HEALTHCARE PURCHASING NEWS

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Learning Objectives

1) Discuss the benefits of connectivity in the perioperative workspace

2) Explain the performance advantages realized from connected equipment

3) Describe the advantages of online resource management

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What, how and why:

Connected equipment for instrument reprocessing

by Jon Semancik

The automotive and aerospace industries are very familiar with the operational advantages of connecting their equipment through communication interfaces with data management software. Manufacturing and test engineers depend on connective technology to perform process control, device synchronization, process analytics, and workflow optimization. However, connective technology is just now gaining traction in the healthcare environment. Interestingly, activities performed within the central services (CS) workspace are uniquely positioned to benefit from this type of connectivity. This is because the CS processing loop relies heavily on automated washing, decontamination, and sterilization equipment while it also requires a high degree of operator interaction. It therefore holds the potential for operator inconsistency and inefficient processes.

There are fundamental advantages that connected equipment offers, including increased equipment uptime, improved availability, and better equipment utilization. Even better, connectivity provides electronic cycle storage, performance metrics and support for operator best practices. In order to appreciate the value of connective technology, we must understand its functions and capabilities.

How are devices connected?

The same technology that has enabled the explosion of the personal computer (PC) and Internet is also the fundamental framework used to connect CS equipment and systems. Ethernet connectivity provides an inexpensive, reliable and secure mechanism for data transmission that can be scaled and expanded to fit specific facility requirements (See Figure 1).

Each washer or sterilizer contains an Ethernet interface that is used to connect these devices within the facility on a local area network (LAN). Communication is then established with the remote monitoring site, over the Internet, through a secure connection (computer or router with firewall protection). The remote monitoring site is then able to receive operational data such as equipment alarms, performance characteristics and cycle history, which are then displayed on personalized web-based dashboards that can be accessed by the CS manager. In addition, the facility staff can use data reports to document performance and in some cases, to justify budgeting for new equipment to replace aging systems.

There is a new generation of automated instrument reprocessing equipment with advances that were pioneered in the process automation world. They are robust and reliable systems that are capable of remote troubleshooting, predictive maintenance analysis, electronic cycle storage and instrument tracking.

Connectivity and equipment performance

Connective technology also plays a critical part in improving equipment performance and uptime levels. Remote equipment monitoring extends the traditional service footprint by inserting "virtual technical experts" into the support loop. In practice, these experts are often aware of equipment issues before the facility's operators or department managers realize what's going on, since they are receiving continuous data from the connected systems and are tracking performance trends.

Remote analysis of equipment alarms can also provide field technicians with valuable situational awareness before they arrive on site. Knowing specific alarm conditions in advance enables field-based technicians to determine the likelihood of needing specific repair parts. They arrive on-site with these parts, which in turn speeds repairs and minimizes downtime.

Remote problem resolution

Another valuable aspect of connective technology is the ability to solve problems remotely without the need to dispatch field-based technicians. Not all equipment issues are the result of actual hardware failures, and a surprising number can actually be addressed by a phone call or online chat ses-

Self-Test Answers: 1. D, 2. B, 3. B, 4. D, 5. D, 6. D, 7. A, 8. D, 9. D, 10. B

sion. Issues such as washer door obstructions, temperature faults and facility utility faults due to steam or water availability have all required the dispatch of service technicians in the past, and can now be resolved remotely.

Dedicated remote triage teams are tasked with monitoring incoming alarm conditions and evaluating the event. Once their evaluation is complete, the team determines whether a field resource is needed. If an event is categorized as a candidate for remote resolution, the customer is contacted and an attempt is made to resolve the issue. If the remote troubleshooting fails, field resources are dispatched with complete knowledge of the triage history. This approach has significantly improved first call fix rates and has maximized equipment utilization. In Figure 2, the graph illustrates the increased number of successful remote call resolutions over time, when technical support resources have specific problem details transmitted from online equipment.

In addition to improved uptime and minimal loss of productivity, remote triage-based problem resolution has environmentally friendly "green" benefits for customers and manufacturers as well. Every time a problem is resolved remotely, a service vehicle is not dispatched; this reduces fuel consumption and eliminates associated greenhouse gases. Even more environmental benefits are achieved because service activities are scheduled and performed more efficiently.

Predictive maintenance

The introduction of remote equipment monitoring into the CS workspace has also set the stage for a fundamental paradigm shift in the way maintenance activities are conducted. Remote monitoring gives customer support and engineering teams advance notification of abnormal equipment conditions, and when this information is used with defined preventive maintenance requirements, it results in even more effective diagnosis, problem-solving and customer triage.

