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Comment on: "Operator gender differences in major mechanical complications after central line insertions: a subgroup analysis of a prospective multicentre cohort study"

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Abstract

We read with great interest the recent study by Naddi et al. in BMC Anesthesiology, which explores operator gender differences in major mechanical complications following central venous catheterization. The study identifies male operator gender as an independent risk factor for complications. However, our attempt to replicate these findings using Colombian data did not support this association. We caution against oversimplifying the influence of sex and gender on health outcomes, as numerous factors, including cultural norms, healthcare practices, and resource availability, significantly impact procedural outcomes. Differences in complication rates may reflect risk-taking behaviors and systemic healthcare disparities rather than inherent biological differences. We emphasize the need for a comprehensive approach to understand the multifaceted nature of central venous related complications. Replication studies across diverse populations are crucial for validating these findings and informing effective strategies for complication prevention and management.

Dear editor,

With great interest, we have read the recently published paper by Naddi et al., in BMC Anesthesiology [1], which investigates the operator gender differences in major mechanical complications after a central venous catheterization (CVC). The paper provides insights into the factors linked to mechanical complications, particularly focusing on sex and gender as potential contributors, and concluding that male operator gender was independently (adjusted estimate) associated with a higher risk of complications (OR 2.67 [95% CI: 1.26–5.64]).

In 2022, the prospectively collected MECH trial reported by Adrian et al., described a cumulative incidence of 0.4% of major mechanical complications after a CVC insertion [2]. The multivariable analyses showed that male operator gender (OR 3.33 CI95% [1.60–7.38]) and other variables were associated with major mechanical complications after adjustment.

Using data collected in Colombia before the widespread adoption of ultrasound, the cumulative incidence of total mechanical complications by sex was calculated, revealing rates of 16% for females and 22% for males [3]. Following adjustment with a similar set of variables as reported by Naddi et al., our attempts to replicate the reported association between gender and mechanical complications were unsuccessful (OR 0.7 CI95% [0.2–1.7]). We proceeded with caution in our interpretation,

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acknowledging the limited occurrence of events in our dataset and our inability to calculate an estimate for major mechanical complications due to constraints inherent in the definition of the outcome.

Sex and gender—not only of the care provider, but also of the patient!—undoubtedly play crucial roles in health outcomes and medical interventions. However, attributing complications solely to these factors might oversimplify the complex interplay of variables involved in CVC-insertion. Cultural norms, healthcare practices, resource availability, and patient preferences are among the myriads of factors that can significantly influence procedural outcomes, including the reduced availability of female operators in some regions around the world. As Naddi et al. described, female operators had a lower incidence of major mechanical complications but also were less experienced, "a finding that calls for further investigation of explanatory factors" [1].

Furthermore, it is essential to consider that disparities in complication rates may not solely reflect inherent biological and/or psychomotor differences between sexes or genders. Rather, they may be indicative of risk-taking behaviors. In Colombia, young boys and girls exhibit equal competitiveness across all tasks [4]. Conversely, in Sweden, girls may outperform boys in certain tasks, while boys display higher levels of risk-taking behavior, albeit with a narrower gender gap observed in Sweden [4]. In addition, broader systemic issues within healthcare systems, including disparities in access to care, quality of care, and patient-provider communication, can also contribute to these variations. Culture factors between Colombia and Sweden may be interesting to describe; while Colombia exhibits high power distance, fostering hierarchical structures across society, Sweden embraces lower power distance, promoting egalitarian values, decentralized power, and participative decision-making [5, 6].

Finally, considering these strong cultural differences in this situation, understanding why different characteristics lead to different risks of complications are causal questions that requires causal methods (including a transparent causal framework) and well-defined questions [7, 8]. Otherwise, Table 2 fallacy would be present with a potential causal interpretation of multivariable adjusted coefficients as causal, which is inappropriate [9]. Readers of the MECH trial should also be cautioned against committing the Table 2 Fallacy in this instance. The authors present several adjusted odds ratios in Table 4 [2]. Despite not being causal, these odds ratios may often be interpreted as such by both academic and non-academic readers, including the press, who assume a causal relationship between gender and mechanical complications [11].

Therefore, while acknowledging the importance of studying sex and gender in medical research, the authors would like to highlight that it is crucial to interpret findings and acknowledge the complexity of this association within the context of broader socio-cultural and logistical determinants of health. It is essential to recognize the complexity of this association and consider the influence of cultural and logistical factors. By adopting a comprehensive and nuanced approach asking well-defined research questions with appropriate causal methods, researchers can promote further understanding of the multifaceted nature of complications associated with CVC insertion and develop more effective strategies in complication prevention and management. Finally, replication studies are essential for confirming findings across different populations, even though researchers and publishers are generally reluctant to conduct and publish them.

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JAC and MK wrote the main manuscript text and reviewed / approved the final manuscript.

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Declarations

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