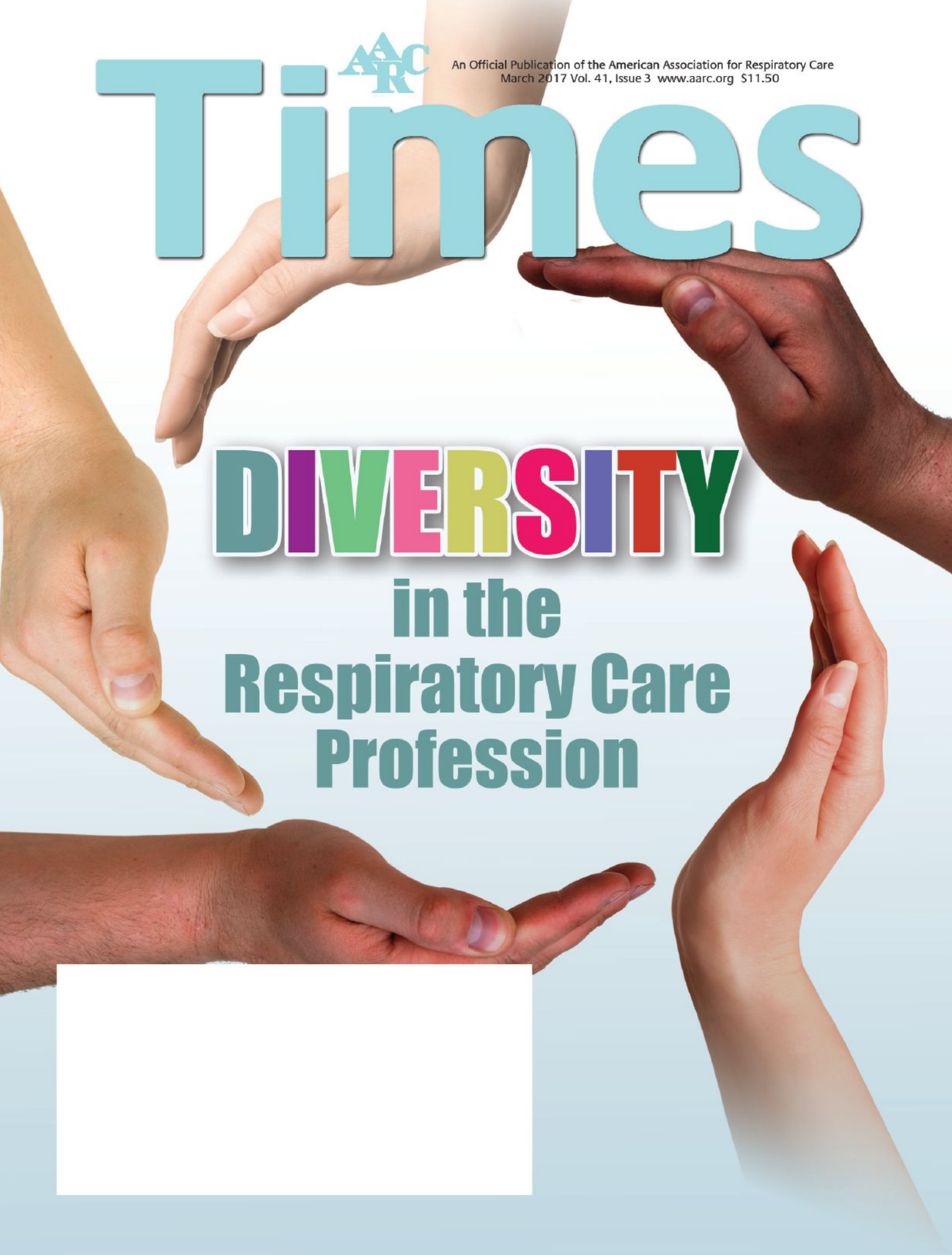
AARC Times
An Official Publication of the American Association for Respiratory Care
March 2017 Vol. 41, Issue 3 www.aarc.org $11.50



