

Is Your AED Ready to Shock?

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There seems to be more news coverage these days about automated external defibrillator (AED) failures and device recalls by manufacturers. In March of this year, the U.S. Food and Drug Administration announced its intent to require new AEDs and accessories to go through a more rigorous approval process.¹ The action is in response to recalls by manufacturers, documented failures, and adverse event reports.

Although AED failures during cardiac arrest events are rare, when they do happen it brings considerable media attention and potential lawsuits. An AED is not something you put on the wall and forget. Unfortunately, there is ample evidence to suggest many AEDs aren't regularly inspected and maintained after being placed in service.²

Don't Risk Being Sued

"Your organization can be sued if your AED is not regularly inspected and maintained and it leads to a bad outcome for an SCA victim," said Richard Lazar, founder and president of Readiness Systems, LLC. He's an expert in AED program operations and risk management.

Although few AED failures are tied to maintenance problems, Lazar pointed out that, when an AED is needed and doesn't work because it was not maintained, it is much easier for the injured party to win a lawsuit. "Maintenance issues are identifiable and can be pointed to as a direct cause of any delays or failures to defibrillate," he explained.

The good news is AEDs are easy to inspect and maintain. The most important inspection tasks are to check the status indicator for a "Ready" or "OK" status and verify the electrode pads and batteries have not expired.

Red Light, Green Light

Although it may not look like it, an AED is a sophisticated electronic device. In addition to interpreting dozens of heart rhythms and delivering shocks, an AED performs self-tests on its internal circuitry to ensure readiness. These self-checks are done weekly and monthly, and sometimes daily. A status indicator or

readiness display will show an alert when a problem is found. This is why it is important for you to conduct regular inspections.

An AED's status indicator is on the front or top of the unit. It displays a visible warning, such as flashing red icon, to convey that the AED needs attention. Problems such as a low battery or failed internal circuitry require immediate service. Other problems may require further diagnosis and/or service.

The status indicators on all AEDs are designed to tell you at a glance if the device status is ready for use or not. This makes inspection quick. (*Note: It's a good idea to make everyone in your organization is familiar with your AED's status indicator and its basic indications.*)

All Charged Up

Battery problems are a leading cause of AED failures, according to a study published in the *Annals of Emergency Medicine*.² Researchers found nearly one in four failures was caused by problems with batteries or power.

All batteries, regardless of the type, discharge over time and need to be replaced or recharged. On average, an AED battery will last two to four years after installation. Battery life depends on the battery type, usage and environmental factors. Self-tests and training use are factors that drain a battery's power. It also varies depending on how often the AED is used or powered on and off. Be aware that batteries don't last as long in extreme temperatures.

Most AED batteries have a "use by" or "install by" date you can use as a guide for replacement. Some battery makers print a manufacture date on the battery. Shelf life ranges from three to five years, depending on the manufacturer. Some AED models store and display battery information such as the install date and usage data. All AEDs will alert you when the battery has limited reserves.

You can help avoid battery-related failures by viewing the status indicator and by checking expiration dates during inspection. Follow specific recommendations in the operating guide for your AED model. Always follow your AED manufacturer's instructions for recycling and disposing of batteries. Some batteries cannot be recharged or recycled; some batteries must be discharged before disposal.

Sticks to Your Ribs

In order to analyze the heart rhythm and shock properly, an AED's electrode pads must have good contact with the skin. Electrode pads adhere to the skin with a conductive gel and pad adhesive. Over time, the gel and adhesive dry out and the pad loses its ability to grip, particularly during chest compressions. In addition, sweat or hair can prevent good conduction and adhesion.

Just like batteries, electrode pads require inspection and replacement. They come in a sealed package but must be replaced periodically. Most pads have a

"use by" date on the package. They normally last two to three years (check your manufacturer's specifications).

During inspection, check the expiration date and that the packaging is sealed. Dispose of any opened or damaged pads. When replacing pads, be sure to record the new expiration or install date in your AED records. Electrode pads are not reusable.

Other Inspection and Maintenance Tips

A written or electronic inspection checklist is a must for the person conducting the inspection. Lazar recommends documenting the date and time of the inspection, the results of the inspection, and any maintenance action that was taken (e.g., battery or electrode replacement or software updates). Also, at that time, you should check that supplies such as gloves and protective masks are up to date and stored properly.

Because AEDs often are placed in public areas, they can be disturbed or tampered with. Make sure the unit is intact and that nothing is broken during visual inspection.

After one is used on a patient, you should replace the battery and electrode pads before putting the unit back in service. Follow your AED policy and manufacturer's instructions for removing event data from the AED. This information, which includes the victim's heart rhythms and the time shocks were delivered, may need to be provided to the person who coordinates medical oversight. Keep in mind that a victim's medical information must be kept confidential.

Along with regular inspections, maintaining an AED requires that you keep track of recall or service bulletins from the manufacturer. Paul Mendoza of Advanced First Aid, Inc., whose company has sold and serviced AEDs for 12 years, often sees AED owners who aren't aware of recalls on their AEDs. "Most recalls or service bulletins are for something simple, such as a software update," he noted. No matter how small the problem, he recommends following through with a manufacturer's advised action to avoid future problems.

Conclusion

An AED might sit idle for years without being used; however, it must always be ready to function. Like any piece of safety equipment, such as a fire extinguisher or smoke detector, an AED must be inspected regularly and maintained. You should inspect your AEDs on a regular basis according to the manufacturer's recommended schedule, which normally is once a month. Some organizations incorporate AED inspection as a part of their routine equipment inspections.

The most important inspection task is to make sure the status indicator shows the unit is okay.

Another important task is to replace batteries and electrode pads as indicated by the expiration or use by dates. Finally, be sure to document the date and time of the inspection, the results of the inspection, and any maintenance action taken. Your organization's AED policy should address inspection, recordkeeping, and maintenance procedures--be sure to follow those procedures.

References

1. FDA issues proposal to improve the quality of automated external defibrillators. US Food and Drug Administration Web site. <http://www.fda.gov>. Published March 22, 2013. Accessed March 26, 2013.
2. DeLuca LA Jr, Simpson A, Beskind D, Grall K, Stoneking L, Stolz U, Spait DW, Panchal AR, Denninghoff KR. *Ann Emerg Med*. 2012 Feb;59(2):103-11. doi: 10.1016/j.annemergmed.2011.07.022.