

# Prioritizing Verification Checks and Preventive Maintenance

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In the natural progression of a biomed's career, we ask if what we do is necessary and justified. In the case of verification checks or preventive maintenance (PM), this question cannot go unanswered. Considering new requirements presented to equipment technicians by healthcare as a whole, a practical approach to PMs is a necessity for the continued prosperity of, and the very need for, our industry.

In the past, technicians were tasked with performing safety and verification checks on nearly every piece of medical equipment they are responsible for. Some technicians were even required to inspect electrical outlets in hospitals. No doubt these were tedious duties. However, in the past one was responsible for only a fraction of the equipment we each maintain today. Additionally, maintaining hyper-accurate reports and logs have always been the responsibility of the equipment technician. Healthcare has advanced a great deal since the 1970s, but the expectation of scheduled performance and safety tests has remained a constant job function of all equipment technicians.

This article is designed to show a means by which some, but not all, safety and verification checks could be reduced or eliminated. Each facility has unique requirements. I am not suggesting that biomed overlook battery replacement, fluid changes, or other critical maintenance; but rather I'm suggesting that we seriously look at equipment management programs.

## Step Back and Look

Examining an average PM we find that the majority of the time, the work (e.g. electrical safety test, output test, input test alarm test, etc.) goes on without question. In my opinion, this is a waste of time. To perform an electrical safety

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inspection on every piece of equipment that you are responsible for—even once a year—is imprudent. Take a look at the long-term results of this testing by asking the following questions:

1. Have you found a defect or failure during the course of the PM?
2. What did you do to correct it (i.e. “jiggle” the power cord)?
3. Could this defect or failure have been prevented by inspection?

The last question requires some thought. Manufacturers constantly ask themselves: Can one inspect quality into products or equipment?<sup>1</sup> Does your inspection directly contribute to the performance and operation of a piece of equipment? More often than not the answer to question three is no. Examine your criteria for performing PMs. Are your PM schedules based upon “worst case” possibilities? If so, perhaps a realignment of your priorities should include a statistical look at how many failures you have actually detected during inspections.

## It's All About Results

In my experience, examining the results of your PMs is more important than making sure they are completed on time. If you have performed a PM on a piece of equipment for a period of five years and never found a deficiency, you have substantial evidence that you will never find a problem. This is detailed in the statistical property called Long Run Regularity.<sup>2</sup> Though Long Run Regularity isn't a perfect fit to our process, look at the fact that a piece of equipment is in use 24 hours, seven days a week. There is a huge amount of data to examine when you include “uptime” and not just focus on failures.

When considering applying a principle such as Long-Run Regularity to an equipment management program, the first step is to look at the results of PMs performed on a group of equipment, such as defibrillators. For example, you might be checking defibrillator power output on a monthly basis. If in the event of your testing over a period of time you have never found an inaccurate power output,

why should you continue to check this parameter? The defibrillator manufacturer may recommend an annual power output test, which should be performed; but if you are testing output more frequently and have never found a problem you are performing a “no value added” test.<sup>3</sup> Experts in time management would call this task a waste of time and resources, which in healthcare are scarce.

During times of lean service practices, we must constantly evaluate what we do and why we do it. If our time could be better spent at another task, we should do that other task rather than performing redundant, unproductive PMs. I know that this statement flies in the face of conventional wisdom. You must decide if your own scheduled maintenance program meets your own needs. But I propose that a good deal of the work that we each do every day is redundant and unproductive. We as an industry must regulate ourselves and disprove the need for non-essential checks and tests. A methodology template should be constructed and followed in order to justify cessation of any PMs in question. A large history of PM data will be required to provide evidence of no value added testing.

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When you are satisfied with your evaluation tool, find a device that should fail the test and run it through the analysis. Pick something critical such as a gas machine; if it fails you have a good impression that the tool works.

### Getting Started

The three questions previously asked serve as a starting point to select your least beneficial PMs. Feel free to ask your own questions specific to your own needs. After a group or piece of equipment has been selected for decreased inspection frequency, verify that several years' worth of PMs have been performed. With data at hand, compare the time spent on inspections against the number and severity of defects found. If your criteria for decreasing inspection frequency are met by the data, you are justified in reducing the frequency of that PM.

Some of the time one may find that no failures were detected during an inspection and there is no evidence to suggest a PM should be performed at all. A good percentage of equipment can be relocated to a non-inspected group and checked only upon failure. After a period of time, one could compile data showing how many of the pieces eliminated from PM rotation have shown up for repair. If this number is large, an adjustment to your schedule is warranted. Your program should be flexible to allow groups or pieces of equipment back into scheduled PM status as needed. This is quoted as “continuous improvement, continuously”<sup>1</sup> by manufacturers and has good relevance to our industry as well. Moreover, each new piece of equipment added to the inventory should be carefully scrutinized as to its maintenance requirements. To err on the side of caution is always prudent. Make it a top priority to schedule new equipment PM to build up enough data so you can make an informed decision as to its ultimate PM schedule. You may find that a piece of new equipment does not require maintenance or it requires a great deal of maintenance. At the very least you will find out something and there is no substitute for empirical data. Realize that it is easier to collect data and verify that a PM is necessary than it is to mindlessly perform an inspection throughout the life of the equipment.

Carefully examine manufacturer recommended PMs and ask yourself why these suggestions are in place. For example, you may find replication of inspections. One can meet the manufacturer recommended PMs without duplicating work already performed. Never feel that asking the manufacturer about recommended service schedules is beyond the equipment technician's responsibilities. Often

the manufacturers simply plan for “worst-case” scenarios as well. One shouldn’t accept manufacturer recommended PMs as the only means of inspection.

### A Contrary Look

One may, in the course of proposing this or a similar system, encounter resistance from medical staff. Assure your detractors that their best interests are your biggest concern and that you are designing systems and tools to better serve their needs. Since the end result would be to free up a technician to assist any staff member in need, emphasize to the staff that your goal is to modernize your equipment management program.

### Summary

The role of the equipment technician has not changed in 30 years, but the equipment and the staff using it has. It is clearly time to update our procedures and methodology. Some of these time-consuming PM tasks yield no measurable benefit to neither our industry nor to our customers. All of the additional requirements placed onto us recently indi-

cate that our customers’ needs have changed and negates our obsession to place inspection stickers all over the place. We need to adapt to the changing environment and become the technicians of the 21st century by abandoning long, outdated practices such as mindless monthly inspections. We are valuable to our customers and our employers for what we know—not what we do. Not just anyone can walk into an active operating room theater and find a bad patient cable on the spot. We alone can control the work that we do. We are the pinnacle of all electronics repair with the duties and responsibilities that go along with it. Isn’t it about time we acted like it? ■

### References

1. **International Organization for Standardization (ISO).** Quality Management Principles. Available at: <http://www.iso.ch/iso/en/iso9000-14000/iso9000/qmp.html>. Accessed April 2005.
2. **Kyoto University.** The Law of Large Numbers. Available at: <http://www.bun.kyoto-u.ac.jp/~suchii/LLN.html>. Accessed April 2005.
3. **Managers.Net.** Value Added. Available at: [http://www.managers-net.com/value\\_added.html](http://www.managers-net.com/value_added.html). Accessed April 2005.