

A Roundtable Discussion Navigating the Noise with Clinical Alarm Management

Roundtable Participants



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Gavin Stern *What are some of the common problems seen with alarm systems for medical devices?*

Maria Cvach Our biggest problems are too many false and/or nonactionable monitor alarms, variation in alarm nomenclature between vendors, variation in alarm hierarchy by vendors, variation in alarm sounds by vendor, and the inability to get alarm data at the point of care (i.e., bedside). These problems lead to difficulty comparing alarm data between organizations and developing a standard for how to manage alarms.

Shawna Strickland I would absolutely agree with those. I would add that due to the variety of alarms out there, we also see issues with education and clinicians understanding the purpose of each alarm.

Judy Edworthy Because most of the people working in this area have demanding clinical or other roles there isn't enough "stand back" thinking going on, which would help you to control some of the issues. Standardization issues and many of the human factor issues often aren't at the forefront because you're working at the sharp end and trying to deal with specific problems all the time. Although there are themes that run across the whole problem, it's difficult and time consuming to put these themes together and to look at the broader picture. I advocate for a standing back and looking at the problem approach as well as encouraging the practical attempts to solve the problems.

Gavin Stern *We've identified some of the common problems, but what are some of the obstacles that are in the way to solving these alarm management challenges?*

Christopher Bonafide One of the problems we face is that there seems to be a misperception in some groups that "more alarms is better" and that "if we could only have another alarm for this," then the hospital would be a little bit safer. Breaking down that misperception and openly talking about alarm fatigue and interruptions from alarms and the potential downstream consequences of those has been a challenge.

Maria Cvach To chime in to what Chris has said—I think there is also risk. One of the obstacles is the risk involved with sensitivity versus specificity. The reason why there are more alarms is because there's fear that you're going to miss something. But then people may not realize that more alarms doesn't mean it's safer. It actually makes people ignore alarms. The other big challenge is the misuse of telemetry for monitoring patients. People are using cardiac telemetry when they may be better off using some other type of monitoring.

Jim Piepenbrink Another issue that was also raised is education. Getting people to understand what alarms are important—and why—is an essential piece of this to level-set some of the expectations. Do we need more alarms or do we need fewer? Identifying what alarms are significant and those that are insignificant helps frame the education of staff

as well as the expectations and outcomes of an alarm reduction initiative.

Samantha Jacques I'd like to talk a little bit about the roles and responsibilities as being a challenge. Many hospitals don't proactively define responsible parties. There's a lot of finger pointing among vendors, nurses, and biomed. Ultimately, without a clear set of roles and responsibilities, there's a struggle to figure out how we can actually fix some of the problems that we have.

Shawn Forrest One of the challenges to developing common solutions is that we have a heterogeneous care environment in terms of both devices and care protocols and also a fragmented governance structure. The most cohesive standardization we have in this space is regarding the design of the alarm systems of individual medical devices because it's the only aspect of the environment in which there's centralized oversight. Even that's challenging because alarm systems in most care environments consist of a variety of devices assembled into systems they may or may not have been designed and validated for by the individual hospital.

Marjorie Funk I agree with what's been said. We also need to consider the multitude of competing priorities in the clinical environment. People are working on so many other issues in addition to alarms that sometimes they are just too busy to deal with all the alarms.

Christopher Bonafide I'd like to mention a few issues specific to pediatrics. One is that the indications for monitoring in children are not well defined. Work by Marge Funk and others really has standardized to some degree at least electrocardiogram monitoring for adults. But those indications are not that well defined for children. That creates issues in variation in decisions about monitoring children, which can result in overmonitoring patients who don't need it, and potentially also undermonitoring patients who might benefit from monitoring. The other issue is that children's vital signs change quite dramatically as they age from being a small infant to being an adolescent and young adult. We don't have very well defined or standardized default alarm limits for children across ages. This again creates variation and creates the potential for lots of unnecessary alarms.

Gavin Stern *The issue of standards has come up a few times, so let's focus on that. With regard to regulations and standards—what does everyone think might be needed when it comes to clinical alarms?*

Judy Edworthy One of the key things with standards is they need to be driven by science, scientific findings, and certainly best practice. But I'm not sure that that's always the case. I don't know if other people have a view on that because once a standard's in place it will be there for a long time, so it really has to be supported by the best and most recent evidence at the point of publication.

