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The global outbreak of severe acute respiratory syndrome (SARS) in 2003 highlighted the inherent risks that infectious diseases pose to prehospital and transport personnel, and the importance of infection prevention and control can be in this setting. During the outbreak, countless personnel were quarantined or became gravely ill because of SARS. Since that time, a number of infectious diseases of global concern have been contracted. Whether it is Middle Eastern respiratory syndrome, measles, Ebola, or Zika virus, our awareness has been heightened, and the prehospital and transport systems we work in have improved their preparation for the next infectious threat. This issue provides a summary of recent publications that address infection prevention and control that are relevant to our setting.

Valdez MK, Sexton JD, Lutz EA, Reynolds KA. Spread of infectious microbes during emergency medical response. Am J Infect Control. 2015;43:606-611.

There are no studies that show the potential spread of infectious disease during an actual emergency response or evaluate the postresponse cleaning and decontamination processes that take place before the next patient transport. The authors of this study used a novel approach to assess what contributes to contamination of the transport environment. They used a harmless bacteriophage (φX174) as a surrogate for a pathogenic organism to assess cross-contamination during patient transports.

Before responses, 2 surfaces were intentionally seeded with the bacteriophage. On call completion, the transport vehicle and equipment surfaces were sampled 3 times: before decontamination, after decontamination using existing practices, and after an intervention designed to prevent cross-contamination and enhance the efficacy of decontamination.

The routine decontamination practices did not significantly reduce viral loads on surfaces (P = .3113), but hydrogen peroxide wipe intervention did (P = .0065). The bacteriophage spread to 56% (27/48) of sites and was reduced to 54% (26/48) and 40% (19/48) with current decontamination practices and intervention practices, respectively. The authors found that routine infection control practices were not consistently applied, and the main vehicle for microbial transfer was the provider’s hands. Although the consistent use of hydrogen peroxide wipes significantly reduced percent prevalence and concentration of viruses, formal training and promotion of surface disinfection were needed to ensure appropriate decontamination. Improved hand hygiene practices could also prevent the spread of infection.

Teter J, Millin MG, Bissell R. Hand hygiene in emergency medical services. Prehosp Emerg Care. 2013;19:313-319.

Infection control in the prehospital setting is challenging because of the fast-paced nature of the work. Patient care takes place in nontraditional settings such as public spaces, private dwellings, and remote locations. As a result, access to hand washing is limited or nonexistent. However, the World Health Organization identified hand washing as a top priority to reduce the transmission of infections. The current literature reveals limited research on initiatives related to prehospital and transport providers and infection control practices.

The authors performed a prospective, 2-part observational study with land-based emergency medical service providers. The goal was to determine the current state of hand hygiene practices. Each provider completed a survey and had their hands swabbed for microbiological cultures. One swab was obtained before hand hygiene, and a second was obtained after the provider performed hand hygiene with an alcohol-based hand rub.

This study recruited 62 participants. The study revealed that a significant number of providers (48/62 [77%]) have a heavy bacterial load on their hands after patient care before hand hygiene, with only 3 (5%) having no growth in the prehand hygiene samples. Isolates included pathogens with known drug resistance, such as Staphylococcus aureus, vancomycin-resistant enterococci, Pseudomonas, and Klebsiella. In posthand hygiene samples, 29 (47%) providers had heavy growth, with 22 (36%) having no growth samples. All levels of providers had a similar distribution of bacterial load. Survey results revealed that few providers perform hand hygiene before or in between patients as recommended by the Centers for Disease Control and Prevention guidelines.

The authors concluded that prehospital providers are potential vectors for infectious diseases if proper hand hygiene is not performed properly. In addition, because providers treat a variety of patients, they are potentially exposed to pathogenic organisms. Although sometimes difficult because of the environment or the circumstance, hand hygiene can reduce the presence of microorganisms on providers’ hands and subsequent transmission of these microorganisms to patients and the prehospital environment.

Moser A, Mabire C, Hugli O, et al. Vaccination against seasonal or pandemic influenza in emergency medical services. Prehosp Disaster Med. 2016;31:155-162.
Influenza is a major and recurrent concern for prehospital personnel. The rate of vaccination among prehospital personnel is low despite many efforts to improve vaccine uptake. What remains unclear is the influence of factors, such as a pandemic or the requirement to wear a mask, may have on vaccination.

The authors of this Swiss study examined prehospital personnel to determine vaccination status, motives for vaccine refusal or acceptance, and what influence declaration of a pandemic may have on influenza vaccination. Sixty-two of sixty-five prehospital personnel responded to the survey. Self-declared vaccination rates were 40%, with an additional 19% receiving it in the setting of a pandemic. During the pandemic, the vaccination rate increased from 26% during the preceding year to 42% (P = .001).

