times compared with those watching 40 or fewer.[7] In our survey, we found a mean maximum of 38 patients watched. A monitor watcher's ability to respond in a timely manner to arrhythmias when watching an excessive number of monitors is potentially inhibited. Additionally, monitor watchers work long shifts (68% report 12-hour shifts). Although no research exists on the effectiveness of monitor watchers over an extended period of time, evidence suggests that the quality of nursing care deteriorates with longer shifts.[19] Therefore, it is possible that monitor watchers are not able to perform their job adequately for 12 consecutive hours. If monitor watchers are not able to respond in a timely manner to critical events, then they may represent a poor investment of resources. Additionally, if nurses come to rely on monitor watchers to alert them to critical events, they may stop paying attention to alarms entirely. If this occurs, a delayed or absent response from a monitor watcher may be a serious patient safety threat. Comments by respondents reflected these concerns.

Moreover, according to our survey, most

monitor watchers were located remotely without a licensed professional in the monitoring area. Some on-site monitor watchers reportedly doubled as unit clerks and therefore were responsible for administrative duties as well as watching the monitor. Research is needed to examine the association of such factors in the work environment and the quality of monitoring. Additionally, 28% reported that monitor watchers were used in adult ICUs. These units typically have bedside monitors, low nurse-to-patient ratios, and nurses educated to interpret rhythms. Therefore, this is an interesting finding and warrants further investigation into how and why ICUs use monitor watchers to enhance patient care.

The descriptive findings from this survey reveal several areas of inquiry for future research. First and foremost, our survey revealed that the use of monitor watchers is prevalent, but the efficacy of monitor watchers in improving patient outcomes has never been established.[5] Second, determining what, if any, effect the presence of monitor watchers has on the prevalence of alarm fatigue in hospital staff would be useful. Third, no evidence supports the level of education, training, and certification necessary to effectively perform the duties of a monitor watcher. Finally, although some research exists on the number of patient monitors a watcher can manage effectively,[7] this research only investigated the effects of patient loads up to 48. We do not know how monitor watchers are affected by loads of 50 to 100 patients, which may be common based on the results of this survey.

Limitations

Several issues limit the value of our study. First, a response bias may have existed with regard to nurses who worked in hospitals that used monitor watchers and therefore were eager to report their practice. Second, we distributed this survey only through nursing organizations, and it is possible that nurses were not as familiar with monitor watcher practice or preparation, especially if monitor watchers work remotely from their hospital. This may have resulted in 1) a high number of skipped questions, 2) selection of "I don't know" as a response when available, and 3) inaccuracies in responses (e.g., certifications achieved, education level, training requirements, salary). Third, some respondents answered questions that were not necessarily relevant to them because the survey did not automatically skip these questions. Fourth, the nursing organizations to which the survey was marketed were very large (AACN: ~104,000 members; NACNS: ~2,122 members), and we do not know how many members actually saw the link to the survey. Our sample represents a small and indeterminate percentage of the potential participants, which limits generalizability. Finally, we did not collect information on where respondents worked; therefore, multiple nurses from the same hospital may have responded to the survey, resulting in potentially similar responses and bias. However, because we obtained information on the number of licensed beds and type of hospital, we verified that a range of hospitals were represented.

First and foremost, our survey revealed that the use of monitor watchers is prevalent, but the efficacy of monitor watchers in improving patient outcomes has never been established.

Conclusion

Our survey revealed wide variation in monitor watcher practice. Respondents indicated that monitor watchers were primarily responsible for alerting nurses of changes in patient condition as observed on the ECG monitor but often have other responsibilities. The reported variation in monitor watcher education, certification, and training would make it challenging to determine monitor watcher efficacy across multiple institutions. The results of this survey have raised a number of ideas for future research, which can potentially help to improve monitor watcher practice, with the aim of decreasing alarm fatigue and improving patient outcomes. ■

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