Shawn Forrest I agree that there is difficulty getting the data necessary to support the development of the standards in some of the areas that are lacking here. There is also a challenge in the standard structure, at least that I'm involved with for devices that individual product areas for devices—your intravenous pumps versus your cardiac monitors—have some different needs, and the detailed understanding of the alarms aspect is not always there in the committees that are covering these individual device types. Some of the things that we would like to have standardized more generally across devices are difficult to do because the general medical device alarm standard covers such a range of devices across various levels of risk.

Samantha Jacques A lot of the standards committee makeups are very industry based. There is not a lot of hospital representation on some of the standards groups. They're doing wonderful work, but they don't necessarily have an appreciation of exactly what goes on in the hospitals. That's challenging when we're writing a standard to not understand what the day-to-day operation looks like.

Shawn Forrest I think we need to develop clear toolsets and some form of knowledge management to capture in a systematic way the methods that do and don't work and at least the detailed standardized procedure that hospitals can follow to optimize their alarm management tools and practices.

Roundtable Participants



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Gavin Stern *Gerry, would you like to weigh in on The Joint Commission's (TJC) 2014 National Patient Safety Goal (NPSG) on clinical alarm safety for hospitals and critical access hospitals, NPSG.06.01.01?*

Gerard Castro NPSG.06.01.01 was published in 2014 and has been incremental in its implementation to give organizations time to determine what their priority alarms are and how to address them. We at TJC should not push any harder at this point because we can't mandate organizations to do something that the field is still struggling with.

We're at the point where we tell organizations that they should establish the policies and procedures for managing alarms, and that's a specific element of performance (EP) within the goal. But we don't define exactly how that's done because of the variation that exists within the organizations that we accredit.

Christopher Bonafide I want to echo what Judy said and I take it one step further. Good science takes time and funding. It would be helpful to think through our priorities for research, and think through how can we work with organizations like the AAMI Foundation as well as with industry to tackle those priorities.

Gavin Stern *What should industry be doing to address these problems? Is this a design problem?*

Maria Cvach Partially, yes, there is a design problem. And it's partially a use problem in that we might be using the device for the wrong reasons. As for design, it would help if there was an industry standard in terms of how alarm data looks and a standard nomenclature for naming alarms. Availability for delay features for low-priority alarms would also be helpful.

Shawna Strickland I agree with Maria, especially that we might not be using the right equipment. One of the bigger issues with mechanical ventilation is that not every machine reports the same alarms in the same fashion. It is very hard to compare apples to apples in that situation.

Maria Cvach We're doing a project at Johns Hopkins Medicine on ventilators right now and we don't have the same ventilator throughout. The nomenclature is different. It's very difficult to compare alarms from one manufacturer's ventilator to another, and we're finding that it is extremely challenging to even understand the data that's coming out of that ventilator. It would

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—Shawna Strickland,
American Association for Respiratory Care

be helpful if vendors would help us by standardizing and also by explaining their data or even having the ability to look at the data at the point of care. Right now, we have to download the data and then try to make some generalizations about what it's telling us. I don't think the vendors have done a good job of making data available at the point of care at the bedside.

Shawna Strickland It's hard to standardize alarms when you're not 100% sure if that particular alarm is going to be on the next machine you buy. When managers look at updating their fleet, they also have to update their policy because a particular ventilation alarm isn't available on the new machine. It's difficult to say what we should be doing when we're not even sure if we can accomplish it.

Samantha Jacques I'm going to echo something Maria said but just take it a step further. The availability of data at the point of care is probably the piece that's the hardest for us to really get our hands on. Ultimately, the purpose of an alarm is to bring your attention to something so that staff can perform a clinical intervention. We've all been trying to set alarms so that they are clinically actionable. But what we really can't understand is what is happening at the time the alarm goes off. There's this missing link because there's no way to trend and track alarms at the point of care in real time. Our physicians and our nurses can't actually provide the care that the alarm is meant to help us provide.

Maria Cvach Right. I would like to be able to show a nurse how to identify when a patient is in alarm flood, meaning they've had excessive alarms for a particular timeframe. That information would help me to train that nurse on how to customize alarms for that particular patient. It's difficult to do that at the bedside without having this type of information.

Judy Edworthy For purposes of research, it would be very helpful if we could get real-time data from equipment. If you're looking at how clinicians monitor trends and how they make judgments on the basis of how information from different devices interacts and signifies an important trend, it would be very useful to have real-time data from several devices at once. We could then look at how that information is integrated by the clinician in order to make a judgment about the patient's condition. If we've got real-time data, then it's so much easier. It's always been a problem getting data out of medical equipment in order to do the research.

