



Texas Preventable Disease

NEWS

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TEXAS STATE DOCUMENTS
COLLECTION

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RECOMMENDATIONS FOR DECONTAMINATING MANIKINS USED IN CARDIOPULMONARY RESUSCITATION TRAINING*

These recommendations were established by members of the Multidisciplinary ad hoc Committee for Evaluation of Sanitary Practices in Cardiopulmonary Resuscitation Training representing the following organizations: American Heart Association: Subcommittee on Emergency Cardiac Care; American Red Cross: First Aid and CPR Programs; Centers for Disease Control: Center for Infectious Diseases, Laboratory Program Office.

In past years, we have received numerous inquiries concerning the possible role of cardiopulmonary resuscitation (CPR) training manikins in transmitting viral hepatitis type B. Recently, inquiries have been received about the potential for transmission of not only hepatitis B but also acquired immunodeficiency syndrome (AIDS), herpes viruses, and various upper and lower respiratory infections (influenza, infectious mononucleosis, tuberculosis, etc). The use of CPR manikins has increased rapidly because of expanded training programs sponsored by medical and emergency organizations. To date, it is estimated that over 40 million people have had direct contact with manikins during training courses. In the US, a number of companies distribute multiple model lines of manikins for training programs in hospitals, police and fire departments, service organizations, lay groups, and schools as part of health, first aid, and physical education courses. Since practicing with a manikin is an integral part of CPR training, the care and maintenance of the manikin is of utmost importance. Instructors and training agencies rely heavily on manufacturers' recommendations for manikin use and maintenance, and these recommendations should be examined carefully before purchasing manikins.

To our knowledge, the use of CPR training manikins has never been documented as being responsible for an outbreak or even an isolated case of bacterial, fungal, or viral disease. It is our opinion, however, that manikin surfaces may present a risk of disease transmission under certain circumstances and that these surfaces should be cleaned and disinfected consistently to minimize this risk. Although the major portion of the following discussion was written in 1978 pertaining only to sanitary practices that should be followed to prevent transmission of hepatitis type B, the current revision by the ad hoc Committee for Evaluation of Sanitary Practices in Cardiopulmonary Resuscitation Training is applicable to lessening the risks of transmitting a wide variety of infectious diseases.

There are several important infection control considerations in CPR training. First, the act of mouth-to-mouth or mouth-to-nose artificial respiration obviously requires close physical contact in which a potential rescuer must ignore his or her concerns for personal protection or aesthetic apprehensions to save the life of a victim. Accordingly, in training sessions, students are urged to overcome such hesitations, and they may practice on manikins contaminated by the hands and oral fluids of previous students. This situation becomes especially obvious during the practice of two-rescuer CPR in which the manikin cannot be adequately cleaned between uses by the two students. Also, the practice of removing upper airway obstruction involves sweeping the back of the manikin throat with a finger, and in this situation, contamination from previous students may be smeared on the manikin face. In practice, there is usually no pause at this point to decontaminate the face before beginning mouth-to-mouth breathing. Additionally, the

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valve mechanisms and lungs in manikin airways invariably become contaminated during use, and if they are not appropriately dismantled and cleaned after class, they may serve as contamination sources for subsequent classes. There is no recognized evidence, however, that the manikin valve mechanisms produce aerosols even when air is forcibly expelled during chest compression exercises.

Some manufacturers have provided protective face shields for manikins to improve hygienic conditions during training sessions, but it is unlikely that such shields would be changed after each use by students learning the two-rescuer resuscitation method. Protective shields and detailed instructions for sanitizing the manikins between uses by students and classes are available from several manufacturers.

When dealing with potential contamination by micro-organisms having either unknown chemical resistance levels (eg, AIDS) or resistance levels that have not been fully characterized (eg, hepatitis and herpes viruses), the manikins pose a difficult disinfection problem. Although there are several intermediate- to high-level disinfectants recommended for use in instances of contamination such as hepatitis B, the majority would meet with objection because of either material incompatibility with the manikin (eg, staining or other damage of plastic materials by iodine compounds) or undesirable residues, odors, or toxicities that may affect students (eg, formaldehyde, glutaraldehyde) when used during the training sessions. Alcohols, quaternary ammonium compounds, and phenolics are not generally recommended, since proper contact times for effective action are difficult to achieve (eg, alcohols evaporate rapidly) or the compounds are not broad-spectrum agents (eg, quaternary ammonium compounds have limited action against certain viruses and bacteria).

