Disinfection Study with FlowArt® Closed Needlefree System

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Purpose:

Central-venous-catheter-related bloodstream infections (CRBSIs) are an important cause of hospital-acquired infection associated with morbidity, mortality, and cost. Amongst, different measures implemented to reduce the risk for CRBSI, preventive strategies based on inhibiting micro-organisms originating from the skin or catheter hub from adhering to the catheter involve utilization of needle-free valves (also called needleless connectors). In this study, the infection risk associated with FlowArt® was assessed by comparing the microbial contamination of FlowArt® needle-free valves before and after standard disinfection procedure.

Materials and Methods:

The study was conducted at the laboratories of Microbiology and Clinical Microbiology Department of Cerrahpasa Faculty of Medicine at Istanbul University, Turkey.

- 6 sterile FlowArt® valves were selected as the study group
- 2 sterile FlowArt® valves were selected as the negative control group
- 2 sterile FlowArt® valves were selected as the positive control group

Bacterial contamination was achieved by smearing the septum of the study group valves with 5-10 uL of 1 x 10^5 CFU/mL of *Staphylococcus epidermidis* ATCC 12228 containing suspension using a sterile swab. Following the contamination, samples were placed in Petri dishes and left to dry for 30-40 minutes. Dry samples were swabbed with a 70% (v/v) isopropyl alcohol wipe (Venar SP) and flushed with 2 mL of sterile saline. Initial 0.5 mL of the flushed saline was collected and cultured by plating in blood agar (TSA with 5% Blood Agar) plates at 37°C for 28 h. Valves were inoculated 20 times in total each day after flush of 2 mL of sterile saline.

2 samples which were designated as the negative control group were inoculated with *Staphylococcus epidermidis* ATCC 12228 and accessed without disinfection with alcohol. 2 samples which were designated as the positive control group were not contaminated with Staphylococcus epidermidis ATCC 12228 but disinfested with alcohol prior to being accessed.

The whole procedure was repeated each day for 7 days on the study group.

Microorganisms were identified using standard laboratory methods.

Results:

A total of 120 accesses were achieved on each study group sample. Control group samples were accessed a total of 20 times.

Table 1. Number (#) of accesses made on FlowArt® needle-free valves and the amount of valves contaminated by microorganisms.

Specimen	Total # of accesses	# Infected Samples	# of colonies
study group	120	0	-
negative control group	20	0	-
positive control group	20	20	10 - >200

None of the study group and negative control group samples were contaminated with microorganism during the study period (Table 1) while significant bacterial colony formation (10 - >200 colonies) was observed on the positive control group samples.

Conclusion:

Due to its design that allows no dead space within the valve and its flat smooth septum that prevents accumulation of biofilm and allows easy cleaning, FlowArt® needle-free valve connector is an effective barrier in the prevention of catheter hub contamination and intraluminal bacterial colonization with appropriate disinfection protocols for 600 activations over 7 days.

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