Gavin Stern *We've talked a bit about training and education so far, especially when it comes to customizing alarms for the patient. What is needed to improve the state of education and how effective is it?*

Marjorie Funk This is a major problem. We don't know how different institutions are educating clinicians about alarms and particularly about customizing alarms settings. Not much is published on this. Also, hospitals vary significantly in terms of whether nurses are even allowed to customize an alarm independently.

Maria Cvach Customization varies based on the institution—it's either encouraged or not encouraged. For example, some institutions only allow customization with a physician order, or they may not allow any customization because there's a lack of awareness on how to do it. New nurses may not understand a monitor's features. There's so much to train, and so many features available. There's a fear that customizing alarms may harm the patient. Initially, we need quick, must-know education to get started. Later, we need more advanced training to ensure people know how to use the features. The manufacturers' books are written for clinical engineers, not for the nurse or respiratory therapist. Sometimes the terminology isn't even what we would use in a clinical environment.

Shawna Strickland The respiratory therapist is pretty well versed on the purpose of each alarm. The problem that we're running into is where to set the alarms. I get a lot of phone calls from respiratory therapists who ask, "what are the parameters where I should set my ventilator's alarms?" We end up having a long discussion about where to set them initially and then to let the patient's condition drive where you customize those alarms. The respiratory therapist is also concerned about customizing those alarms for the patient's condition. "How far apart?" "Am I setting the alarms too tight or too wide?" "Am I going to be notified in an actionable situation or I am going to create a misinform?"

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—Maria Cvach, Johns Hopkins Health System

Christopher Bonafide We haven't touched too much on the necessary changes in culture on individual hospital units when it comes to alarm customization. Here at Children's Hospital Philadelphia, we recently changed the policy from a situation where physicians had to enter orders every time alarm parameters were changed, to nurse-driven alarm management that did not require orders. We had training associated with that. But one of the things that we observed after this change was that while we thought we had pretty good education and changed the policy to support nurses—there was still this cultural aspect on each unit where nurses often didn't feel comfortable customizing the alarms. They knew how to make the changes—they had learned that in their training—but the culture was that nurses needed the approval of physicians before changing alarm limits. Regardless of the changes we want to make, it's important to consider the culture within each hospital and individual unit.

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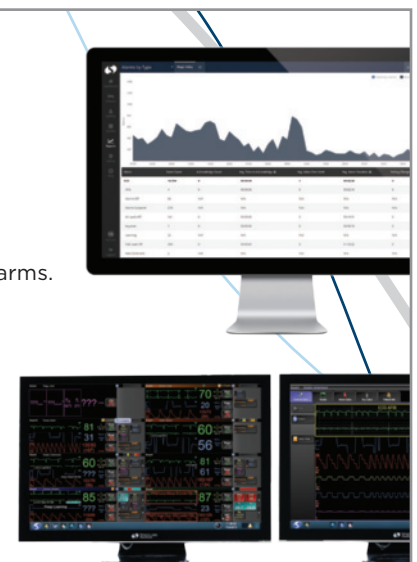
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Marjorie Funk I agree, Chris, but how do you change culture? At Yale New Haven Hospital, the nurses in many units are comfortable customizing alarms settings whereas in others they hesitate to customize alarms. A lot of it is related to unit culture and goes beyond the education and the training.

Christopher Bonafide Where we've had success was in identifying champions on each individual unit who help us understand what that culture looks like and what the barriers might be. Then they help us champion that change. You're absolutely right that it's not easy. It's much more difficult than educating.

“A consistent, sustained approach where you go back and educate time after time is really what gets your culture to change in a meaningful and sustained way.”

—Samantha Jacques, Penn State Health

Gavin Stern *I'm glad you brought up the issue of culture, Chris. Let's explore that a bit more. Marge underscored that culture is tough to change. How do you move the needle on that?*

Marjorie Funk Chris' point about the champions is important. We've done work where unit champions have been key to changing culture on a unit. You identify the thought leaders on the unit and encourage them to incorporate the change and help others to do so.

Jim Piepenbrink Having that unit champion provides local expertise on that unit. They provide at-the-elbow support so questions can be answered as close to real-time as possible. They help to understand what their alarms are, what the data's telling them, and also when to look at trends, and what are the factors leading to that alarm. Then they can provide education as to why this is occurring, what the data is telling us, and what changes might be appropriate to make. It takes a lot of time and investment to find and train those people. That's part of the culture as well—investing the time and resources to have that local expertise.