Recommendations

1. Purchasers of training manikins should thoroughly examine the manufacturers' recommendations and provisions for sanitary practices.
2. Students should be told in advance that the training sessions will involve "close physical contact" with their fellow students.
3. Students should not actively participate in training sessions (hands-on training with manikins) if they have dermatologic lesions on hands or in oral or circumoral areas, if they are known to be seropositive for hepatitis B surface antigen (HBsAg), if they have upper-respiratory-tract infections, if they have acquired immunodeficiency syndrome (AIDS), or if the student has reason to believe that he or she has been exposed to or is in the active stage of any infectious process.
4. If more than one CPR manikin is used in a particular training class, students should preferably be assigned in pairs, with each pair having contact with only one manikin. This would lessen the possible contamination of several manikins by one individual and therefore limit possible exposures of other class members.
5. All persons responsible for CPR training should be thoroughly familiar with hygienic concepts (eg, thorough handwashing prior to manikin contact, not eating during class to avoid contamination of manikins with food particles, etc), as well as the procedures for cleaning and maintaining manikins and accessories (eg, face shields). Manikins should be inspected routinely for signs of physical deterioration, such as cracks or tears in plastic surfaces, which make thorough cleaning difficult or impossible. The clothes and hair of manikins should be washed periodically (eg, monthly or whenever visibly soiled).
6. During the training of two-rescuer CPR, there is no opportunity to disinfect the manikin between students when the "switching procedure" is practiced. In order to limit the potential for disease transmission during this exercise, the second student taking over ventilation on the manikin should simulate ventilation instead of blowing into the manikin. This recommendation is consistent with current training recommendations of the American Red Cross and the American Heart Association.

7. Training of the "obstructed airway procedure" involves the student using his or her finger to sweep foreign matter out of the manikin's mouth. This action could contaminate the student's finger with exhaled moisture and saliva from previous students in the same class and/or contaminate the manikin with material from the student's finger. When practicing this procedure, the finger sweep should either be simulated or done on a manikin whose airway was decontaminated before the procedure and will be decontaminated after the procedure.
8. At the end of each class, the procedures listed below should be followed as soon as possible to avoid drying of contamination on manikin surfaces:
 - a. Disassemble manikin as directed by manufacturer.
 - b. As indicated, thoroughly wash all external and internal surfaces (also reusable protective face shields) with warm soapy water and brushes.
 - c. Rinse all surfaces with fresh water.
 - d. Wet all surfaces with a sodium hypochlorite solution having at least 500 ppm free available chlorine (1/4 cup liquid household bleach per gallon of tap water) for 10 minutes. This solution must be made fresh at each class and discarded after each use.
 - e. Rinse with fresh water and immediately dry all external and internal surfaces; rinsing with alcohol will aid drying of internal surfaces, and this drying will prevent the survival and growth of bacterial or fungal pathogens.
9. Each time a different student uses the manikin in a training class, the individual protective face shield, if used, should be changed. Between students or after the instructor demonstrates a procedure such as clearing any obstruction from the airway, the manikin face and inside the mouth should be wiped vigorously with clean absorbent material (eg, 4" x 4" gauze pad) wet with either the hypochlorite solution described in recommendation No. 8 above or with 70% alcohol (isopropanol or ethanol). The surfaces should remain wet for at least 30 seconds before they are wiped dry with a second piece of clean absorbent material.

We are somewhat reluctant to recommend use of alcohols in this instance and do so only as an alternative, since some persons find the odor of hypochlorite objectionable. Although highly bactericidal, alcohols are not considered to be broad-spectrum agents and use of alcohols here is recommended primarily as an aid in mechanical cleaning; also, in a short contact period alcohols may not be effective against bacteria or other pathogens. Nonetheless, in the context of vigorous cleaning with alcohol and absorbent material, little viable microbial contamination of any kind is likely after the cleaning procedure.
10. Individuals responsible for the use and maintenance of CPR manikins should be encouraged not to rely totally on the mere presence of a disinfectant to protect them and their students from cross-infection during training programs. Emphasis should be placed on the necessity of thorough physical cleaning (scrubbing, wiping) as the first step in an effective decontamination protocol. Microbial contamination is easily removed from smooth, nonporous surfaces by using disposable cleaning cloths moistened with a detergent solution, and there is no evidence that a soaking procedure alone in any liquid is as effective as the same procedure accompanied by vigorous scrubbing.
11. With specific regard to recent concerns about potential for hepatitis B and AIDS transmission in CPR training, it has recently been shown that the hepatitis B virus is not as resistant to disinfectant chemicals as it was once thought to be. Current recommendations for strategies dealing with AIDS contamination are the same as those for viral hepatitis B.

RECENT FDA DRUG APPROVAL

Clofazamine (Lamprene), a designated orphan drug, has been approved to treat lepromatous leprosy, including dapsone-resistant lepromatous leprosy and lepromatous leprosy complicated by *erythema nodosum leprosum*. It has not been demonstrated to be effective in the treatment of other leprosy-associated inflammatory reactions.

Studies of the drug were carried out by PHS's National Hansen's Disease Center in Carville, Louisiana. It will be marketed by Ciba-Geigy of Summit, NJ 07901.

The drug does not show cross-resistance with dapsone or rifampin. Investigational studies are underway on its use in infections caused by *Mycobacterium avium intracellulare*, one of the opportunistic infections in patients with acquired immunodeficiency syndrome (AIDS).

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