

TITLE: BACTERIOLOGICAL EVALUATION: EFFICACY OF NON-RETURN VALVES ATTACHED TO INFUSION TUBES TO PREVENT BACK FLOW IN RADIOLOGY

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ABSTRACT:

In radiology, non-return valves are attached to infusion tubes to perform magnetic resonance and computed tomography scans. In this sense, there are doubts regarding the safety of patients who use this infusion system. The aim of this research was to evaluate the bacteriological effectiveness of non-return valves to prevent back flow and cross-contamination in health care. Recent culture of methicillin-resistant *Staphylococcus aureus* (ATCC 43300) - (37°C for 24 hours) was used to standardize the bacterial inoculum in saline (10⁸CFU/mL). Fifty infusion tubes were filled with aliquots of 1.0mL of the standardized bacterial inoculum. Besides, three infusion tubes with only saline were used as a negative control as well as three infusion tubes with standardized bacterial inoculum and damaged non-return valves were used as a positive control. The infusion tubes were evaluated with respect to the passage of bacteria through non-return valves after pressure exposure to 10psi for 2.5 hours in back flow. The sterility test of bacterial passage for each of the samples was realized in test tubes with 10.0mL of *Fluid Thioglycollate Medium* (BD Difco, Sparks, MD, USA) and incubated at 37°C up to 14 days. For confirmation of bacterial contamination by methicillin-resistant *Staphylococcus aureus*, positive samples from test tubes were seeded on Petri plates (90x15mm) with *Mannitol Salt Agar* (BD Difco™, USA) and incubated at 37°C for 24 hours. According to the results, after the incubation period of the sterility test, there was not detected back flow of methicillin-resistant *Staphylococcus aureus* through 50 samples of non-return valves attached to infusion tubes. On the other hand, the scientific literature shows that non-return valves cannot prevent backflow and cross-contamination in health care according to physical, functional and microbiological aspects. In this research, non-return valves attached to infusion tubes were effective in preventing the back flow of cross-contamination by methicillin-resistant *Staphylococcus aureus*. Thus, future researchers are needed to understand how non-return valves can fail and how to ensure their use with microbiological safety for patients.

Keywords: infusion tubes, methicillin-resistant *Staphylococcus aureus*, non-return valves, radiology.