Maria Cvach Having an engaged clinical engineering department helps with changing culture as well. Our nurses have a really good relationship with our clinical engineering department, and we ask clinical engineering's advice on what would happen if we did certain things with the monitor. We have a demo lab where we can try things out before we actually put it out on the unit. That helps a lot.

Samantha Jacques At Hershey Medical Center, we have a very similar problem that Marge does—some “gung-ho” units that are at the forefront leading some of this change management. And then we have units where our nurses are still afraid of individualizing alarm limits. I agree that having a champion on floor is the way to go. But with so much change going on in our

organizations it's not just a one-time training that engrains the change in your culture. A consistent, sustained approach where you go back and educate time after time after time is really what gets your culture to change in a meaningful and sustained way. We all don't want to implement something and then 6 months later we realize that we've gone back to the old way because there was no consistency or follow-up in the rollout.

Jim Piepenbrink I think maybe what's missing is strong governance. Some institutions have individual units that have taken the lead on this because they're interested in it, and they know it makes their lives easier in the long run. But if it's not an institution-wide initiative with strong leadership from clinicians, information technology (IT), biomedical engineering, respiratory, other invested parties, then things tend to die on the vine. Change requires a consistent approach with check-ins on progress. We also need to be better at taking the pulse of the individual units that may be struggling a little bit.

Gerard Castro I'm always reminded that one of the first elements of performance (EPs) of NPSG.06.01.01 is to have leaders establish alarm system safety as a hospital priority. That's demonstrated through investments in training, in simulation, applying that consistent approach, investment in people's time and resources, and technology to make this stuff happen. Absent that—none of this will succeed. So it is absolutely cultural, it's technical. These factors are described in different sociotechnical models, and without all of those elements we will not succeed in this effort.

Gavin Stern *AAMI and the FDA convened a summit to address clinical alarm management issues in 2011. In 2014, TJC published NPSG.06.01.01 on alarm safety, the second phase of which began in 2016. What kind of progress has there been on this issue?*

Gerard Castro Our latest compliance data with regards to NPSG.06.01.01 shows that there was in fact good compliance with the EPs in the first half of 2016. Compliance data is what the surveyors collect when they are out at the organization. They score either “compliant” or “non-compliant” with the EPs that compose the NPSG. EP1 states that leaders establish alarm system safety as a priority. EP2 is that the organizations identify the most important alarm signals to manage. What surveyors can actually look for is EP3, establishing the policies and procedures for managing the alarms. They found that up to 99% of the organizations surveyed do in fact have policies and procedures in place. Does that mean that the organizations are succeeding at managing the alarms? It's still a struggle as evidenced by our discussion today. EP4 relates to education of staff on relevant alarms and their management.

I also looked at our sentinel events. The data show that alarm management is still a problem and it still results in harm to patients. Interestingly, the sentinel event data the alarm management issues primarily deal with are bed alarms. It's 40% related to falls and about 15% delays in treatment, which are more

associated with telemetry alarms. The rest are medication errors and other unanticipated events. So, the sentinel event data indicate that organizations still struggle with this problem and these problems can lead to severe harm or death.

Marjorie Funk I work with the Healthcare Technology Foundation, and we just completed our third survey, which we've done every 5 years. We found some disappointing trends, including worsening perceptions of what participants called "nuisance alarms" and more alarm-related adverse events. But we also found an increase in alarm improvement initiatives. I think people are working on it and my guess is that if we do another survey in 5 years we'll see improvements. Some of the disappointing results that we found could be due to an increased awareness of the topic of alarm problems. I was disappointed at first, but now I'm thinking that people are at least doing something about it. So, I'm optimistic for the future.

Maria Cvach I really am happy that TJC instituted the alarm management NPSG and the four EPs. It heightened awareness with organizations that there is a problem. I worry that people are trying to fix the problem by writing a policy, and I feel that they need to take a step back. I remember having phone calls from hospitals who were going to get surveyed. They were concerned that they didn't have a policy in place and asked if they could see our policy. I always caution people and say that the policy really should be one of the last steps. You have to look at your alarm management plan and then your policy needs to match your organization's alarm management plan. I worry about people having a written policy that is not followed. I ask organizations to take a step back and look at how they can measure their problem. Once they have done that, and taken steps to manage their problem, they can develop the policy.

