



Intactness of Medical Nonsterile Gloves on Use of Alcohol Disinfectants

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Dear Editor,

Phlebotomists wear gloves for their own protection and for patient safety; they wash hands (or apply alcohol disinfectants when pressed for time) and change gloves between patients [1-3]. Blood collection is delayed when gloves are changed after washing and drying hands. Moreover, latex glove disposal might increase environmental pollution. Cleansing gloved hands to prolong the use of gloves results in considerable savings of disposable examination gloves. However, the current regulation prohibits alcohol disinfection when gloves are worn, because of the concern that sanitary intactness of gloves may be compromised by alcohol; it also prohibits examination gloves to be re-processed because of their composition, thinness, and inelasticity [1].

We evaluated the intactness of 50 medical nonsterile gloves after using alcohol disinfectants, by testing five pairs of gloves from different brands: four brands of powder-free non-sterile latex medical examination gloves and one brand of nitrile gloves.

Latex glove of brands Top glove (Top Glove, Klang, Malaysia) and HandyCare (Latexx Manufacturing, Kamunting, Malaysia) were sanitized with 62% ethanol Clesis hand sanitizer gel (Libebcos, Cheonan, Korea), and Dowoo (Siam Sempermed Corp., Bangkok, Thailand) brand, with 62% ethanol 3M Hand Instant

Sanitizer (3M Korea, Seoul, Korea). Gloves were sanitized by rubbing and drying the gloves 30 times. DERMAGRIP Nitrile extended cuff examination gloves (WRP Asian Pacific, Sepang, Malaysia) were sanitized in the same way, using 62% ethanol 3M Hand Instant Sanitizer. After sanitation, the gloves were filled with water and checked for leakage. All the gloves were intact after the sanitization procedure. Latex gloves of the brand Maxter (Maxter Glove Manufacturing, Klang, Malaysia) were still intact after performing the rub-and-dry action 100 times with 83% ethanol skin cleaner, New Clean Swab A (Meditop, Yongin, Korea). The distribution of major contaminated regions on the hands of phlebotomists was studied to check for decontamination after venipuncture. Fig. 1 shows the contact points of the five phlebotomists' hands with the forearm of the patient.

Bacterial suspensions of *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, and *Acinetobacter baumannii* were prepared to match 0.5 McFarland turbidity standards. Glass slides were smeared with each inoculum and dried for 30 minutes at room temperature. Gloved fingertips were placed on the smeared surface for 1 minute; then, they were pressed onto blood agar plate, and the plate was incubated at 35°C for 18 hours to allow for bacterial growth. Subsequently, we rubbed the gloved fingertips with alcohol disinfectant and dried them; the

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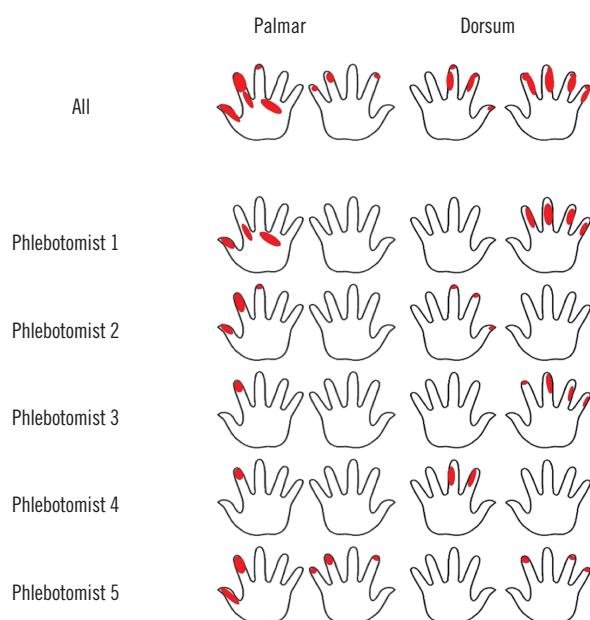


Fig. 1. Distribution of red-smears on the hands of phlebotomists transferred from the forearm of the volunteer.

gloved fingertips were then pressed onto blood agar plates. The plates were incubated to allow for bacterial growth for proper evaluation of the decontamination effect. No significant bacterial growth was noted on gloved fingertips with bacterial suspension smear after disinfecting with ethanol. However, we did not assess the risk of viral contamination.

Chemical resilience to ethanol and isopropyl alcohol is excellent in latex and nitrile gloves; evidence suggests that cleansing latex gloved hands with an alcohol-based hand rub solution is effective in removing microorganisms, with hand contamination rates increasing only after 9–10 cycles of cleansing [4, 5].

All the gloves were intact after application of alcohol disinfectant 30 times, while one brand of latex gloves stayed intact after application of 83% ethanol 100 times. Rules pertaining to the changing of gloves for blood sampling may depend on institutional policies. It is known that prolonged use of gloves can lead to hand irritation and other problems, and some nonpetroleum-based creams may affect the gloves' integrity [3]; hence, extended periods of glove use should be avoided. In St. Paul's Hospital, for the purpose of convenience and expediency of

work, we introduced glove change policies that mandate gloves to be changed every 10 minutes or after blood collection from five patients even when there is no visible contamination or perforation.

Possible leakage of the virus during stressful procedures was reported [6]; however, we could not assess the risk of viral contamination, because this study was limited to blood sampling from adult patients in the outpatient department. However, phlebotomists were required to change gloves immediately if the gloves became visibly contaminated with blood or body fluids, or showed perforation.

The main focus of this study was not the financial issues; rather, it was the environmental aspect of disposed gloves, saving time during blood collection for patient convenience, and reducing the workload of phlebotomists. This study was conducted on adult outpatients during very busy times in the outpatient department. Each institution should evaluate its own policies.

Authors' Disclosures of Potential Conflicts of Interest

No potential conflicts of interest relevant to this article were reported.

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