ABSTRACT

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Subject of study: Specialist in laboratory methods

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Title: Microbiological diagnostics of causative agents of infectious diseases associated with central venous catheter insertion

Background: The purpose of the thesis is to provide a comprehensive insight into the issue of microbiological diagnosis of agents that cause central venous catheter related infectious processes. The primary objective of the thesis is to evaluate the frequency of occurrence of individual microbiological agents and draw a comparison between published reports and empirical findings. The secondary objective of the thesis is to consider the extent of central venous catheter microbial colonization, i.e., in how many cases of positive culture cultivation, their contamination or significant colonization have been determined, and eventually whether system catheter infection has been proved in correlation with the results of blood culture.

Methods: One hundred and seventy-one central venous catheters from different inpatient departments were delivered to the microbiological section of hospital Nemocnice Boskovice s. r. o. for culture examination have been examined. Using Maki's semi-quantitative method and the method consisting of immersing the catheter's distal end into culture medium, the microbial colonization of catheters has been proved. The consequent identification of microorganisms has been established via the automated device Vitek 2 Compact. The blood culture method has been used to assess the coefficient of correlation with the procedure described above.

Results: Data collected within the timespan January 1st, 2019 and January 31st, 2019 have been evaluated. From the total number of 171 samples delivered to microbiological examination using Maki´s semi-quantitative method and the method consisting of immersing the catheter's distal end into culture medium, 91 samples

(53.2 %) have proved to be positive, and 80 samples (46.8 %) have been proved negative. The positive culture samples have shown the contamination of catheter in 18 samples (28.1 %), according to the assessment criterion of 15 colony forming units, and significant colonization in 46 samples (71.9 %). Bacteria *Staphylococcus epidermidis,* confirmed in 54.9 % of samples, has been the most frequently identified microbial agent. The samples of 12 patients have been also subject to blood culture method, resulting in 9 correlations with the above-mentioned testing method, and a system catheter sepsis has been determined. In these cases, the gram-positive bacteria *Enterococcus faecalis* has been approved to be the most frequently identified microbial agent (44.4 %).

Conclusions: The central venous catheters of patients suffering from inexplicable fever have been subject to microbiological examination with the result of 91 samples (53,2 %), out of 171 samples of central venous catheters, stated positively. Coagulase negative staphylococci, especially *Staphylococcus epidermidis,* have proved to be the most frequently isolated and identified microbial agent. *Enterococcus faecalis* or *Pseudomonas* have been other frequently isolated microorganisms. The results agree to data defined in scientific studies.

Key words: Central venous catheter (CVC), Maki's method, catheter colonization, catheter related infections, biofilm formation, microbiological examination of catheters.