Gerard Castro I completely agree with you, Maria. It's putting the cart before the horse. It's great when you have a policy, but if the work as imagined doesn't match the work as actually performed, then we still run into problems. It's a start, but I'm heartened by the work that you all are doing in providing that guidance and—to the extent that we can get those workflows—those processes and procedures out there and promote them to organizations. It lets them know how it can be done and how to empower our clinicians to customize those alarms. I think that's the biggest need right now. We can put these policies out there, but you know well how you actually accomplish these things.

Jim Piepenbrink Some organizations are ahead of the curve based on the work that's been presented over the last few years. But I think there's a number that are still struggling with how to get started. To Maria's point, I think they're looking at creating policies and procedures to help facilitate change when in fact it probably prohibits change or inhibits it. One of the gating factors is for organizations to really understand what the risk is: looking at the environment and at the type of alarms that are occurring to

determine if there is alarm flood, and the geography of the units.

It's really taking a step back and understanding what your environment looks like and what are the things that are prohibiting either people getting to alarms or understanding what they are. Is it educational? Is it the amount of technology on the hallways? Or the bedsides themselves? And maybe start there and look at where we can make incremental improvements. It's not something that you just hit the "easy button" and make it happen. There's a lot of infrastructure that needs to go with it, whether it's education, data analysis, and what have you. Taking a step back is a really good first step for organizations.

Maria Cvach Also, this is not just one department's problem to fix. It's a multidisciplinary problem and it involves IT, clinical engineering, nursing, respiratory therapy, and a host of different people. When I talk to organizations, sometimes I see one department or unit trying to fix the problem when it really needs to be a hospital initiative.

Shawn Forrest From my vantage point, companies are actively developing novel tools to attempt to address alarm fatigue. There's been a good degree of progress on understanding the approach to testing intelligent alarms. The AAMI alarm standard committee has developed guidance (AAMI TIR66) for manufacturers that discusses the validation of these systems. There's also been progress on the device side with tools that have to be meshed with patient management procedures to optimize a total approach. Those tools will be useful in addressing alarm fatigue and some of the other issues with alarms.

Gavin Stern *I think that segues into our next question. We have new tools such as middleware and central monitoring stations, monitor watchers, and various technology-based solutions to clinical alarms. Is this technology working as intended? Have there been pitfalls? Are there alternative strategies that could be used?*

Shawn Forrest The solutions with alarms are a marriage of device alarm system design and patient management procedures that mesh with that system design and its settings. It's the optimization of both aspects that's required to make it work well. There are challenges that stem from one or both of those not fitting well to each other. There could be some better guidance on how to fit your procedures to a given system and vice versa.

Clinical Alarm Management Resources

The AAMI Foundation has developed several complimentary tools and resources to help healthcare organizations successfully manage clinical alarms. They include:

- *Clinical Alarm Management Compendium*
- A series of white papers from experts on the front lines
- A report on the 2011 Medical Device Alarms Summit

To download these resources, go to www.aami.org/foundation and look under "Patient Safety Initiatives."

“Understanding what your workflow is, and how to get the chosen technology seamlessly integrated with your workflow—that’s where hospitals have been successful, regardless of what technology they implement.”

—Samantha Jacques, Penn State Health

Maria Cvach Middleware has helped us with identifying and notifying staff of alarms that need to be managed. There are still a lot of false alarms even with use of middleware. Central monitor watchers are sometimes nice because they filter alarms before sending to somebody to act. But many organizations don’t have monitor watchers. Middleware has been a good solution if this is the case. Staff have come up with some really cool ideas to develop alarm notification algorithms. Developing notification algorithms to prevent a missed alarm has been a focus of our alarm committee’s work for the the past couple of years.

Jim Piepenbrink We’ve seen a lot of organizations download data, but it’s historical data. They’re trying to assess what changes they should make based on that history. One of the advantages to middleware is that you can create dashboards, which I know Sam did at Texas Children’s Hospital. You present some near-realtime information for any particular unit. The data is used to assess the alarm flood—is this something that an individual can change or a unit change? It presents some additional information in a much more rapid cycle than we’re used to seeing.

Samantha Jacques Although I agree with everything that’s being said, I firmly believe that workflow should be the driving factor for what technology you implement. Implementing middleware in 100% of hospitals is not going to fix the alarm management problem. Really understanding what your workflow is, and how to get the chosen technology seamlessly integrated with your workflow—that’s where hospitals have been successful, regardless of what technology they implement.

