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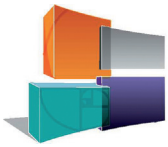

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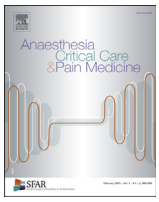

Editorial

Postoperative admission in surgical ICU, less is more?

After high-risk surgery, complications rate can reach 16.8% and mortality is close to 0.5% [1]. Postoperative complications also reduce quality of life after surgery [2]. Considering the number of procedures performed each year worldwide, it represents a major burden for the society. ICU (intensive care units) are among the costliest hospital units. Over the last few years, in an attempt to rationalise and optimise healthcare expenditure, several studies tried to address the link between postoperative ICU admission and outcome [3,4]. Moreover, there are also large discrepancies of ICU bed availability according to districts. That is why admission criteria in such unit should be well balanced, in particular in underserved area with high risk of bed-shortage.

In this issue "Admission to surgical intensive care unit in time with intensivist coverage and its association with postoperative 30-day mortality: The role of intensivists in a surgical intensive care unit" by Tak Kyu Oh et al., the authors addressed the original question of the role of intensivist in ICU. They compared patients' outcome (i.e. 30-day mortality and length of stay) after ICU admission in a surgical ICU during intensivist coverage hours (further referred as "open-hours") compared with non-intensivist coverage hours (further referred as "after-hours"). This is a retrospective single centre study in a tertiary care academic hospital. In this centre, patients are admitted either in surgical, emergency or neurologic ICUs after surgery. Each ICU is staffed with three daytime attending intensivists between 8.00 and 18.00. There is usually one nurse for two patients. After hours, an attending physician receives in-house calls after 18.00 and on weekends (the intensivist in not on-site). The residents from each surgical department are in charge of the patients in each ICU. The authors analysed a cohort of 10,708 patients admitted in the ICU between 2006 and 2017. After propensity score matching, they reported an improvement in 30-day mortality in the group of patients admitted in the ICU during open-hours (3.2%) as compared to their counterparts (4.7%) (relative risk 1.45, 95% CI 1.20–1.75, $P < 0.001$). In the same way, in the matched cohort, the length of stay in the ICU as well as was the length of hospital stay after ICU admission were longer for patients admitted during after-hours vs. open-hours, respectively 16 [10.0;28.0] vs. 14 [10.0;23.0], $P < 0.001$ and 24 [17.0;47.0] vs. 22 [18.0;44.0], $P < 0.001$.

Database analysis is a powerful tool to draw hypotheses but does not permit to reach causality since it may pool inconsistent data and patients. The single centre design limits the generalisation of the results but also represents strength because it reduces confounding factors related to inner hospital organisation or between centres discrepancies in patient recruitment. Matching patients according to McCabe and/or Knaus Scale might have increased between groups comparability. This original research emphasised on the need to have skilled physician in the ICU, regardless of the hour of admission.

This study presents a single equation (i.e. 30-day mortality) with two unknown variables that are: (1) Does admission during understaffed nightshift impact the outcome; (2) Does non-intensivist coverage impacts patient's outcome. This latter question is also closely related to (3) the impact of ICU vs. ward admission on patient's outcome after surgery.

1. Does admission during understaffed nightshift can impact the outcome?

The admission in the ICU, especially during night shift or after-hours, should not be considered as an "easy way" to reduce admission in the ward during understaffed period. Such strategy could increase bed shortage and the benefit for the patient may be null with an unfavourable cost-effectiveness ratio. In an Australian cohort of 504,713 admission, Morgan et al. reported [5] that admission in the ICU during out-of-office hours (after 6.00 pm and on weekends) after planned surgery was also a risk factor of mortality and higher hospital length of stay. In this cohort, intensivists were available after-hours and on weekends, and nurse-to-patient ratio of one-to-one for critically ill patients remains constant during night and day. To explain the higher mortality rate, authors proposed several hypotheses including surgeon exhaustion leading to decreased performances. Additionally, after hours can also bring to a reduce availability of supportive service such as blood product in case of bleeding and radiology for diagnosing complications. This study is in line with an American study in the same setting [6].

These results also suggest that after-hours and weekend admission in ICU rather than in the surgical ward should not be argued when the surgery can be delayed. We have a lot to learn about all these studies to envision how to plan surgery and organise night and day work in the ICU. Whether after-hours admissions can influence by themselves the mortality is unsure and remains to be addressed.

2. Does non-intensivist coverage impacts patient's outcome?

The present study by Tak Kyu Oh et al. mainly advocates for the key role of specialised physicians in the ICU to care for patients at all times, including nights and weekends. The question is timely

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and important since most ICU teams worldwide are trying to determine the best model of staff during nightshift.

