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Fluorescent Assessment of Sterile Technique (FAST) for opening procedural kits

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Introduction

Maintaining sterility during preparation of equipment for central line placement and intrathecal injections is critical to preventing serious infectious complications. In practice, some clinicians open and prepare kits immediately before use (Method A), while others open, set up, and then re-close kits for later use (Method B). This study compared the incidence of sterile breaches associated with these two preparation methods.

Materials and Methods

This study was approved by the Duke University Health System IRB (IRB Pro00116142). Written informed consent was obtained from all participants prior to participation.

After informed consent, fluorescent UV dye was sprayed on the outside of both spinal and central line procedural kits. Participants including anesthesia faculty and trainees performed mock spinals and central lines on the respective mannequins with each of the aforementioned methods. A blinded evaluator then utilized a UV flashlight to identify breaches in sterility as indicated by the presence of UV dye either on the mannequin or internal components of the kit. The size and location of sterility breaches were documented.

Data analysis compared the incidence of sterility breaches in both study arms. Incidence outcomes were analyzed with Fisher's exact tests, and setup times with Mann-Whitney tests.

Results/Case Report

A total of 100 simulated procedural setups were analyzed (48 central line kits and 52 spinal kits). For central line kits, absolute contamination was significantly more frequent with the reopen method compared with the open-once method (46% vs 8%; Fisher's exact $p = 0.008$). Contamination inside the kit was also higher with the reopen method (38% vs 4%; $p = 0.010$), while mannequin contamination was uncommon and not significantly different (13% vs 4%; $p = 0.38$). Median setup time was shorter with the reopen method (168 vs 298 seconds; Mann-Whitney $U = 108$, $p < 0.001$).

For spinal kits, absolute contamination did not differ significantly between methods (73% vs 58%; $p = 0.38$), but contamination inside the kit was markedly higher with the reopen method (69% vs 12%; $p < 0.001$). Mannequin contamination remained rare

and similar between groups (12% vs 4%; $p = 0.61$). Median setup time was again shorter with the reopen method (59 vs 126 seconds; Mann-Whitney $U = 75$, $p < 0.001$).

Overall, reopening kits was associated with substantially greater internal kit contamination while reducing setup time, with minimal differences in mannequin contamination across procedures.

Discussion

In this simulation-based study, reopening sterile kits was associated with substantially greater internal contamination while offering shorter setup times. Mannequin contamination remained infrequent and unchanged between methods, suggesting contamination risk is primarily contained within the kit itself. These findings highlight a potential trade-off between efficiency and sterility. Avoiding kit reopening, or developing workflows that minimize handling after initial opening, may reduce contamination risk during procedural preparation.

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