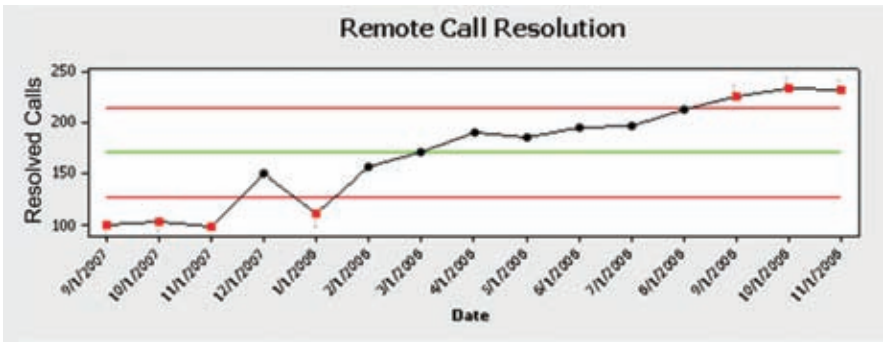

Figure 2

A classic approach to maintenance involves setting specific calendar-based maintenance intervals (every three months or six months, for example) regardless of equipment utilization. Adopting a predictive maintenance process involves analyzing actual equipment parameters such as cycle count, valve actuations, phase completion times and other device-specific characteristics. Modeling service activities based on the insight gained from monitoring these parameters will provide the ability to address certain failure points before they actually break down, which maximizes equipment utilization and uptime.

Another benefit of a predictive service strategy is the reduction of unscheduled service calls and the shorter duration of repair activities. Downtime for a repair can be influenced by available on-hand replacement parts; this can lead to the need for multiple visits in order to address a specific point of failure. The predictive approach allows the technician to have system data that identifies the potential problem and assures that he arrives with all the appropriate parts at the first visit, which may eliminate repeated visits for the same issue.

Going online and paperless

An effort has been under way in many industries to reduce, and in some cases eliminate, the paperwork associated with transactional activities, and the healthcare environment is no exception. Many facilities are offering their customers access to online medical records, appointments, and prescription requests; additionally, the bundle of patient records that once followed the patent around is now tracked electronically in many cases. Connected devices now offer the same level of convenience and piece of mind to the CS professional that has transformed other areas of the healthcare world.

If we step into the workflow of a typical CS department, we can identify numerous opportunities to transform business practices into an electronic form. For example, accurate record-keeping is essential to ensure patient care and traceability. Cycle details from sterilizers, which are sterility assurance records that are kept to track instruments and loads, have historically been printed from the integrated printer and then manually filed for audit purposes. While this is a basic function, it still requires attention to detail to ensure that all cycle tapes are processed correctly and filed so they can be retrieved if necessary. Transitioning this activity to an electronic file storage site eliminates all possibility for operator error and ensures that the data is stored in a secure location that can be readily retrieved. In the case of connected decontamination or terminal sterilization resources, access to archived records is only a click away.

Online tools have also transformed the way managers transact everyday business, whether it involves receiving equipment alarms, placing service requests, or providing training for their employees. A variety of informatics is readily available online, including complete operational details such as service history, alarm history and individual device utilization. Knowledge management systems provide quick and easy access to frequently asked questions and common problem resolution techniques without the need to engage an outside resource. Furthermore, when assistance from a field based technician is required, requests can be placed, and

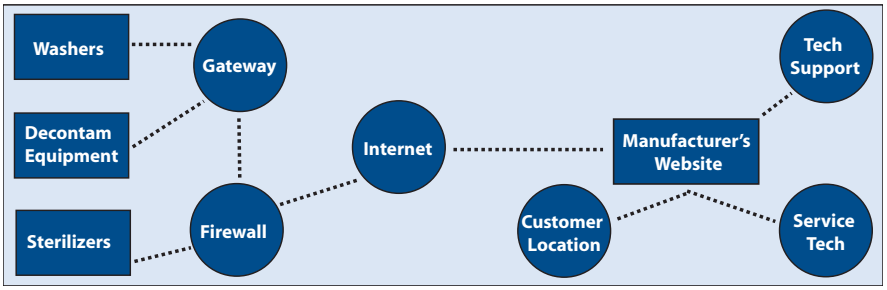

Figure 1

See SELF-STUDY on page 40

SELF-STUDY *from page 39*

confirmation received, by simply accessing a webpage (see Figure 3).

Other areas of the CS department can benefit from the advantage of a paperless work environment. Electronic instrument count sheets provide a mechanism to accurately display tray assembly details without the effort of maintaining extensive banks of file folders. Updates and changes can be implemented without the worry of outdated copies being used, and the file folder will never be empty. In addition, electronic images of specific instruments can be hot-linked to the count sheet, providing an immediate reference for training and review purposes.