DIVERSITY in the Respiratory Care Profession

Ventilation for Life

Clinical Alarm Safety and the 2016 HTF Clinical Alarm Survey

by Ronda Bradley, MS, RRT, FAARC, and Shawna Strickland, PhD, RRT-NPS, RRT-ACCS, AE-C, FAARC

You finally make it home after a long shift, shower, and hit the bed. Then it starts. You know them: the sounds you hear over and over in your head. Is that the ventilator or the pulse oximeter? Maybe it is the humidifier or the capnometer. I am pretty sure I would recognize it, if it was asystole — but would I? All bedside clinicians have experienced this at least once in their career. In fact, we take pride in being able to recognize the alarm by the sound it makes. How many of us have watched a movie and criticized the production when the alarm is clearly from a PB7200 but the machine is an MA1 (bellows make for good drama)? But in all seriousness, what is all the noise about? Alarms are designed to let us know when there is an issue with a piece of equipment or a change in the patient's condition, which could cause an adverse event if it is not addressed. In the last 20 years, the technology surrounding the patient and the clinical setting has exploded, creating a cloud of noise around our patients and clinical settings. This has created a new phenomenon of clinical alarms hazard, which is defined as "the failure of staff to be informed of a valid alarm condition in a timely manner or to take appropriate action in response to the alarm."[1] One important part of the clinical alarms hazard equation is alarm fatigue. Alarm fatigue is defined as "a situation in which health care workers can become overwhelmed by, distracted by, or desensitized to the number of alarms that activate."[1]

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Clinical alarm hazards

Many professional organizations and regulatory bodies with oversight in improvement of clinical care have cited clinical alarms hazard as a priority. In fact, the ECRI Institute has named clinical alarms hazard to their "Top 10 List" of health technology hazards every year from 2007 – the year the ECRI Institute started the list – through 2016. In 2017, it fell off the Top 10 List, although "missed ventilator alarms" stayed on.[2-4] Approved in 2013, The Joint Commission published National Patient Safety Goal (NPSG) 06.01.01 with the intent to reduce the harm associated with clinical alarm systems. Phase II of NPSG.06.01.01 became active in January 2016, requiring hospitals to develop and implement policies and procedures related to clinically appropriate alarm signals, monitoring and responding to alarm signals, when alarms can be disabled, when alarm parameters can be changed, and who has the authority to set or change parameters.[5] In 2004, the Healthcare Technology Foundation (HTF) began an initiative to provide awareness and improvement in clinical alarm safety. The HTF surveyed national audiences on clinical alarm systems in 2006 and again in 2011. In 2016, the HTF distributed the survey for the third time to determine what changes, if any, have occurred since the last survey.

2016 HTF Clinical Alarm Survey results

Unlike the 2011 HTF Clinical Alarm Survey, the majority of the respondents in 2016 were nurses. Of the

1,241 respondents in 2016, 375 (30%) were respiratory therapists (RTs). Other respondents were clinical engineers and biomedical equipment technicians. Just over 30% of all respondents to the 2016 survey identified as a manager or administrator; 44% of the RT respondents indicated that they serve in a management or administration role. The RT sample averaged about 26 years of health care experience.

In an effort to identify trending data, most of the questions on the 2016 survey were also asked in 2011. The data from RTs were evaluated separately from the full sample to determine any differences in the perceptions of RTs versus nursing and engineering colleagues. Although there were a few minor differences in responses, the differences were not statistically significant. The data in Tables 1 and 2 showcase the survey questions and compare the 2016 responses from RTs to the 2011 responses from RTs.

Regarding nuisance alarms, the 2016 data show an increase in the RTs' perception of the frequency (71.5% in 2011 versus 81.3% in 2016) and clinical impact (66.4% in 2011 versus 80.5% in 2016) of nuisance alarms and an even greater response from the RN respondents (91.6% and 87.4% in 2016, respectively). The 2016 RT responses also indicated an increase in perception that setting clinical alarms in current medical devices is overly complex. Though a larger percentage of the 2016 RT and RN respondents indicated that their facilities have implemented new technology to improve clinical alarm systems in the past two years versus the 2011 RT and RN respondents, a smaller percentage of respondents in the 2016 sample expressed confidence in that technology to improve alarm management.

