

LETTER

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Central venous pressure monitoring and mortality: What was neglected?

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Dear editor,

We are interested in the recent published article about the association between central venous pressure (CVP) monitoring and mortality for ICU patients with sepsis [1]. The study provides new insights into this traditional monitoring. However, an important factor might make the study more convincing if it had been taken into account.

The clinical experience tells us that ICU admissions after surgeries (surgical patients in the ICU) are more likely to have central venous catheters than those from the medical system (medical patients in the ICU). Besides, as has been proven by many studies, medical patients have worse prognosis than surgical patients in the ICU [2–4]. Chen and his colleagues collected tens of important covariates to adjust the results, but the admission resource (from surgical or medical systems, which can be identified with the official codes [5]) was neglected [1]. To validate our supposition, we conducted an analysis in the same database. According to the inclusion and exclusion criteria of Chen's study, we extracted a very similar (10,131) but not identical (10,275) cohort (because we didn't get the authors' original codes). The CVP monitoring group has 4,505 patients (vs. 4516 in Chen's study), while the non-CVP monitoring group has 5626 ones (vs. 5759 in Chen's study). As shown in the mosaic plot (Fig. 1a), CVP monitoring is positively associated with ICU admissions after surgery (1574/4505 [35%] for CVP group vs 835/5626 [15%] for non-CVP group, Phi coefficient = 0.235, $p < 0.001$). And the 28-day mortality is significantly lower among surgical patients

(12% for surgical patients vs 21% for medical patients, relative risk [95% confidence interval]: 0.60 [0.53–0.67], $p < 0.001$). Briefly, the CVP monitoring group has a larger proportion (more than twice the non-CVP monitoring group) of surgical patients, which has a lower 28-day mortality rate (nearly a half) than medical patients. Not considering the admission resources may bring bias to Chen's study.

Service units of patients in the MIMIC database (MICU, SICU/TSICU and CCU/CSRU in Chen's study) were collected as a covariate. Except for MICU, the other two units were balanced in the numbers of surgical and medical patients (Fig. 1b). As a result, the proportions of surgical and medical patients could not be adjusted between CVP monitoring and non-CVP monitoring groups, which means that the effect of admission resources could not be replaced by service units. We would be very interested in the results if the effect of admission resources were considered.

Acknowledgements

We appreciate the researchers at the MIT Laboratory for Computational Physiology for publicly sharing of the MIMIC-III database.

Authors' contributions

ZW conceived the idea and takes responsibility for the content of the manuscript. SG did the major work of data extraction and analysis. The authors meet the criteria for authorship as recommended by the International Committee of Medical Journal Editors (ICMJE). Writing and edition were provided by SG, ZD, LY and ZW. All authors read and approved the final manuscript.

Funding

The authors received no funding for this study.

Availability of data and materials

The datasets extracted and analyzed during the current study are accessed in this website (<https://mimic.physionet.org/gettingstarted/access/>).

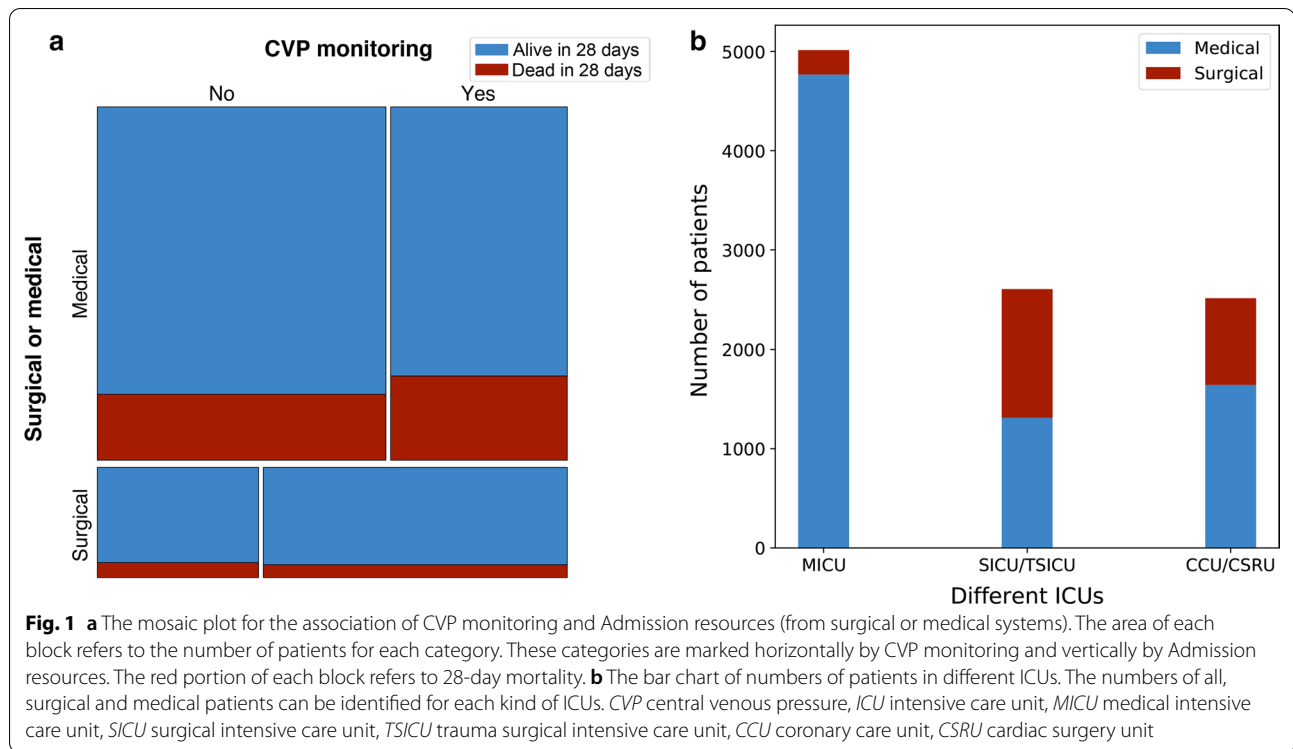
Ethics approval and consent to participate

Not applicable.

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**Consent for publication**

Not applicable.

Competing interests

The authors declare that they have no conflict of interest.

Received: 24 September 2020 Accepted: 16 October 2020

Published online: 23 October 2020

References

- Chen H, Zhu Z, Zhao C, Guo Y, Chen D, Wei Y, Jin J. Central venous pressure measurement is associated with improved outcomes in septic patients: an analysis of the MIMIC-III database. *Crit Care*. 2020;24(1):433.
- De Jong A, Verzilli D, Sebbane M, Monnin M, Belafia F, Cisse M, Conseil M, Carr J, Jung B, Chanques G, et al. Medical versus surgical ICU obese

patient outcome: a propensity-matched analysis to resolve clinical trial controversies. *Crit Care Med*. 2018;46(4):e294–301.

- Le Gall JR, Lemeshow S, Saulnier F. A new Simplified Acute Physiology Score (SAPS II) based on a European/North American multicenter study. *JAMA*. 1993;270(24):2957–63.
- Puxty K, McLoone P, Quasim T, Kinsella J, Morrison D. Survival in solid cancer patients following intensive care unit admission. *Intensive Care Med*. 2014;40(10):1409–28.
- mimic-code/concepts/severityscores/sapsii.sql. <https://github.com/MIT-LCP/mimic-code/blob/master/concepts/severityscores/sapsii.sql>. Accessed 20 Sept 2020

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

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