Managing workflow

Electronic tray and instrument tracking capabilities, when linked with the CS cleaning and sterilization equipment, provide workflow management and process knowledge throughout the perioperative loop. Instruments are scanned individually, or as part of a tray, at numerous points throughout the process including: entering the CS department, entry into the washer, exit from the washer, at tray assembly, entry into the sterilizer, exit from sterilizer, exit from the CS department, when entering the OR, when exiting the OR, and when they are put into storage. Instrument tracking can also be used for flash sterilization processes.

Obviously, accurate online knowledge of instrument and tray locations can be quite useful, but this information can also be leveraged to improve performance through workflow management and process optimization. Manufacturing organizations have been incorporating practices that improve efficiencies and reduce waste, known as LEAN, for quite some time. Activities performed in the CS department have similar characteristics as an assembly line, and can therefore benefit from these practices as well.

Online tools provide process metrics such as equipment cycle times, assembly times, assembly errors, missing instrument reports, and tray utilization. Data can then be reviewed for process bottlenecks, unused or underused instrument sets, operator performance, and facility ranking; this information can simplify manpower scheduling and can provide justification for facility enhancements.

Internal training and enhancements

Online continuing education courses have been a successful and convenient way to provide training. Leading equipment manufacturers are now offering web-based training for customers and for their own employees, on topics such as operator training and the theory of operation. Knowledge management systems also capture information from many facilities, which is then used to formulate frequently asked questions and list common error conditions and their typical resolutions. These become resources for all users.

These systems also ensure that in-house service representatives have access to the latest equipment configurations, recommended updates, and technical recommendations from the original equipment manufacturer (OEM). Staying current with the most up-to-date maintenance practices and recommendations through OEM technical tips ensures that equipment is maintained at optimum levels. Online chat capabilities also assure in-house resources of immediate access to OEM support when issues arise.

What's more, connected equipment and their microprocessor controls allow OEMs to continue enhancing the performance of systems that are already installed in the field. Remote access to equipment provides the manufacturer with the ability to enhance operation and feature sets by simply downloading updated firmware to the unit.

eCommerce

Many consumers have already embraced web-based shopping because it offers a quick and easy means to transact business, and this is becoming more prevalent with business-to-business purchases as well. Connected devices provide current system configuration and individual serial numbers for all equipment. Access to detailed system configurations eliminates confusion, simplifies part selection and expedites accurate order placement and receipt.

Figure 3

Consumables such as washing chemistries or biological indicators are also available through these sites. Again, eliminating the catalog-based approach employed in the past ensures that your facility is always current with the latest accessories and consumable product introductions.

It's a new world out there

The Ethernet and the Internet have revolutionized the way in which we watch movies, listen to music, shop, and manage our business transactions. Why not leverage the powerful benefits of connected devices in the healthcare CS arena as well? Manufacturers of washing, decontamination and terminal sterilization equipment realize the critical nature of these devices and have deployed remote connection technology. In addition to delivering the highest levels of system uptime possible, the information gained from this connectivity offers the tools for CS managers to optimize workflow and associated processes. Connective technology promises to deliver the same productivity and performance improvements within the CS environment that have become commonplace in other industries and applications. HPN

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What, how and why: Connected equipment for instrument reprocessing

1) **Connected devices within the CS environment require the following:**
   a. Ethernet interface
   b. Connection to the Internet
   c. CS equipment that is remote connection enabled
   d. All of the above

2) **Predictive maintenance utilizes a calendar based maintenance approach:**
   a. True
   b. False

3) **Triage technical support provides the customer with:**
   a. Ability to order cleaning chemistries
   b. Proactive remote technical support and assistance
   c. Ethernet connectivity
   d. Online training

4) **What are the main advantages of remote equipment monitoring**
   a. Online access to equipment for service and support
   b. Equipment operational metrics
   c. Process knowledge and details
   d. All of the above

5) **What is a main benefit of connected devices for in-house maintenance staff members?**
   a. Workflow management
   b. Online chat capabilities
   c. Online technical tips
   d. B and C

6) **Online tools provide management with ability to:**
   a. Place service requests
   b. Order consumables
   c. Monitor alarm history
   d. All of the above

7) **Connected devices require Ethernet for remote monitoring.**
   a. True
   b. False

8) **Connected devices simplify eCommerce by:**
   a. Displaying current equipment configuration by serial number
   b. Displaying alarm conditions
   c. Simplifying part selection
   d. A and C

9) **Remote problem resolution results in the following environmental benefits:**
   a. Reduced fuel consumption
   b. Reduced green house gas emissions
   c. Simplified workflow management
   d. A and B

10) **Online resources facilitate workflow and process management by providing:**
   a. Alarm history
   b. Electronic asset tracking and documentation
   c. Triage support
   d. A and B

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