

Microbiological safety related to multi-use systems connected to singleuse connectors with non-return valves: use in radiology for 24 hours

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Purpose or Learning Objective:

Biosafety in the use of contrast injectors and saline solutions in radiology services remains a topic of discussion. Multiuse systems connected to single-use connectors with one-way valves are frequently used in Magnetic Resonance Imaging (MRI) and Computed Tomography (CT). However, there is a lack of scientific evidence regarding the absence of microbiological risk associated with these systems. This study aimed to analyse the presence of bacterial contamination in multi-use systems connected to contrast and saline solution injectors after 24 hours of use. Additionally, a standard operating procedure was reviewed to improve the proper handling of connectors with one-way valves, focusing on biosafety, contamination control, and infection risk reduction in infusion systems in radiology.

Methods or Background:

A total of 309 infusion systems (MRI and CT syringes connected to connectors - transfer-fill and patient-set, Alko do Brasil Indústria e Comércio Ltda., Rio de Janeiro, RJ, Brazil) were collected in july of 2024 by trained researchers following aseptic and biosafety procedures. The connectors attached to the syringes were sealed with sterilised caps, individually placed in plastic bags, and then stored in a closed refrigerated box. Samples were collected in the early morning, 24 hours after the infusion systems had been installed, on the previous day. For microbiological processing, 1 mL of solutions from each syringe (contrast and saline solution) was inoculated into 9 mL of tryptic soy broth. The samples were incubated at 37 °C for 14 days under aerobic conditions and were visually inspected daily to monitor bacterial growth (culture medium turbidity). To guide clinical practice, a standard operating procedure, developed and validated in 2018 by 11 experts was reviewed. The necessity of reviewing the document emerged after its implementation in clinical practice that occurred between 2018 and 2023 in 120 health care institutions, which included private and public institutions and hospitals across all Brazilian states.

Results or Findings:

None of the analysed multi-use syringe samples (n = 309) with connectors transfer-fill e patient-set showed bacterial growth after 24 hours of use. After a thorough review of the standard operating procedure, new aspects were incorporated. The initial version consisted of five sections, which included: Objective; Applicability; Material; Procedure Description; and References. The new revised and reorganised version has the structure as follows: Objective; Purpose; Key Considerations; Material and Equipment; Technical Description Before Starting the Examination, Immediately Before Puncture and After Completion of the Examination; Patient Management under Contact Precautions; and References.

Conclusion:

Given the absence of bacterial growth, the multi-use system with one-way valves (syringes, transfer-fill and patient-set) used in radiology services proved to be effective in preventing cross-contamination, contributing to patient safety. Furthermore, the restructured standard operating procedure can significantly guide clinical practice, enhancing biosafety, and reducing the contamination control and infection risk in radiology.

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