BRIGHT IDEAS

Using a Scientific Approach to Meet Joint Commission AEM Standards

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The release of a new standard by The Joint Commission (TJC) can send TJC-accredited hospitals and their healthcare technology management (HTM) departments on a mad dash toward fulfilling the requirements. In 2015, TJC released its revised equipment maintenance standards for critical-access hospitals, EC.02.04.01,1 which aligned TJC preventive maintenance (PM) standards with the Centers for Medicare & Medicaid Services (CMS) August 2014 survey and certification letter 14-41-CAH.2 Both standards specify the steps a hospital must take in order to develop its own program for maintaining equipment. EC.02.04.01 includes five elements of performance (EPs). But it was EP4 that most concerned the University of Vermont (UVM) Technical Services Partnership (TSP). The updated EP4 requires that “the hospital identifies the activities and associated frequencies, in writing, for maintaining, inspecting, and testing all medical equipment in the inventory. These activities and associated frequencies are in accordance with manufacturers’ recommendations or with strategies of an alternative equipment maintenance (AEM) program.”

More recent changes announced by TJC at the 2016 AAMI Conference & Expo require hospitals to complete all PM activities in line with manufacturer recommendations or an AEM program 100% of the time.3 For TSP, the EC.02.04.01 standard meant that staff would need to evaluate, update, and record PM procedures for more than 10,000 make and model combinations, encompassing nearly 2,000 different types of equipment. To climb that mountain, they developed a comprehensive and scientific process to evaluate their maintenance procedures. The result was the development of a detailed, disciplined, and comprehensive process for the development of medical device testing procedures currently on the inventory and for new devices that are acquired and added to TSP’s inventory.

“We went through a major effort in 2013 to redesign and refine our testing frequencies based on new, comprehensive, and standardized data. There comes a point and time where you have to redo your work with new information. This was a reinvigoration of that effort from about 10 years ago, with more information and better practices,” said

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At a Glance

SUBJECT
Technical Services Partnership at the University of Vermont

LOCATION
Burlington, VT

SIZE
28 hospitals and several hundred clinics

STAFF
Project team of six biomedical equipment technicians, three biomedical service supervisors, and one clinical engineer

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Michael Lane, associate director at TSP. “Without a doubt, it’s much more data driven this time.”

**Challenge**

TSP is a not-for-profit department within UVM that provides comprehensive HTM services for a more than 45,000-square-mile area spanning 28 hospitals and hundreds of clinics in northeastern New York, Vermont, and New Hampshire. Most of TSP’s equipment is maintained under AEM.

In spring 2013, TSP began a detailed review of approximately 33,000 performance inspection and PM work orders to scientifically assess how the inspection program affected the medical equipment. A review of failure rates and a resulting change in testing frequencies led to two initiatives. As previously described, TSP conducted a top-down assessment and rework of all work order codes and definitions to ensure consistent data entry. A second initiative, which began in February 2016, consisted of a detailed review of the equipment testing procedures used by TSP personnel to ensure consistency when testing the myriad of devices.

“One of the underlying factors to get this done has to do with compliance with TJC and CMS standards and the AEM program. But what we’re finding are major variations among models. We want to be sure that we’re capturing everything that needs to be done for particular models,” said Leah Francoeur, a clinical engineer at TSP. For equipment that falls outside of AEM (e.g., medical lasers, radiology equipment), TSP needed to ensure that they were meeting original equipment manufacturer (OEM) specifications for PM, as described in the service manuals.

Via an AEM program, TJC gives hospitals the ability to set up their own equipment maintenance program by determining the best approach for each equipment type. However, many hospitals fear taking the plunge. Instead, they may stick with manufacturer recommendations even when their experience indicates that modifications may be appropriate.

Establishing an AEM program requires leadership and outside-the-box thinking. TSP was determined to tackle TJC’s new standard by developing a thorough, scientific, and detailed approach to updating the AEM program. They developed a methodology to determine what equipment they should follow manufacturers’ recommendations on, what to maintain under AEM, and then to evaluate what the AEM should specify. Different methodologies were utilized for varying equipment types, which were in turn assigned to staff members charged with leading the initiative for their technology. TSP prioritized higher-risk devices and will tackle device categories one at a time.

“It’s kind of a new paradigm that Mike and this group have developed,” said Tobey Clark, director of TSP. “They’re reaching out beyond the clinical engineering level by looking more closely at the manufacturing level and the technical staff, then integrating that with the standard procedures we’re trying to work on. We really need to make sure that we cover all the bases and do it in a systematic fashion.”

