Analysis of factors influencing 3-and 6-h compliance with the surviving sepsis campaign guidelines based on medical-quality intensive care unit data from China

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To the Editor: In the past decades, there were at least 31.5 million sepsis patients worldwide. Of these patients, 5.3 million sepsis patients face death every year.1-4 Studies have shown the mortality from sepsis can be reduced by compliance with the surviving sepsis campaign guidelines (Cssc).1,2 Compliance with guidelines depends on the execution of the medical team. We assume that the medical quality of the intensive care unit (QICU) will have an important impact on the Cssc.

We designed this experiment to investigate the Cssc and QICU in China. The total number of secondary and tertiary hospitals registered in China National Critical Care Quality Control Center (China-NCCQC) was 7525 in 2018. Hospitals with patients of septic shock admitted in ICUs <20/year and incomplete data were excluded from this study. Finally, 1854 hospitals were involved. The data were collected between January 1, 2018, and December 31, 2018. The quality indicators of ICUs included deep vein thrombosis (DVT) prophylaxis rate, unplanned extubation rate, reintubation rate within 48 h, rate of vasopressor in patients with mean arterial pressure (MAP) ≤65 mmHg after fluid resuscitation, 3. Completion of central venous pressure (CVP) and central venous oxygen saturation [ScvO2] measured in patients with lactate ≥4 mmol/L. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The trial protocol was approved by the Central Institutional Review Board at Peking Union Medical College Hospital (NO. S-K1297) and individual consent for this retrospective analysis was waived. The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. Statistical analysis was performed using SPSS software, version 16.0 (IBM Corp., Armonk, NY, USA). The Kolmogorov-Smirnov test was employed to check whether the data were normally distributed. The results are described as mean ± standard deviation. Comparisons between multiple groups were analyzed by one-way analysis of variance (ANOVA), and pairwise comparisons after ANOVA were conducted using the Tukey multiple comparisons test. All of the statistical tests were two-tailed, and a P < 0.05 was considered to be statistically significant.

The completion of 3-h Cssc is generally higher than the completion of 6-h Cssc. The main constraint on the 6-h Cssc is the completion of CVP and ScvO2 measured in patients with lactate ≥4 mmol/L. In the lower, higher, and highest groups of the DVT prophylaxis rate, the 6-h Cssc, the sub...
Figure 1: Correlation between clinical quality control indicators and compliance of surviving sepsis campaign (SSC) guidelines ($C_{SSC}$). Monitoring indicators included deep vein thrombosis (DVT) prophylaxis rate, unplanned extubation rate, reintubation rate within 48 h, rate of unplanned ICU admission, return rate within 48 h. Each indicator is divided into four grades according to the implementation. Each 25% from bad to good is one level, with 0, 1, 2, or 3 points. According to the scores, they are divided into the lowest group, the lower group, the higher group, and the highest group. Results are presented as mean ± standard error. $^*P < 0.05$ compared to the lowest group, $^†P < 0.05$ compared to the lower group, $^‡P < 0.05$ compared to the higher group. DVT: Deep vein thrombosis; ICU: Intensive care unit.
indicators of 3-h C_{ISC} and the sub-indicators of 6-h C_{ISC} were significantly higher than those in the lowest group (P < 0.05) [Figure 1A]. In the higher and highest groups of the DVT prophylaxis rate, the sub-indicators of 6-h C_{ISC} were significantly higher than those in the lower group (P < 0.05) [Figure 1A]. In the lower, higher, and highest groups of the unplanned extubation rate, the rate of unplanned ICU admission, and the return rate within 48 h, the sub-indicators of 6-h C_{ISC} were significantly higher than those in the lowest group (P < 0.05) [Figure 1B]. In the lower, higher, and highest groups of the re-intubation rate within 48 h, the 6-h C_{ISC} the sub-indicators of 3-h C_{ISC}, and the sub-indicators of 6-h C_{ISC} were significantly higher than those in the lowest group (P < 0.05) [Figure 1C]. In the lower, higher, and highest groups of the return rate within 48 h, the 6-h C_{ISC} was significantly higher than those in the higher group (P < 0.05) [Figure 1C]. In the lower, higher, and highest groups of Fig. 1: Quality Improvement of Critical Care Medicine Quality Control Requirements for Critical Care Medicine, Quality Improvement of Critical Care Program, led by China-NCCQC, was initiated in 2015. This study is part of the above program. Wang et al. [4] found that the C_{ISC} of emergency physicians is often hindered by the doctors’ awareness and attitudes. C_{ISC} is related to DVT prophylaxis rate, unplanned extubation rate, re-intubation rate within 48 h, and rate of unplanned ICU admission. There are several possible reasons for this phenomenon. First, DVT prophylaxis rate, unplanned extubation rate, re-intubation rate within 48 h, and rate of unplanned ICU admission are more relevant to physician decisions than other indicators. Second, from the perspective of QICU, prevention of DVT and implementation of the SSC guideline bundle are both clustered ‘treatments’, fully reflecting doctors’ awareness and attitudes regarding critical care patients, which is likely why 3-and 6-h C_{ISC} and DVT prophylaxis rate have a good consistency. Third, adverse events, such as unplanned extubation rate, re-intubation rate within 48 h, and the rate of unplanned ICU admission reflect management ability of ICU. The stronger that the management ability is, the better that the 3- and 6-h C_{ISC} is. The relationship of 3- and 6-h C_{ISC} with ICU re-admission rate within 48 h is uncertain. Compared with other adverse events, factors that cause return within 48 h after transferring out of the ICU might be more complex and occur outside of the ICU. Therefore, it is difficult to effectively manage these factors that cause return within 48 h after transferring out of the ICU. The above phenomenon might be the main reason for the poor test titer of this indicator. In this study, it was found that the groups with the worst scores tended to have the worst bundle compliance compared to other groups, with significant differences, while differences between other groups were often not significant. The reason might be that C_{ISC} has been ahead of the implementation of most quality control indicators due to the universal promotion of the concept of early goal-directed therapy. As a result, the completion of quality control indicators cannot test the differences in C_{ISC}. However, for hospitals where the treatment of sepsis is still not standardized, it is still of great significance to strengthen the construction of QICU. There are some limitations of our study. First, since only one year of data was included in this study, the relationships of QICU on 3- and 6-h C_{ISC} could not be analyzed continuously and dynamically. Second, additional study is needed to determine whether differences in mortality from sepsis might emerge with follow-up beyond 1 year.

**Conflict of interest**

None.

**References**

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