On The Road with Pre-Hospital Infection Control

By Scott A. Matin and Peter I. Dworsky

Like other healthcare professionals, emergency medical service (EMS) personnel face the growing number of multidrug-resistant organisms. In addition to protecting themselves from possible infection, EMS providers must ensure that their vehicles and equipment are adequately cleaned and disinfected so as not to expose future patients.

In a recent study published in the journal Prehospital Emergency Care, one department conducted environmental culturing of its ambulances; of 21 vehicles, 10 were colonized with methicillin-resistant Staphylococcus aureus (MRSA). In another study, the stethoscopes of 50 EMS personnel who visited a hospital emergency department (ED) during a 24-hour period were swabbed and 16 were growing MRSA. Yet another study tested equipment surfaces most likely to come in contact with patients' skin and found that 57 percent of the equipment tested using the Kastle-Meyer technique was identified as still being contaminated with traces of blood despite being identified as ready for reuse. Because EMS providers are responsible for cleaning and disinfecting their own ambulance and equipment, an emphasis must be placed on strict policies and procedures in order to protect themselves and patients.

Despite there being a tremendous amount of literature available on infection control in the healthcare environment, the majority of it pertains to hospitals and fixed facilities. When focusing on the pre-hospital environment, there is not a substantial amount of guidance. In many cases, EMS attempts to adopt policies and procedures written for stable or controlled settings, but an ambulance is not the same as an ED or an operating room (OR). The majority of EMS systems have moved to disposable patient-care items where possible because typically those that are multi-use are too big or will melt when used in a standard hospital sterilization process.

Last year's brush with H1N1 influenza is a classic example of policies not being adaptable. Centers for Disease Control and Prevention (CDC) recommendations called for hospitals to have separate entrances or waiting areas for patients with suspected infections. The Joint Commission requires a separate air-handling system with negative-pressure rooms for patients with infectious airborne illnesses. This is clearly impossible in an ambulance. Although the CDC did release an interim guidance document for EMS, it related to 9-1-1 answering centers and the need for more detailed questioning regarding the patient's travel history. The recommendations included in that document also called for EMS to wear personal protective equipment (PPE). No mention was made as to the best practice on decontaminating the ambulance after transport.

The Occupational Safety and Health Administration (OSHA) estimates there are approximately 6 million workers in healthcare, of which 1.5 million are in EMS, who are at risk for being exposed to a bloodborne pathogen. In reality, every provider of EMS and first responder services are at risk and this risk is substantial based on the environment in which they work -- motor vehicle accidents and trauma, unlit areas, and unstable environments with limited manpower.

In many instances, hospitals own or operate the local EMS agency and it is incumbent upon the infection prevention and control department to ensure that the hospital exposure control plan covers the EMS department.

On paper it is quite simple to comply with the OSHA standards; in reality there are many barriers that an employer must overcome. The majority of them involve compliance on the part of the employee. It is not enough to supply PPE and training to staff; the employer must ensure that the staff is using it properly. However, this is not always practical given the environment in which EMS operates, so constant education and reminders are imperative.

The other often overlooked OSHA standard that applies to EMS is the respiratory protection standard 1910.134. This requires all responders to have an initial and annual fit test for the N-95 mask. Again, many EMS agencies are volunteer and are resistant to or have poor compliance with this requirement.

While some EMS agencies are part of a hospital, many are not. They may be volunteer or paid, part time or full time and in many cases do not have the expertise or manpower to ensure compliance with these standards. The Infection Control Departments should contact these local agencies and create a partnership to assist them with compliance, training and follow up information.

Because the majority of EMS agencies are not hospital-based, it is particularly important that procedures are in place that would allow for accurate and timely notification should pre-hospital personnel be exposed to a potentially infectious pathogen. A law that helps address this but not known by many in healthcare other than hospital infection control departments and EMS is the Ryan White Care Act. The law was named after a 13-year-old hemophiliac from Indiana who inadvertently became infected with HIV during a blood transfusion in the 1980s. Shortly after his death in 1990, Congress passed the Ryan White Care Act, intended to improve the quality and availability of care for low-income, uninsured, and underinsured individuals and families affected by HIV and AIDS. The Ryan White programs also fund and provide technical assistance to local and state primary medical care providers, support services, healthcare providers and training programs.

