Letter to the Editor

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Skin microbiome and placement of vascular access: A solved problem?

Giorgia Montrucchio[1], Vittorio Cerotto[2], Davide Vailati[3], Giuseppe Capozzoli[4], Fabio Gori[5] and Luca Brazzi[1,6]

Dear Editor,

We appreciated the article recently published by Moureau et al. in the *Journal of Infection Prevention* (Moureau et al., 2018). It correctly emphasises the role of microorganisms that are normally found on patients' skin as potential risk factors for the development of infections related to the placement of vascular accesses.

Even if we acknowledge to the authors the great merit to have addressed a topic not sufficiently investigated in the literature, we believe that the conclusion that the positioning of a central vascular access through chest or upper arms seem, per se, to reduce infection risk does not sufficiently considers other factors already discussed in the literature.

The mechanisms of infection of endovascular devices have been, in fact, demonstrated not to depend only on the insertion site, but, rather, on the modalities of insertion, on the characteristics of the biofilm and on the possible contamination of the catheter hubs or intravenous fluids. Moreover, it is universally recognised that the choice of the site for insertion of a vascular access depends on the evaluation of multiple factors such as patients' characteristics, goal and length of stay of the device, risk of complications, and that healthy volunteers and hospital patients are inertly different as previous antibiotic therapies, length of hospital stays, presence of multiple devices and invasive surgical interventions play a major role in the selection of the microbiome (O'Grady et al., 2011). In addition, physiological conditions—such as nutritional status and hydration—may also play an important role in modifying type and quantity of skin flora.

The role of all these factors has been studied by Reichel et al. using a systematic review of the literature supplemented by in vivo tests (Reichel et al., 2011). They found that microbial density was higher on sebaceous-rich and wet skin sites and that the highest aerobic microbial density was present on the forehead, followed by the upper back, the abdomen and the lumbar area, and that men carried significantly more microorganisms on all sites.

Unfortunately, as clearly recognised by the authors, the healthy volunteer cohort was, in the study by Moureau et al., small; not all sites were sampled in both healthy volunteers and hospital patients. Moreover, they were unable to extrapolate changes in skin colonisation over time. It would therefore be desirable for a future study to include a larger population of healthy individuals not exposed to the hospital environment in order to better assess the role of the confounding factors illustrated above.

Furthermore, for both chronic outpatients and hospitalised patients, specific risk factors represent a fundamental aspect in determining the evolution of the cutaneous and general microbial flora and deserve a detailed evaluation. Hence, it is essential to consider the impact of previous therapies, the duration of hospitalisation, the presence of multiple devices and invasive surgical intervention that seems to be particularly relevant in the selection of microbiome. As suggested by the authors themselves, only surveillance over time could provide important information on the evolution of microorganisms, especially in intensive care patients, where the skin colonisers may represent a source of multi-resistant organisms.

A second aspect that should be clearly addressed approaching the description of skin microbiome is related to the method for the execution of cutaneous tampons and their microbiological evaluation.

In the literature, there is no univocal methodological standardisation of the methods of skin sampling and microbiological culture. It has been highlighted that the results obtained by different studies designed to evaluate the microbial flora of human skin are not adequately explained in their methodology or are far to be comparable due to the use of different sampling and microbiological evaluation.

[1]Department of Anaesthesia, Intensive Care and Emergency, 'Città della Salute e della Scienza' Hospital, Turin, Italy
[2]Anaesthesia, Intensive Care and Pain Care, Città di Castello Hospital, Italy
[3]Anaesthesia and Intensive Care, Melegnano Hospital, Milan, Italy
[4]Department of Anaesthesia, Bolzano General Hospital, Italy
[5]Anaesthesia and Intensive Care 1, 'Azienda Ospedaliera di Perugia', Perugia, Italy
[6]Department of Surgical Sciences, University of Turin, Turin, Italy

Corresponding author:
Giorgia Montrucchio, Department of Anaesthesia, Intensive Care and Emergency, 'Città della Salute e della Scienza' Hospital Corso Bramante 88, Torino, 10126, Italy.
Email: g.montrucchio@gmail.com

Moureau et al. proposed overcoming this critical issue, describing the sample collection technique and the microbiology testing. However, some aspects continue to not be described with sufficient detail, since there are references to 'chest' or 'base neck' with a no clear definition of the sampling area and its overall size. This makes it impossible to extrapolate results obtained in other clinical settings.

Moureau et al. also did not consider the femoral venous access site in their study. This site for venous access is, in fact, an important site, particularly for treating acute renal failure by renal replacement therapy in the non-obese, bedbound, intensive care unit (ICU) patient. In particular, Duguè et al. showed that despite its proximity to the groin, the femoral route does not expose patients to a higher risk of catheter-related infection than the jugular route when catheterisation occurred in the ICU with the standard infection control practices (Duguè et al., 2012). For this reason, a study concerning the local density of microrganisms is therefore of major importance for the femoral route in ICU.

Last, but not least, the management of the vascular access is strictly correlated not only to the site and to the methods of positioning, but also the skin disinfection methods and the appropriate management of the device that are all essential factors in determining the risk of complications (Pronovost et al., 2006). These aspects have been only partially investigated by Moureau et al. in their analysis evidencing that bacterial counts under transparent dressing were lower but not statistically different to the one observed on skin outside of the dressing.

In conclusion, we believe that the work of Moureau et al. has brought to light the need for a new series of studies investigating the risks associated with the placement of vascular accesses. Due to the fact that the choice of the insertion site for a vascular access depends on multiple factors, such as the patient, the objective and the length of stay of the device, only a complete and systematic approach aimed at optimising the choice, positioning and management of the device can really help in understanding and possibly reducing the risks of complications.

Conflict of interest

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ORCID iD

Giorgia Montrucchio https://orcid.org/0000-0001-9341-965X

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