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 PAO1 were diluted to 1x10⁷ CFU’s/mL in Luria broth medium (LB) in 8 mm diameter closed ETT and incubated horizontally at 37⁰C 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=1X10⁷ CFU/cm², KIMVENT=4.86x10⁶ CFU/cm² (p= 0.01), AirwayMedix 1.1X10⁴ CFU/cm² (p=0.01).

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