Marjorie Funk A lot of hospitals are jumping on the monitor watcher bandwagon, and we don’t know if it makes a difference. The use of monitor watchers is specific to the workflow of an organization. Maybe in some organizations monitor watchers make a positive difference, but in others it may make things worse. It could be that those monitor watchers aren’t competent—they may be calling for irrelevant or invalid alarms. We also need to figure out appropriate qualifications of monitor watchers and where they should be located. How long can a monitor watcher realistically stay attentive, and for how many monitors? We’ve been using monitor watchers for decades, but we don’t know the effect on patient outcomes. A large well-designed multicenter study is needed.

AAMI FOUNDATION ALARM MANAGEMENT INITIATIVES

Gavin Stern *The AAMI Foundation’s National Coalition for Alarm Management Safety recently completed its first two-year phase. What has been accomplished in those two years and how do you see issues playing out over the next two years?*

Jim Piepenbrink Over the past couple of years, there’s been a wealth of knowledge transfer through seminars and patient safety papers, and in journal articles. That’s all shown that alarm management can work, and I think it’s touched on all of those things that have been mentioned: workflow, data analysis, cultural changes, and education. The AAMI Foundation had a meeting in July of 2016 in Annapolis, MD, where we extended the alarm coalition another two years because it was clear that while there have been some incremental advances there’s still more work to be done.

Currently there are eight teams working on different projects for the next couple years. We’ve got one at the Regenstreif Center for Healthcare Engineering at Purdue University looking at cataloging alarm defaults for monitors and oximeters. We’re looking at adding some ventilator data to that as well to better understand alarm defaults. Is there great variation? Is there something we can learn from that data that will be populated in that?

There is also a mentorship program that we’re working on and identifying some of the stronger institutions out there that have mature alarm management programs that would be willing to be accessible to others that may need help getting off the ground creating an alarm management program. We’re trying to identify what some of the common concerns might be and elicit experts to help others who will need to wrap their arms around this.

Shawna Strickland has a ventilator alarm group that is looking at benchmarking alarms and best practices and educational initiatives for alarms. We have a patient profile group where we were trying to understand if there are some particular patient profiles that we could look at creating some alarm threshold rules to help reduce erroneous alarms. We also have a rules and algorithms group where they are looking at multiple physiologic attributes and creating some rules for predictable alarms, which is very exciting.

We have an appropriate monitoring group, which is currently evaluating which type of patients are candidates for cardiac telemetry monitoring. This group is integrating the evaluation criteria into the forthcoming American Heart Association standards. The team is evaluating a tool kit to help organizations determine which patients are best suited for telemetry monitoring. Judy Edworthy is working on alarm sounds to see if a unified approach to alarm sounds across devices regardless of the manufacturer should be adopted as part of IEC 60601.

We also have a group headed by JoAnne Phillips from the University of Pennsylvania looking at nursing and clinician training related to alarms. There is not a lot of published literature out there related to successful education programs, but there are probably are some really good best practices out there. JoAnne's team is pulling together a toolkit and some strategies for staff education.

There is a lot of work underway and we're very excited to see how we can push the needle on this.

Maria Cvach Don't forget—we've also done some work in the interim. We have the SpO₂ toolkit, which is due to come out, and the alarm compendium that was developed. The American Association of Critical-Care Nurses has created an alarm management toolkit. So there's been a lot of work that's been done and many of our AAMI Alarm Steering Committee members have written white papers and published articles on this topic.

Christopher Bonafide One thing that I'm very excited about is that the AAMI Foundation has established a research funding endowment. Their funding of Gari Clifford's work last year was really fantastic. The new Mary K. Logan Research Awards are a

fantastic contribution that the Foundation is making to move the science of the field forward. From the looks of it, the Foundation will be continuing to award research grants in the coming years. I really appreciate that commitment to the scientific aspects of this work.

Judy Edworthy We are working on the actual audio of the alarms as well. Once you start to reduce false alarms and make the whole system a lot better, there is a point in making the sounds better, too. Reducing the number of alarms would of course affect alarm fatigue issues. But there will be still issues to be resolved. The type of sounds that you use and the way you convey the information to the clinicians is also going to be important.

Shawna Strickland And this isn't the first time that the AAMI Foundation has looked at ventilator alarm safety. In 2015, the AAMI Foundation partnered with the American Association for Respiratory Care to develop a series of webinars focused on mechanical ventilation alarm safety for respiratory therapists and nurses, both in the home and in the hospital. Our ventilator alarms workgroup is thrilled that AAMI is continuing that work through the alarm coalition. ■



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