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Brief report

Stickers used for the identification of intravenous lines could be a portal of entry of microorganisms through the catheter: Results from a clinical study

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We evaluated the colonization of stickers used to identify intravenous access lines in a clinical practice setting. We isolated the same microorganisms in colonized catheters and on the stickers in 77.8% of cases. Therefore, stickers could be a portal of entry of microorganisms through the catheter. Alternative methods for labeling intravenous lines are required.

The World Health Organization (WHO) recommends labeling, for example with plastic stickers, venous and arterial vascular access lines due to severe errors that have been occurred because of mixing up venous and arterial lines.[1-7] We have previously described in 2 recent in vitro studies that the surfaces of these stickers become colonized routinely after 3-5 days of handling and they could be a potential source of catheter colonization.[8,9] However, it is necessary to evaluate this finding in a clinical setting.

Our study consisted of assessing the colonization of stickers used for intravenous (IV) line identification and to compare the isolated microorganisms in colonized stickers with those isolated in colonized catheters and in their closed connectors.

MATERIAL AND METHODS

This study was carried out in the Laboratory of Clinical Microbiology, the Infectious Disease Department, and in the Cardiac Surgery Postoperative Care Unit at the Hospital General Universitario Gregorio Marañón.

During 6 months we prospectively collected all central systems removed from patients admitted to the Cardiac Surgery Postoperative Care Unit irrespective of the reason for withdrawal. Superficial cultures from the skin surrounding the catheter insertion site and from all the catheter hubs were immediately obtained before catheter withdrawal. When there was suspicion of catheter-related bloodstream infection (CRBSI), blood cultures were also obtained.

The whole system was divided into the following segments: catheter tip, stickers, and closed connectors. The laboratory procedure consisted of the following cultures: catheter tip by roll-plate technique and sonication (positive culture, $\geq$ 15 CFU/plate and $\geq$ 100 CFU/catheter segment, respectively), skin and all hubs by the semiquantitative method ($\geq$ 15 CFU/plate), stickers by pressing the sticker into a blood agar plate (qualitative), and connectors by sonication (1 minute) in brain-heart infusion broth and 100 μL sonicate was cultured into a blood agar plate (Figure 1).

We recorded, in a preestablished protocol, patient characteristics, underlying diseases, comorbidity factors, severity of illness scores such as Acute Physiology and Chronic Health Evaluation II, the maximum severity reached until catheter withdrawal, and microbiologic data of blood cultures.

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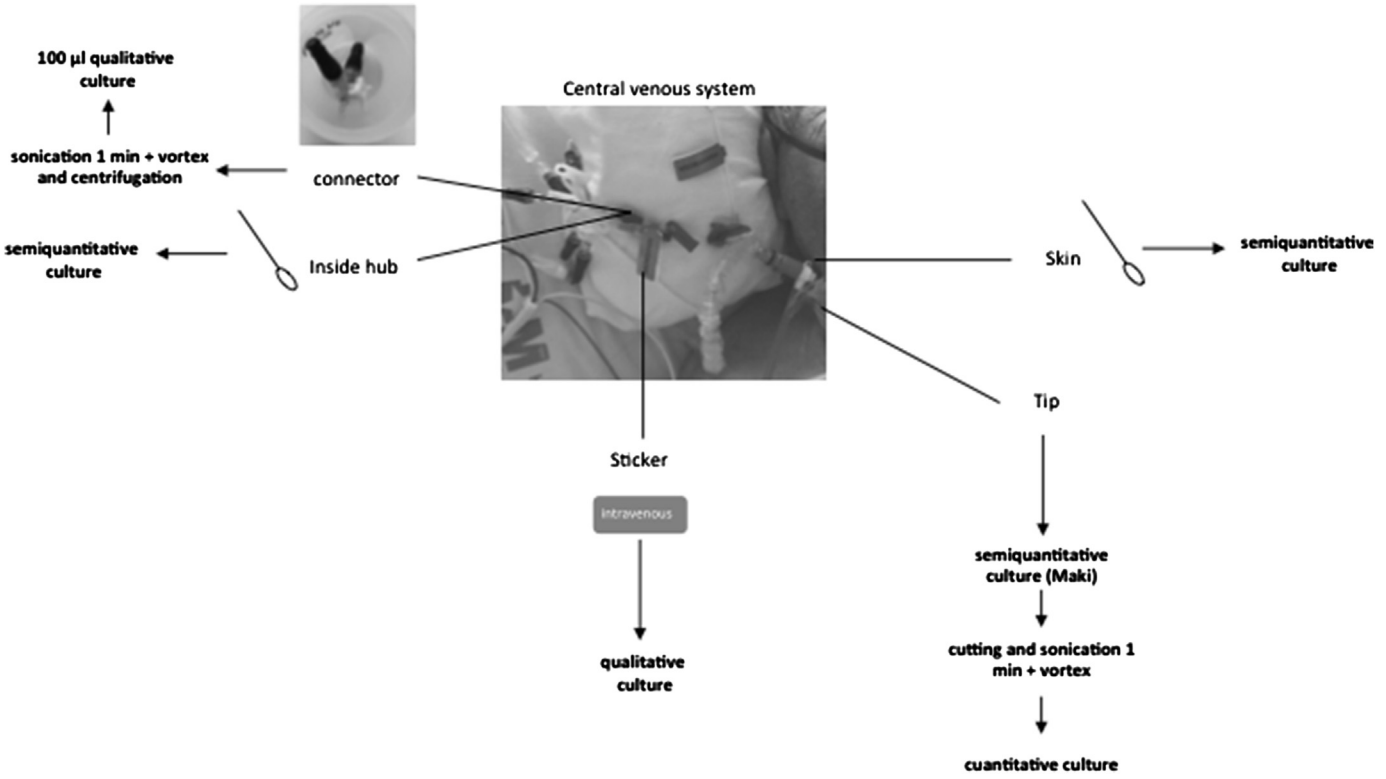