Although only 28.7% of the RT respondents and 33.6% of the RN respondents indicated that the NPSG06.01.01, which became effective in January 2016, has reduced adverse patient events, the RT respondents indicated a slight increase in effective policy and procedure usage. The data also showed an increase in the perception that nuisance alarms disrupt patient care and reduce trust in alarms overall. An increased perception of missed alarms, background noise interference, and confusion in identifying alarm source was also noted from both the RT and RN respondents.

Table 1. Summary of HTF 2011 and 2016 Survey: Respiratory Therapy Responses

Survey question	2011	2016
Nuisance alarms occur frequently.	71.5%	81.3%
Nuisance alarms disrupt patient care.	66.4%	80.5%
Nuisance alarms reduce trust in alarms and cause caregivers to inappropriately turn alarms off at times other than setup or procedural events.	75.5%	82.7%
Properly setting alarm parameters and alerts is overly complex in existing devices.	16.1%	20.7%
Newer monitoring systems (e.g., less than 3 years old) have solved most of the previous problems we experienced with clinical alarms.	35.0%	21.2%
The integration of clinical alarms into The Joint Commission patient safety measures have reduced patient adverse events.	39.9%	Not asked
The Joint Commission's National Patient Safety Goal on Alarm Management that became effective in 2014 has reduced adverse patient events.	Not asked	28.7%
The alarms used on my floor/area of the hospital are adequate to alert staff of potential or actual changes in a patient's condition.	74.7%	74.5%
There have been frequent instances where alarms could not be heard and were missed.	28.7%	40.6%
Clinical staff is sensitive to alarms and responds quickly.	66.7%	48.5%
When a number of devices are used with a patient, it can be confusing to determine which device is in an alarm condition.	50.2%	57.3%
Background noise has interfered with alarm recognition.	38.7%	47.4%
Central alarm management staff responsible for receiving alarm messages and alerting appropriate staff is helpful.	52.2%	52.9%
Alarm integration and communication systems via pagers, cell phones, and other wireless devices are useful for improving alarms management and response.	61%	51.8%
Smart alarms (e.g., where multiple parameters, rate of change of parameters, and signal quality are automatically assessed in their entirety) would be effective to use for reducing false alarms.	77.1%	64.6%
Smart alarms (e.g., where multiple parameters, rate of change of parameters, and signal quality are automatically assessed in their entirety) would be effective to use for improving clinical response to important patient alarms.	78.5%	69.2%
Clinical policies and procedures regarding alarm management are effectively used in my facility.	58.7%	59.2%

Table 2. Summary of HTF 2011 and 2016 Yes/No Survey Questions: Respiratory Therapy Responses

Survey Question	2011 Yes	2016 Yes	2011 No	2016 No	2011 Not sure	2016 Not sure
Has your institution experienced adverse patient events in the last 2 years related to clinical alarm problems?	16.5%	27.8%	39.6%	35.7%	44.0%	36.5%
Does your institution utilize "monitor watchers" in central viewing areas to observe and communicate alarm conditions to caregivers?	49.3%	52.3%	42.6%	40.2%	8.1%	7.5%
Has your institution developed clinical alarm improvement initiatives over the past 2 years?	20.1%	57.1%	40.5%	25.3%	49.4%	17.5%
Has your healthcare institution instituted new technological solutions to improve clinical alarm safety?	19.9%	37.2%	33.5%	43.5%	46.6%	19.3%
Does your hospital use alarm notification systems such as pagers, cell phones, or other wireless devices to communicate alarm conditions?	Not asked	34.0%	Not asked	61.2%	Not asked	4.9%