Thirty percent of those vaccinated in the current year indicated they would not get vaccination next year. Altruism and discomfort induced by the requirement to wear a surgical mask if not vaccinated were the main motivations to get vaccinated in the setting of a pandemic. Factors limiting vaccination included the option to wear a mask, avoidance of medication, fear of adverse effects, and concerns about vaccine safety and effectiveness.

The authors concluded that a mask-wearing policy was a motivation for vaccination but could also promote an undesired alternative to vaccination. Concerns about vaccine safety and efficiency and self-interest of health care workers are still the main determinants for influenza vaccination acceptance and require ongoing efforts to help overcome the historically poor influenza vaccine uptake among prehospital personnel.

Wepler M, Stahl W, von Baum H, et al. Prevalence of nosocomial pathogens in German ambulances: the SEKURE study. Emerg Med J. 2015;32:409-411.

Orellana RC, Hoet AE, Bell C, et al. Methicillin-resistant Staphylococcus aureus in Ohio EMS providers: a statewide cross-sectional study. Prehosp Emerg Care. 2016;20:184-190.

These 2 studies are listed together because they address the same issue: the prevalence of methicillin-resistant Staphylococcus aureus (MRSA) in the prehospital setting. MRSA is a growing concern because this multi–drug-resistant organism was once found exclusively in hospitals but is now being increasingly found in the community setting. In addition, the organism is increasingly difficult to eradicate and risks becoming resistant to the few antimicrobials available to treat the infection.

The authors of the first study found that 7% (11/150) of ambulances tested remained contaminated with MRSA despite cleaning and disinfection. Contact surfaces directly surrounding patients or staff were the most frequently contaminated. The authors concluded that disinfection guidelines and ongoing education regarding cleaning needed to be reinforced.

The authors of the second study found that MRSA was detected in the nasal swabs taken from 4.6% (13/280) of paramedic personnel surveyed to assess MRSA prevalence. Risk factors associated with MRSA carriage identified include those who did not practice frequent hand hygiene after glove use (odds ratio = 10.51; 95% confidence interval, 2.54-43.45; P = .0012) and individuals with low frequency of hand washing (< 8 times per shift) (odds ratio = 4.20; 95% confidence interval, 1.02-17.27; P = .0468). Both risk factors can be mitigated with changes in provider behavior and improved adherence to infection prevention and control practices.

Alrazeeni D, Al Sufi MS. Nosocomial infections in ambulances and effectiveness of ambulance fumigation techniques in Saudi Arabia. Phase I study. Saudi Med J. 2014;35:1354-1360.

Although a great deal of emphasis has been placed on proper hand hygiene, along with decontamination and disinfection of the transport vehicle and its equipment, there remains a risk that these procedures miss potentially pathogenic organisms because they reside in areas that are inaccessible to decontamination and disinfection.

The authors of this study examined the relationship between disinfection and cleaning procedures, along with the use and impact of fumigation, to minimize the spread of infectious disease to patients and prehospital personnel. This surveillance-based, prospective, experimental study was conducted using 10 land ambulances used to respond to large numbers of calls on each shift. Three areas known for an increased propensity for microbial contamination (stretchers handle, oxygen flowmeter knob, and ambulance door handle) were swabbed both at the beginning of day and night shifts after all the intended cleaning and decontamination procedures had been completed. Samples were collected after the disinfection of ambulances and after fumigation with 6% hydrogen peroxide for up to 2 hours.

The specimens from all 10 ambulances showed similar results. In post-disinfection but before fumigation, swab samples showed positive cultures growing moderately to large quantities of environmental and skin flora in all 3 sites sampled 90% to 100% of the time. However, almost all organisms were susceptible to the fumigation technique, with fumigation being effective in decreasing microbial contamination by 60% to 90% depending on the location sampled.

The authors concluded that ambulances are a potential source of contamination, with persistence of contamination despite routine disinfection. More intense infection control mechanisms and disinfection practices are required, and fumigation offers the potential for an added level of decontamination.

Although hospital-based literature examining infection prevention and control practices is robust and has grown substantially in the past decade, there is a paucity of similar work in the prehospital or transport setting. Translation of hospital-based practices to the prehospital setting is difficult because of the major differences between these 2 settings. Despite the lack of evidence, there are things that are clear and readily translated to the prehospital and transport setting: 1) hand washing protects staff and decreases with risk of disease spread; 2) uptake of immunization among prehospital and transport personnel remains low despite the overall benefits of immunization; 3) high-risk, pathogenic organisms are prevalent in the prehospital setting and pose a risk to our providers and our patients; and 4) there remains significant room for improvement in the training and techniques used to clean and decontaminate vehicles and equipment. Although more prehospital and transport-specific evidence accumulates, attention to these 4 items will improve the safety and well-being of our providers and our patients.

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