In Part G, "Notification of Possible Exposure to Infectious Diseases," the law outlines several situations which allow for the sharing of protected health information between hospitals and EMS in order to protect emergency response employees. Two of the main situations addressed in the law include:

-- When a patient is transferred to a healthcare facility and is found to have an airborne infectious disease. In this case, the medical facility must notify the designated officer of the emergency response employee that transported the patient as soon as possible, but no later than 48 hours after the determination has been made.

-- When an emergency response employee believes that they have possibly been exposed to an infectious disease by a patient that they have transported to a medical facility. In this case, after collecting the appropriate information about the incident and making a decision that their emergency response employee may have been exposed, the designated officer for the agency will contact the receiving medical facility requesting a determination whether or not the employee was exposed to an infectious disease. Upon investigation of the request, the medical facility will notify the designated officer of their determination in writing.

With the increase in community-acquired infections and threats of future pandemics, several companies are developing products that are now mobile and can be used outside a fixed location. Their target audience is emergency first responders such as police, fire and EMS agencies and their vehicles. The three primary technologies used today employ hydrogen peroxide, alcohol, and a broad-spectrum disinfectant. The first and second approach atomizes the hydrogen peroxide and alcohol-based chemicals into micro sized droplets and the third uses a broad range disinfectant to create a dry mist of microscopic particles. All three approaches allow their product to penetrate hard to reach areas inside vehicles and buildings. This includes ventilation ducts, under equipment and in various cracks and crevices often missed during routine hand sanitizing. All three approaches claim to leave no residue to wipe off.

As for the delivery of the chemicals, most systems disinfect by "fogging" the vehicle or room, while the alcohol-based system requires a user to manually spray the chemical at the intended target. Of those that "fog," some machines are small and light enough to place inside of an ambulance, others are heavier and require a hose to be placed through the window or predesigned port on a vehicle, and the latest technology employs a drive through chamber that the vehicle is driven inside of which will treat both the outside and inside of a vehicle all at once. On average, depending on the ambulance size, disinfecting time ranges from 20 minutes to one hour. Lastly, one other approach being marketed heavily to EMS includes utilizing ultraviolet lights in the ambulances; however the time needed to decontaminate an ambulance is excessive and as a result presents several operations-related difficulties.

Some of the areas where pre-hospital infection control can easily be improved upon involve changes in the attitude of the providers. Staff members need to have annual training to understand the significant hazards that they are exposed to on a daily basis, this is especially true as diseases are constantly changing. This can be accomplished with simple educational programs and more importantly, task-specific research. As previously noted, the research regarding the tools used by pre-hospital providers, written in a manner easily understood, will be more compelling than papers on the sterilization techniques for reusable endoscopes. Making it personal with evidence-based practices will enhance compliance.

Another area for improvement should be communications with hospital providers in two main areas. The first being, when an EMS unit is picking up a patient; they often are not informed of the patient's infectious status until they have already made contact. Signage is often blocked or removed from the patient's door as they are being discharged. The first notification they have is when a hospital provider walks in the door wearing full PPE and asks, "Where is yours?" The second area involves post-exposure communications. When the EMS infection control officer follows up with an exposure, they are often told information cannot be released; this results in the EMS provider undergoing expensive testing and follow-up at an independent occupation health facility.

Many EMS agencies do not have stations or fixed facilities for the staff to be at between calls, so they are often posted on a street corner or parking lot. While this positively affects operational response times, it leads to a decrease in infection control in that the crew often does not have access to cleaning products, running water or the ability to dispose of contaminated waste. Additionally, unless the EMS agency is hospital-based, they do not have access to timely, low-cost testing to ensure their cleaning efforts are in fact working.

While the challenges facing EMS today are unique, improved infection control practices for pre-hospital providers are not only possible but essential. First, agencies must be alert to what is occurring throughout the world when it comes to infection control news, procedures and research. Second, well thought-out policies and procedures must be implemented and strictly adhered to ensure consistency throughout the agency. Third, ongoing education for staff must be done to make sure everyone is on the same page and educated to the current standards. Lastly, regular testing must be done to ensure infection prevention and control practices are working and don't need to be modified.

Scott A. Matin is the vice president of clinical services and Peter I. Dworsky is the corporate director of support services for MONOC Mobile Health Services, New Jersey's largest provider of EMS and ambulance services. Both Matin and Dworsky have served as MONOC's infection control officer and have been involved in EMS as a clinician, educator and manager for more than 25 years.

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