Review

Crit Care Shock (2018) 21:148-150

The optimal ICU organizational structure

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A variety of intensive care units (ICU) staffing models exist, which to a large extent are based on local practice and economic factors rather than cost-effectiveness and the quality of care delivered. The organizational structure of ICU in the United States are usually classified according to two types of models, namely a low- or high intensity model, or an open- or closed ICU model. (1,2) In a low-intensity ICU, patients are managed by non-intensivists, however an intensivist may be consulted on some cases (open model), whereas in a high-intensity model intensivists are consulted on all patients (open model) or the intensivist assumes responsibility for the patient and directs all aspects of the care (closed model). The closed ICU structure is the predominant model in almost all Western nations. (3,4) There are significant organizational differences between open and closed ICU. Open units are those in which admission of patients to the ICU is uncontrolled and management of the patients is at the discretion of each attending physician (not an intensivist). Admissions are based on a first-come, first-served basis. As the attending of record does not have the time nor skills to provide “comprehensive critical care” he/she "portions off" the patients' care to a number of organ specific sub-specialists. This frequently results in conflicting treatment strategies. Furthermore, both accountability and responsibility are also portioned-off, with no physician assuming ultimate responsibility for the patients' care. Such a system is highly cost inefficient and not conducive to achieving optimal patient care. The role of the intensivist in an open unit is to attempt to achieve a balance between all the consultants involved in the care of the critically ill patient, and to attempt to prevent the patient from "falling through the cracks" due to the fractionated care.

Closed units are those in which the intensivist screens all admissions and discharges and assumes full responsibility for all aspects of the patients' forward in quality of healthcare and patient safety, it has put forth ICU physician staffing as one of its initiatives. (6) The key elements of the Leapfrog intensivist-physician staffing recommendations are that all ICU patients are managed or co-managed by intensivists and that intensivist coverage should meet the following standards: i) intensivists are present in the ICU during daytime hours 7 days a week, with no other clinical duties during this time, ii) they return >95% of pages within 5 minutes, and iii) they can rely on a physician (e.g. fellow or resident) or non-physician extender who is in the hospital and able to reach ICU patients in less than five minutes during non-daylight hours. It should be noted that the Leapfrog initiative does not require 24/7 in-house intensivist coverage.

Two competing factors need to be balanced when considering the length and type of on-call structure, namely continuity of care and the burnout syndrome. (7) Although the average length of stay of an ICU patient is 2 to 3 days, the length of stay of the more complicated patients with multi-organ dysfunction frequently exceeds 7 days. Frequent handovers result in breaks in communication and inconsistencies in care. Daily changes in intensivist coverage leads to highly fragmented care. Furthermore, the lack of continuity is very troubling to the patients’ family as well as the other members of the ICU team. On the other hand the burnout syndrome is a very real problem amongst intensivists, with long work hours and the ICU organizational structure being important predictors of this syndrome. (7,8) There is little data that 24/7 in-house intensivist coverage reduces mortality or improves patient outcomes. (9-11) Such a model is prohibitively ex-

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pensive and highly cost ineffective, increases the fragmentation of care and likely increases the risk of physician burnout. Furthermore, the nighttime intensivist model may not be feasible, given the strained intensivist physician workforce. (12) A recent position statement from the American Thoracic Society (ATS) states "our systematic review and meta-analysis suggests nighttime intensivist staffing is not associated with reduced ICU patient mortality. Other outcomes and alternative staffing models should be evaluated to further guide staffing decisions." (9) The optimal staffing model should be adapted to the specific characteristics of each hospital and each ICU within that hospital; however, day time intensivist staffing for "shifts" of 5-10 days, with resident/fellow or non-physician extender in-house at night and with nighttime intensivist availability, comes close to being the ideal model.

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