**Solution**

The Procedure Development Team project kicked off in February 2016 with a multidisciplinary team of six biomedical equipment technicians, three biomedical service supervisors, and one clinical engineer. The team members were responsible for developing, analyzing, and reviewing the make and model testing procedures for the hospital system’s entire inventory.

“We’re updating all of our specific procedures that are related to daily work from a biomed perspective,” said Larry Robert, biomedical services supervisor at TSP. “Ultimately, we’re standardizing all of our procedures so that a person testing and/or performing repairs on one end of our service region is doing the exact same thing another tech is completing on the other end of our service region.”

With limited resources, TSP staff focused initially on high-risk areas: defibrillators and...
defibrillator/pacers, medical lasers, and anesthesia equipment. The team evaluated available data and found that many devices lacked clear or sufficient testing guidelines. Tasks listed in service manuals often failed to follow a logical sequence, and many of the procedures utilized unhelpful or confusing acronyms. TSP developed a formalized process and form to develop procedures for each device make and model. The key steps in the process include:

1. **Risked-based prioritization process for procedure development.** Based on the risk scoring of the device type, all devices in the Hospital Equipment Maintenance System (HEMS; TSP’s computerized maintenance management system) are scored based on TSP’s risk analysis methodology.

2. **Evaluation and correction of inventory make/model inaccuracies.** A make and model review seeks out inaccuracies, which often are caused by inadvertent data entry errors, in HEMS (Figure 1).

3. **Consulting with OEMs to acquire necessary resources for review.** Staff assigned to a particular make/model to collect information must ensure that the OEM manuals are in the HEMS system and available to all staff for review (Figure 2). Staff consult the service manual in the procedure development process.

4. **Documenting key factors, including obsolescence data, personal protective equipment requirements, PM parts, software, cybersecurity parameters, and required test equipment.** The unique attributes of each make and model, reflecting the current challenges of the day’s HTM work, are documented in the procedure form for integration into TSP’s processes (Figure 3).

Using this methodical process, the team identified and developed standardized procedures for TSP staff to use in the field when testing medical equipment during performance inspections, according to PM cycles, and following repairs. TSP configured its HEMS to streamline the process and reduce confusion. In the new system, PM procedures are automatically displayed on the work order and in HEMS, reducing the need to carry around bulky technical manuals (Figure 4). In addition, recommended tests and part replacements change dynamically depending on the time of year. Some equipment models might be due for a periodic or annual PM, which requires basic testing. Other equipment may be due for parts replacement. That reduces the need to research past work orders to deduce what PM is due.

“Whenever I go to a site, I can’t just test based on how I remember doing it before,” said Mark Robinson, a biomedical equipment...
Andrew Whyte, a surgical laser specialist, said he previously had to worry about making return visits because an item was missed. For example, battery replacements may be due at times that don’t line up with other maintenance tasks. “You might go to a site and realize you don’t actually have some part component that you’re supposed to have if you’re just going off the top of your head,” Whyte said. “Going through and producing these procedures and then using them, you recognize that, even though these equipment are different models, they both use the same parts and procedures. That’s a good thing to know when your customers are 200 miles out.”

**Next Steps**

This initiative resulted in the development of a detailed, disciplined, and comprehensive process to generate medical device testing procedures currently on the inventory, as well as for new devices that are acquired and added to the inventory.

The initiative is still in its early stages, Lane said, and remains an ongoing process. Staff continue to evaluate and catalog equipment that is already on the books, while each piece of new equipment that is added to the hospital system’s inventory proceeds through a standardized process to develop procedures and collect information. Building in those tasks at the front end will save time and resources down the line, Lane said.

Overall, the project has increased the accuracy of information by make and model versus a generalized type category. In the future, Lane said he hopes TSP’s system will benefit the HTM field by encouraging thoughtful maintenance practices based on an AEM strategy by make and model.

“You wish it could go a lot faster, but you have to take this and grind it out. There’s no easy answer to get the end result, which is for

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**Figure 3.** A template used by University of Vermont (UVM) Technical Services Partnership (TSP) personnel to develop preventive maintenance procedures
every device to have a detailed, easy-to-follow, and measurable AEM procedure. Then, the PM procedure would be efficient in the field for the staff so they know what needs to be done, have access to all the resources, and can document the pass/fail capabilities very easily,” Lane said. “You want to make sure that you’re doing what makes sense, and aren’t wasting a ton of time and effort doing PM or performance tests that aren’t going to lend a lot of value to the equipment.”

The ultimate goal of the Procedure Development Team is to help others at UVM develop their own procedures by templating their work. That would increase procedure development capacity.

“TSP staff will essentially be mentors for others in the organization as they work to develop procedures so that we can tackle that massive number of procedures we have to develop,” Lane said.

References


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