Changes in oropharyngeal flora and infections related to the use of medical devices

Half-time review Hulda Thorarinsdottir

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Department of Clinical Sciences Lund, Anesthesiology and Intensive Care

Supervisor: Assoc. Prof. Thomas Kander

Background: The normal body exists in mutualistic balance with a large range of microbiota. With illness and hospitalization this balance can be disturbed harvesting hospital acquired infections (HAI). The frequency of HAI is highest among intensive care unit (ICU) patients. Medical devices such as central venous catheters (CVC) and endotracheal tubes (ETT) increase the risk of HAI, by forcing or disrupting the bodies normal barriers. Sooner or later all medical devices are colonized by microbes (most often normal flora) forming biofilms on the material surface and subsequently leading to infection.

Research questions: Does the oropharyngeal flora change with hospitalization and what characterizes patients with changes in oropharyngeal flora? How prone are the most widely used ETT and CVC materials to infection? Could ETTs coated with Lactobacillus plantarum 299 and 299v inhibit biofilm formation by pathogens? How is blood compatibility of different CVC materials?

Methods: Oropharyngeal swabs from 487 hospitalized patients and controls have been analysed. Retrospective evaluation of 1722 CVC insertions during two years. Biofilm formation on three different ETT materials have been clinically evaluated in 107 ICU patients. ETT’s coated with Lactobacillus plantarum 299 and 299v have been tested in vitro. Six CVC material have been tested in Chandlers loop model to evaluate blood compatibility.

Results: Changes in oropharyngeal flora is an early and frequent event in hospitalised patients. Proton pump inhibitor medication is associated with colonisation of gut flora in the oropharynx. The incidence of CRI was low in this Scandinavian cohort. The introduction of a simple hygiene insertion bundle was associated with decreased incidence of CRI.

Results from the clinical ETT study and the in vitro studies are yet to be determined.

Significance: By determining contributing factors among patients, we might be able to better prevent changes in the oropharyngeal flora and subsequently diminish the risk of nosocomial pneumonia. The implementation of a simple hygiene insertion bundle seems to be an effective intervention to reduce CRI. We need to understand the importance of the material in order to improve out-come of device related infections. This project studies the most widely used ETT and CVC materials in Sweden.
Articles:

1. Proton pump inhibitor Tranberg medication is associated with colonisation of gut flora in the oropharynx. A¹, Thorarinsdottir HR¹, Holmberg A, Schött U, Klarin B
   ¹ Tranberg A och Thorarinsdottir HR share first authorship as they contributed equally.

2. Impact of a simple hygiene insertion bundle on catheter related infections; an observational study on incidence of infection and risk factors. Thorarinsdottir HR, Rockholt M, Klarin B, Broman M, Frankel CJ, Kander T. In manuscript.