The Impact of Implementing Critical Care Team on Open General Intensive Care Unit

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Background: There are a plethora of literatures showing that high-intensity intensive care unit (ICU) physician staffing is associated with reduced ICU mortality. However, it is not widely used in ICUs because of limited budgets and resources. We created a critical care team (CCT) to improve outcomes in an open general ICU and evaluated its effectiveness based on patients' outcomes.

Methods: We conducted this prospective, observational study in an open, general ICU setting, during a period ranging from March of 2009 to February of 2010. The CCT consisted of five teaching staffs. It provided rapid medical services within three hours after calls or consultation.

Results: We analyzed the data of 830 patients (157 patients of the CCT group and 673 patients of the non-CCT one). Patients of the CCT group presented more serious conditions than those of the non-CCT group (acute physiologic and chronic health evaluation II [APACHE II] 20.2 vs. 15.8, p<0.001; sequential organ failure assessment [SOFA] 5.5 vs. 4.6, p=0.003). The CCT group also had significantly more patients on mechanical ventilation than those in the non-CCT group (45.9% vs. 23.9%, p<0.001). Success rate of weaning was significantly higher in the CCT group than that of the non-CCT group (61.1% vs. 44.7%, p=0.021). On a multivariate logistic regression analysis, the increased ICU mortality was associated with the older age, non-CCT, higher APACHE II score, higher SOFA score and mechanical ventilation (p<0.05).

Conclusion: Although the CCT did not provide full-time services in an open general ICU setting, it might be associated with a reduced ICU mortality. This is particularly the case with patients on mechanical ventilation.

Key Words: Critical Care; Intensive Care Units; Mortality

Introduction

There are so many literatures showing that a high-intensity intensive care unit (ICU) physician staffing is associated with a reduced ICU mortality. Its rationale is that physicians can prevent or attenuate morbidity and mortality and thereby can improve the outcomes because they are skilled in not only treating critically-ill patients but also immediately detecting and then resolving problems. But a high-intensity ICU physician staffing is not widely used in ICUs in many countries because of limited budgets and resources. According to Young and Birkmeyer, about 15% of all ICU patients were treated in ICUs that meet the Leapfrog standard in the United States. Recent published studies have shown that at least 95% of total ICU patients were managed by critical care physicians for the entire stay in about 18.6% (23/123) of ICUs in the United States. According to a white paper published by the Korean Academy...
Society of Critical Care Medicine (KSCCM), only 17.3% of total ICUs were equipped with high-intensity ICU physicians who can work over eight hours a day. Given the above background, we created the critical care team (CCT) to improve outcomes in an open general ICU and evaluated its effectiveness based on patients' outcomes.

Materials and Methods

1. Study design

We conducted this prospective, observational study in an open, general ICU setting during a period ranging from March of 2009 to February of 2010. The study was approved by the Ethics Committee and Institutional Review Board (IRB) of Chungju Hospital, Konkuk University. Written informed consent was waived because the observational study had the prospective nature and it was conducted to provide rationale of the ICU care policy of our institution by the IRB.

2. Critical care team

Our hospital is a secondary referral hospital equipped with 445 beds except for ICU ones. In addition, its open general ICU has 26 beds where there are 55 board-certified teaching staffs. The CCT consisted of five teaching staffs, each of which includes one pulmonologist, one gastroenterologist, one vascular/trauma surgeon, one pediatrician and one neurologist. The CCT performed the activity only for patients of the CCT group. Each member of the CCT was expected to play its own role: the management of airway and mechanical ventilation (the pulmonologist), the examination of all the abdominal problems including gastroduodenofibroscopy (the gastroenterologist), the related surgical operations and procedures including tracheostomy and chest tube drainage (the vascular/trauma surgeon), the management of mechanical ventilation in the absence of the pulmonologist and cardiopulmonary resuscitation in developed unexpected arrests (the pediatrician) and the treatment of delirium/seizure and acute mental deterioration of patients assigned to the CCT (the neurologist).

It was activated by patients' needs, calling criteria based on the medical emergency response improvement team (MERIT) study or each member's decision. Patients' needs were defined when patients of the CCT group complained to the CCT members or ICU nurses about their three symptoms (pain, dyspnea, and palpitation). In these cases, at least one CCT member directly examined patients and discussed or, if necessary, managed patients' symptoms with other remaining CCT members. We educated the ICU nurses about MERIT criteria in our ICU conference one month before the start of the study. Attending ICU nurses would call CCT members who could be reached if patients of the CCT group met MERIT criteria. The decision of the CCT member was defined when any CCT members needed to discuss the condition or treatment plan of patients of the CCT group with other CCT members. We directly called CCT members without consultation and then discussed with them for the management of patients in future, Otherwise, we provided some treatments including procedures. We were the CCT members who were not full-time high-intensity ICU staffs, but provided rapid medical services, including consultation, within three hours after calls or consultation. We also regularly examined patients and managed patients during rounding after patients were assigned to the CCT group. Of the CCT members, at least one member on duty always covered at night and during weekends. Although the CCT members were on vacation, they were recommended to provide consultation, if necessary, by accessing a web-based remote control program.

3. Study subjects

In the current study, criteria for ICU admission were based on the guidelines by the American College of Critical Care Medicine and Society of Critical Care Medicine. The chief of ICU and an attending physician who assumed responsibility for patient's care determined ICU admission according to the priority of above criteria. An attending physician of the department was assigned to each ICU patient according to his or her primary reason for ICU admission. Inclusion criteria