To understand why Intensivist coverage is useful during nights and days, and to improve patient's outcome, 2 aspects should be addressed: First, nowadays, surgical ICUs ensure postoperative care in highly specialised fields such as solid organ transplantation, extracorporeal life support, burned or multiple trauma patients including brain injury. These patients require continuous optimisation of therapeutics. Secondly, systematic admission of patients after elective surgery is elusive because of frequent bed-shortage. To determine whether a patient should be admitted in the ICU immediately after the surgery or just-in-case of complications requires specific knowledge on the surgeries and their complications, as well as the suspected delay of occurrence of the latter. This explains why, caring for critically ill patients requires highly experienced intensivist staff, and should include senior nurses and physicians.

3. What is the impact of ICU vs. ward admission on patient's outcome after surgery?

Kahan et al. [7] analysed the data from an international 7-day cohort study of 44,814 patients including cardiac surgery patients. Their results argue against systematic ICU admission after surgery because it did not improve patient's mortality. Although the study was well conducted, Kahan et al. did not differentiate pre-planned elective ICU admission for high-risk patients and unplanned urgent admission for intensive care support. As a result, the group "ICU admission" may include patients admitted due to secondary organ failure in the ward. Moreover, in the field of surgical ICU one size does not fill all, especially regarding cardiac surgery after which most complications are life threatening. As a result, stratified analysis on the type of surgery as well as on the staffing model could have tempered the results. The need for surgical ICU cannot be denied because, regardless of the improvement of technics, surgery will always give rise to complications among which some require intensive care. In the United Kingdom, the addition of more ICU beds across the country was reported to reduced mortality [8]. Kahan et al. did not conclude that ICU admission after major surgery was useless, but emphasise that the indications should be carefully considered. High bed availability may lead to more frequent admission of patients too sick (moribund) or not sick enough that may not benefit from ICU [9]. The higher mortality rate in ICU patients reported in the Kahan et al. [7] study mainly suggested that the anaesthetic team did a well triage at the preoperative evaluation. We have also to envision that sometimes ICU admission could be harmful. For instance, as proposed by Zampieri [10], improper ICU admission can lead to overtreatment (unnecessary and aggressive fluid resuscitation, delirium related to confined environment in elderly people) that may alter patient's prognosis.

4. What is a relevant ICU admission criterion?

This question still remains complex to address because the decision of ICU admission after surgery is driven by a comprehensive understanding of the patient's health-status by the anaesthetist trying to envision its ability to recover from a major surgery. The matter is to know what to expect from ICU admission. For example, an admission in the ICU leading to discharge on day 1 (i.e. total gastrectomy) appears useless mainly because complications will occur after the 3rd day of the surgery and whether postoperative ward admission can alter patient outcome is unsure. Besides, Kahan et al. reported that the most frequent complication after surgery was infection, and it is difficult to envision how ICU admission can avoid infection, especially surgical site infection. However, considering patient experience, ICU admission could allow to closely monitor pain scale on to perform epidural analgesia, which may increase the patient comfort. At the opposite of the spectrum, bleeding or prosthetic valve dysfunction will cause immediate life-threatening conditions after cardiac surgery and prompt us to closely monitor these patients, but for how long?

If staging the risk of the surgery is quite straight forward, the best score to assess patient's risk remains controversial and complex since unsolved questions remains:

- when taken one by one, no threshold for a given risk can strictly indicate ICU admission, it is all a matter of comprehensive anaesthetic evaluation and dialogue with ICU staff;
- for 2 patients with equal risk factors of postoperative complications undergoing the same surgery procedure, postoperative complications can be influenced by anaesthesia protocol or surgical technics.

These considerations also strengthened the idea that pooling data from different centres can be misleading. The skills of medical or paramedical staff, operators learning curve should also be included in the stratification of patients' risk.

5. Conclusion

Taken together, previously published data suggest that systematic admission in the ICU after surgery is unsure. LESS systematic ICU admission means MORE beds available for critically ill patients and MORE time for staff to care for. To make this equation true, ICU staff should be adjusted in each hospital and proper admission criteria should be set after consultation with surgeons and anaesthetists. Finally, surgical schedules should fit with availability of supportive services at the time of surgery. These are possible ways to improve both patient's outcome and experience, and in the same time to reduce the workload for intensivists. For stable patients, requiring close monitoring or adjusted analgesia a "postoperative intermediate care" should be envisioned instead of ICU admission. This can represent a fine balance between clinical safety and medical costs.

Disclosure of interest

The authors declare that they have no competing interest.
Outside of this topic: conflicts with LFB, Fresenius, Baxter.

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