CRITICAL CARE

COMMENTARY

Effect of off-hour staffing in Chinese ICUs

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See related research by Ju *et al.*, http://ccforum.com/content/17/5/R230

Abstract

Analysis of Chinese ICU staffing in relation to final outcome yields comparable results as those reported in Western ICUs. This underlines the general principle that we would all like to apply in our hospitals; that is, availability of knowledgeable staff that are adequately trained to recognize and treat an acutely deteriorating critically ill patient as soon as possible.

In the previous issue of *Critical Care* Ju and colleagues report on their findings, evaluating whether off-hours admissions to the ICU are associated with increased mortality in mainland China [1]. Patients may develop critical illness during every moment of the day, often resulting in off-hour admission to the emergency department, or evaluation for potential admission to the ICU if already admitted to the hospital. Since timely and adequate initial treatment is essential for the subsequent course of events, it will also affect final outcome. The way treatment is delivered depends on organizational aspects, which may differ markedly according to the time of day the patient presents. The effect of ICU admission time on outcome has been studied in a variety of settings with mixed results. Some authors found increased mortality for patients admitted during off-hours [2-5], while others did not find a mortality difference [6-10]. One study even showed improved survival for patients admitted during off hours [11], or increased mortality for patients admitted during the morning rounds [12]. All these studies were retrospective and all suffer from at least two problems that make interpretation difficult. Firstly, off-hour patients are different from office hour patients with regards to illness severity and diagnosis at least. Secondly, even if this cause is identified, this does not necessarily hold true for other settings: there is a lack of external validity. Nevertheless, all these studies warn us to be aware of the possibility of a quality gap during off-hours compared to daytime, particularly with respect to the presence of an intensivist during the night. However, Kerlin and colleagues [13] recently demonstrated that mortality was not influenced by the presence or absence of intensivists during the nighttime. Recently, a meta-analysis, including 52 out of 16,774 citations, evaluated whether intensivist staffing patterns influence hospital mortality after ICU admission [14]. They showed that high intensity staffing is associated with lower mortality, which proved to be particularly related to the availability of an intensivist as part of the ICU team. However, given this type of organizational structure, no additional benefits could be demonstrated with respect to nighttime intensivist presence in the hospital. This suggests that the organizational structure involving an intensivist is the most crucial denominator for the reduction of mortality.

In the previous issue of *Critical Care*, Ju and colleagues report on a propensity score matching analysis evaluating the effect of admission time on mortality in an ICU in mainland China in a retrospective dataset [1]. They studied 2,891 ICU patients over a 3 year period; of these, 2,716 (94%) were daytime ICU admissions, which were compared to the other 175 (6%), who were admitted during the nighttime (defined as the period between 5:30 p.m. and 7:30 a.m.). They found that the patients admitted during off-hours had higher Acute Physiology Age and Chronic Health Evaluation II scores, prolonged stay in the ICU and higher ICU mortality. They suggest that their findings may be related to availability of intensivists and qualified residents and recommend reevaluation of their staffing model and training system.

Of course, several points could be raised when reading and interpreting their report. For instance, the authors report a low percentage of off-hour admissions when compared to other studies. This seems a bit odd, in particular since the period between 5:30 p.m. and 10 p.m. (evenings) will normally result in more unscheduled admissions than in the period between 10 p.m. and 7:30 a.m. Does this mean that patients were simply not

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identified when deteriorating in the wards because hospital staff were lacking, or because the staff were not adequately trained to recognize early warning scores? The chain of systems required to detect potentially critically ill patients - that is, trained and qualified personnel in the emergency room, in the general wards, and in the recovery room, and the availability of a medical emergency team - will all increase the number of acute ICU admissions during off-hours. Indeed, the authors show that patients admitted off-hours were more seriously ill with inherent increased ICU length of stay and hospital mortality. Another important factor may be their reported nurse to patient ratio in the ICU, which was 1:2.5. This is quite low when compared to most Western ICUs, where ratios are generally 1:1 or 1:1.5.

Despite the aforementioned points, it is intriguing to read about Chinese ICU staffing in relation to final outcome, not only because information of this kind is generally lacking, but also because the final results and conclusions of the authors are so similar to those reached when evaluating so-called Western ICUs. This underlines the general principle that we would all like to apply in our hospitals; that is, the availability of knowledgeable staff that are adequately trained to recognize and treat an acutely deteriorating critically ill patient as soon as possible. This requires not only the availability of onsite intensivists, but also training of all hospital personnel in logistics, including a medical emergency team. It will be interesting to follow developments in China in the years to come.

Competing interests

The authors declare that they have no competing interests.

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