Figure 1. Methodology of the study.

Definitions

Catheter tip colonization

Isolation of either ≥ 15 CFU/plate in Maki's semiquantitative technique or ≥ 100 CFU/catheter segment in the sonication method.

Skin and/or hubs colonization

Isolation of ≥ 15 CFU/plate in semiquantitative culture.

Colonized stickers

We defined a colonized sticker of the central system when at least 1 qualitative culture of all stickers belonging to the whole system was positive.

Catheter colonization

We defined catheter colonization as having a positive catheter tip culture and/or a positive hub culture and/or a positive blood culture obtained through the catheter.

CRBSI

Isolation of the same microorganism(s) both in the colonized catheter and in at least 1 peripheral blood culture obtained 7 days before or after catheter withdrawal.

Statistical analysis

Values are expressed as the mean ± standard deviation or median (interquartile range) for continuous variables and as percentages, with a 95% confidence interval, when applicable, for categorical variables. Categorical variables were evaluated using the χ^2 or 2-tailed Fisher exact test. Two-tailed test of significance at a P value <.05 were used to determine statistical significance.

We calculated the validity values of the stickers by comparing with the gold standard of colonization. The sensitivity, specificity, and positive and negative predictive values with their 95% confidence intervals were calculated using EPIDAT version 3.1. Accuracy was defined as the sum of true positive and true negative results.

Statistical analysis was performed using SPSS (IBM-SPSS Inc, Armonk, NY).

Ethics

This study was approved by our local ethics committee.

RESULTS

We included a total of 101 central venous systems from 65 patients with a mean ± standard deviation age of 63.89 ± 13.7 years. The main underlying condition was congestive heart failure (36.9%) followed by diabetes mellitus (33.8%) and myocardial infarction (24.6%). The overall mean comorbidity index ± standard deviation and Acute Physiology and Chronic Health Evaluation II score at admission was 2.0 ± 1.6 and 8.71 ± 3.2, respectively. The main reason for catheter withdrawal was end of use (68.3%) followed by suspicion of infection (15.8%). Other patient and catheter data are detailed in Table 1.

From the 101 central venous systems, we were able to collect cultures of the stickers and connectors in 82 (81.2%) and in 73 (72.3%) systems, respectively. This corresponded to a total of 213 sticker cultures and 178 connector cultures. The catheter tips and the hub superficial cultures were collected in all of them (n = 101; 100%) (Figure 2). Blood cultures were obtained in 17 central venous systems (16.8%).