Discussion

At first glance, it appears that the problem with clinical alarms is getting worse. What happened between 2011 and 2016 to produce these results? Looking to the data in Table 2, we see that the rate of "Not sure" responses dropped dramatically. For example, when asked about the institution's clinical alarm improvement initiatives over the last two years, almost half of the respondents in 2011 indicated that they were not sure. However, in 2016, only 17.5% indicated that they were not sure of the institution's clinical alarm improvement initiatives. When asked whether an adverse patient event related to clinical alarms occurred in the prior two years, 44% of the 2011 respondents were not sure, while 36.5% of the 2016 respondents answered in this way. Do the data tell us that more adverse patient events are occurring or are we, as clinicians, simply becoming more aware of the issues surrounding clinical alarms?

With more than 100 alarm signals per patient per day[6], clinicians — including RTs — are at a high risk of becoming desensitized, overwhelmed, or immune to the alerts generated by physiologic monitors, mechanical ventilators, medication pumps, and other alarm-generating devices in acute care centers. This desensitization results in alarm fatigue and can result in missed actionable alarms and, ultimately, adverse patient outcomes. The Joint Commission, the Association for the Advancement of Medical Instrumentation, and ECRI Institute recommend, among other actions, to have guidelines for alarm settings and guidelines for tailoring alarm settings and limits for the individual patient.[5-7] The RT plays a vital role in the development, implementation, and execution of clinical alarm safety initiatives as well as the development and implementation of staff training programs.

The full survey can be accessed at the Healthcare Technology Foundation website: http://www.thehtf.org/clinical.asp. ■

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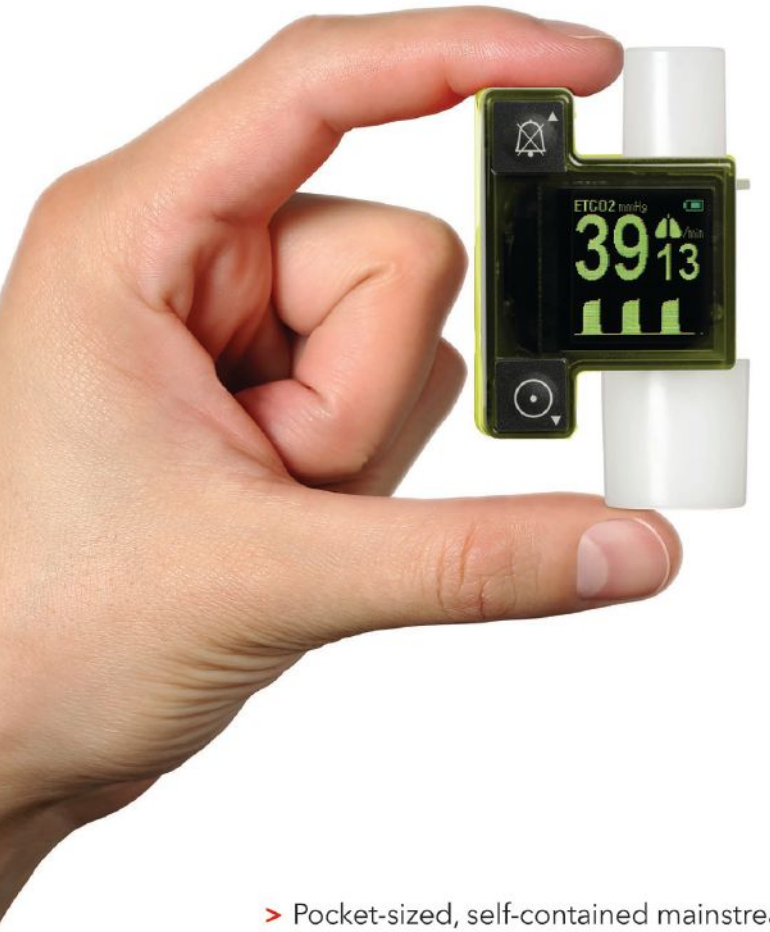

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