In Vitro evaluation of the effectiveness of a novel closed suctioning system in biofilm removal from the endotracheal tubes.

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Introduction

Biofilm formation in endotracheal tube (ETT) is the major cause of ventilator-associated pneumonia (VAP) in intensive care unit (ICU) patients. Biovo Technologies (Tel Aviv, Israel) developed a novel device (AirwayMedix Closed Suction System).

Objectives

1. Develop a reproducible system of *in vitro* biofilm formation and evaluation in ETT by *P. aeruginosa* 2. Compare the amount of biofilm removal after cleaning with AirwayMedix versus the KIMVENT* device.

Methods

Over night cultures of *P. aeruginosa* PAO1were diluted to $1x10^7$ CfU's/mL in Luria broth medium (LB) in 8 mm diameter closed ETT and incubated horizontally at 37^0 for 24 h. Planktonic bacteria were removed by washing with three volumes of the ETT tubes and were divided into three groups: biofilm removal with AirwayMedix, KIMVENT* (Kimberly Clark, USA) or control. Quantification of attached bacteria was performed on 4 cm segments from the middle part of the ETT.

Results

The conditions of *in vitro* biofilm formation by *P. aeruginosa* in ETT and its evaluation were achieved. Enumeration of the attached bacteria: control=$1X10^7$ CFU/cm^2, KIMVENT=$4.86x10^6$ CFU/cm^2 (p= 0.01), AirwayMedix $1.1X10^4$ CFU/cm^2 (p=0.01).

Conclusions

The AirwayMedix system proved to be superior to the KIMVENT system in its ability to remove bacterial biofilms from ETT.