THE EFFICIENCY OF A WATER JET PRESSURE CLEANING TOOL TO REMOVE CONTAMINATED CONTENT IN LUMENS OF MEDICAL DEVICES

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Background

The efficiency in cleaning medical devices is critical for sterilization and each of them require a special way to clean in order to maintain its function performance. Some lumen devices are a challenge of this process. The hygiene devices and equipment with small lumen requires a long period of time and effort that are considered as a problem for the CSSD. In order to identify what the real contribution of one of the steps of processing these materials was developed this research. Doubts about the efficiency of drag of organic matter fluids content with microorganisms in lumen devices related to the time required for effective cleaning was the motivation of this study.

Objective

To verify the efficiency of a water jet pressure cleaning tool removing contaminated content in lumens of medical devices through jets with different products under controlled conditions.

Methods

An experimental trial →20 stainless steel devices with a diameter of 5mm and 28.3 cm long was performed. The devices were filled with a suspension of ATCC® (American Type Culture Collection) 27853 *Pseudomonas aeruginosa* strain), in the range of 0.5 Mc Farland (to obtain standardized bacterial suspensions), which equals to 1.5 x 10^7 bacteria/mL. The culture medium used was Trypticase Soy Broth (TSB). Bacterial impregnation performed on metal devices (n = 22, 2 positive controls and 20 sample tests) was done in the Microbiology Laboratory.

It was chosen the TSB to be suitable for microbiological testing and similarities including density and viscosity of organic materials may exist in health products. After impregnation, jet was applied at a rate 3,93L / min in each lumen by thirty seconds period. Four cycles of experiments with the 20 lumen devices were carried out separately with jets produced by the equipment. The equipment was a set of three jet pressure tool (chemical, water and compressed air) with automated dilution (software) using a closed system.

The jets were performed with following products: 1) water ; 2) mild detergent; 3) enzymatic detergent; 4) mild alkaline cleaner with disinfectant action glucoprotamin based. Before each new round of experiments the items were washed, sterilized and tested to control negatives. After each cycle, metal lumen devices were imediately taken to the microbiology laboratory for bacteria counts (Bioburden Technique). Metal devices were filled with Peptone Water and Cetrimide Agar culture media used for positive control and Standard Count Agar (PCA) to the sample test. They were incubated at 42°C and 35°C respectively. Readings were taken after 24 and 48 hours.

Results

Bacterial growth: all plates, all cycles with different cleaning products (Table) .

Water cycle and the neutral detergent cycle: same results → 100% of bacterial growth, **20 [1x10^7 UFC].**

Enzymatic detergent cycle: **6[1x10^2 UFC]** 30% considered drop in the log of microbial growth and **3[1x10^3 UFC], 11[1x10^7 UFC].** Glucoprotamin cycle→ 90% reduction of log **12[1x10^1 UFC] e 6[1x10^2 UFC] e 2[1x10^7 UFC].**

Once the enzymatic detergent and glucoprotamin have different activities it is suggested that the reduction log occurred by their specific actions. Even having been increased action with the glucoprotamin, the 30 seconds jet period could not remove all bacterial suspension in 100% of challenged samples..

Conclusion

Although **visually effective** for cleaning and there was CFU reduction, the period of 30 seconds with the jet cleaning pressure tool **is insufficient for efficient drag the entire contaminated** contents under the evaluated conditions.

To evaluate the money spent with water or cleaning agent is also important for further testing. Cleaning process should be evaluated by comparing manual processes individually and in combination with the automated process using the equipment tools.

Limitations of the study are related to microorganisms were our measure of remaining content. A sterily product flush testing similar to body fluids content could me done. More tests are desirable to more specific results.

Table- Samples with remainig colony former units counting in tested products

Product / CFU	[1x10^7]	[1x10^3]	[1x10^2]	[1x10^1]	TOTAL
Water	20(100%)	-	-	-	20(100%)
Mild detergent	20(100%)	-	-	-	20(100%)
Enzymatic detergent	11(55%)	3(15%)	6(30%)	-	20(100%)
Glucoprotamin	2(10%)	-	6(30%)	12(60%)	20(100%)

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