FACTFINDERS FOR PATIENT SAFETY

SWABBING VIAL TOPS

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MYTH: Alcohol swabbing of newly opened vial tops is necessary to prevent infection.

FACT: Swabbing newly opened vial tops before drawing up an injectate has been a standard procedure in healthcare settings. However, the evidence supporting its efficacy is mixed. While a recent study has found no significant benefit [1], guidelines from the American Society of Anesthesiologists (ASA), Centers for Disease Control and Prevention (CDC), and World Health Organization (WHO) still recommend this practice [2-5].

Vial manufacturing typically involves sterile conditions, minimizing the risk of bacterial contamination [6]. However, the vial caps are considered dust covers and not sterile barriers [6]. Studies have shown that microbial contamination can occur even with routine handling of vials [6].

Alternatively, there have been instances of infection associated with vial swabbing. One case series included 9 children who developed pyogenic abscesses attributed to cotton-ball alcohol swabbing of vaccine vials [7]. A recent study compared bacterial cultures from isopropanol-sterilized and unsterilized vials [1]. Positive cultures were a minority of all vials with no significant differences between groups. Positive culture rates were 1-3% for lidocaine, 8-24% for iohexol contrast medium, and 0-7% for dexamethasone [1]. The isolates correlated with species associated with skin flora or ambient air (e.g., Bacillus species and coagulase-negative staphylococci) [1]. This evidence supports the argument that swabbing may be unnecessary and potentially introduces contaminants.

Expert consensus opinion on vial top swabbing remains divided. While the CDC and WHO endorse the practice, the WHO has also acknowledged instances of infection associated with it. The ASA and the Association for Professionals in Infection Control and Epidemiology (APIC) support swabbing with single-use sterile 70% isopropyl alcohol pads, emphasizing aseptic techniques and sterile alcohol [2-5,8].

In conclusion, while vial top swabbing has been a widely adopted practice, the evidence supporting its efficacy is limited and debatable. Further research is needed to determine whether this procedure is necessary or can be safely eliminated from routine practice.

MYTH 2: Greater than 60% isopropyl alcohol, applied topically, kills all harmful pathogens.

FACT: Greater than 60% isopropyl alcohol is not universally effective against all pathogens.

Isopropyl alcohol exhibits germicidal activity against a broad spectrum of microorganisms, including gram-negative and gram-positive bacteria and various viruses. At concentrations of 60% or higher, it effectively kills bacteria such as Escherichia coli and Staphylococcus aureus, including methicillin-resistant strains. Additionally, isopropyl alcohol is virucidal against HIV, influenza, respiratory syncytial virus, herpes simplex virus, and hepatitis B and C at concentrations ≥ 60%[2]. However, it is ineffective against bacterial spores like Clostridium difficile [9]. The bactericidal action of isopropyl alcohol occurs during its evaporation, and it is not complete until dry [9].

Conclusions/Recommendations

- While a recent study has suggested that vial-top swabbing is not beneficial, the CDC, WHO, ASA, and APIC still recommend it.
- When vial tops or glass ampules are swabbed with alcohol, IPSIS recommends that physicians and healthcare providers:
  - Allow alcohol to dry (for at least 30 seconds)
  - Use at least 60% single-use, disposable alcohol swabs
- Physicians in a hospital system should consult their local infection control and prevention department, which may have institution-specific guidelines.

References

1. Schneider BJ, Ehsanian R, Sherwood D, et al. To swab or not to swab? Isopropanol swabs of common injectate vials does not decrease microbial burden. Interventional Pain Medicine 2023;2:100302.
2. Recommendations for Infection Control for the Practice of Anesthesiology (3rd ed.) American Society of Anesthesiology. Developed by the ASA Committee on Occupational Health Task Force on Infection Control. 2010.
3. Siegel JD, Rhinehart E, Jackson M, Chiarello L, and the Healthcare Infection Control Practices Advisory Committee. 2007 Guideline for isolation precautions: Preventing transmission of infectious agents in healthcare settings. https://www.cdc.gov/niosh/docket/archive/pdfs/NIOSH-219/0219-010107-siegel.pdf
4. Hutin Y, Hauri A, Chiarello L, et al. Best infection control practices for intradermal, subcutaneous, and intramuscular needle injections. *Bull World Health Organ*. 2003;81(7):491-500.
5. WHO Best Practice for Injections and Related Procedures Toolkit. 2010, World Health Organization: Geneva.
6. Hilliard JG, Cambronne ED, Kirsch JR, Aziz MF. Barrier protection capacity of flip-top pharmaceutical vials. J Clin Anesth 2013;25:177-80.
7. Simon PA, Chen RT, Elliot JA, Schwartz B. Outbreak of pyogenic abscesses after diphtheria and tetanus toxoids and pertussis vaccination. Pediatric Infectious Disease 1993;12:368-71.
8. Dolan SA, Felizardo G, Barnes S, et al. APIC position paper: Safe injection, infusion, and medication vial practices in healthcare. Am J Infect Control 2010;38:167-72.
9. Boyce JM. Alcohols as surface disinfectants in healthcare settings. Infection Control & Hospital Epidemiology 2018;39(3):323-8.