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Progress in Safety and Quality in ICU Care in the US?

Author

Charles G. Durbin,

Jr. MD, FCCM

President of the Society of Critical Care Medicine

cgd8v@virginia.edu

Scientific studies support delivery of ICU care by a multi-professional team of experts stationed at the patient's bedside. A looming shortage of healthcare providers in the United States will threaten ICU safety and quality.

Introduction

Evaluation of and increasing the quality of healthcare is an international issue. Patients, physicians, insurance entities and governments share a concern for improving quality and reducing cost of care. Each interested community has their own agenda but the common understanding is that the current system of care in the United States is neither consistently safe nor universally effective. The intensive care unit is of particular interest as the cost of intensive care is very high and the risk to life and limb from errors is great in the vulnerable patients cared for in ICUs.

Multi-Professional Teams Improve Care

The Society of Critical Care Medicine was founded over thirty years ago with the belief that having a multi-professional team of experts overseeing care at the critically ill patient's bedside is the optimal way to deliver safe and effective care. Scientific studies have overwhelmingly supported this hypothesis. Most strongly supported is the improvement in patient survival of having a board-certified intensivist involved with patient care and as leader of the multi professional ICU team.

In a systematic metaanalysis, Pronovost defined a "high-intensity unit model" as one in which there was a mandatory consultation with an intensivist on all ICU patients or all patients were managed by the critical care team, and a "low-intensity unit model" in which there was no required or only elective consultation by an intensivist (Pronovost et al. 2002). 16 of 17 published studies demonstrated lower hospital mortality with a high-intensity model compared to a low-intensity model. This difference was highly significant. The high-intensity model was also associated with shorter length of stays. No study demonstrated increases in mortality with a high-intensity model of staffing in place. This metaanalysis included all papers between 1979 and 2000, and the selected 27 studies comprised over 27,000 critically ill adults and children.

Critical Care Nurses' Team Contribution

Other studies have documented the value of having other expert members of the ICU team at the bedside. These individuals include critical care pharmacists, specially trained ICU nurses, and respiratory therapists. Each profession can bring state-of-the-art practice to care.

Nursing qualifications and workload have been associated with patient outcome. Nursing-to-patient ratios directly influence the incidence of preventable adverse events in ICU patients. In a paediatric ICU, factors that predicted unplanned extubations included patient agitation and a nurse-to-patient ratio of less than 1:1. Having a nurse-to-patient ratio of less than 1:2 in caring for patients following repair of an abdominal aortic aneurysm increased patient complications and length of stay in a study of Maryland hospitals (Pronovost et al. 2001). Using non-ICU trained nurses to care for patients with central venous lines inserted for hyperalimentation was associated with a higher line infection rate than when patients were cared for by ICU specialist nurses (Alonso-Echanove et al. 2003). Providing additional nursing hours reduced errors even when the extra staff members were not ICU trained (Binnekade et al. 2003). This was due to allowing ICU trained nurses to concentrate on the higher level, more risk-prone activities. Nursing inexperience contributed to at least half of the more than 1400 adverse events reported in the Australian survey of ICU outcomes study (Morrison et al. 2001).

Respiratory Therapists for Quality Care

Critical care respiratory therapists have contributed in important ways to ICU care. The use of patient-driven protocols for increasing and

withdrawal of respiratory support has shortened duration of mechanical ventilation and reduced the incidence of ventilator associated pneumonia (VAP) in critically ill patients, by promoting consistency in ventilation (Ely et al. 1999; Restepo et al. 2004). These protocols are developed locally, are collaborative and supported by the team. They include state-of-the-art ventilatory care recommendations, which are continually updated as knowledge increases. Identification and reduction of risk factors for the development of VAP is an area of respiratory care in which large gains have been made. Use of inline suction devices and reducing the frequency of ventilator circuit changes has saved money and reduced VAP (MacIntyre 2005; Stamm 1998). Instituting therapist-initiated daily spontaneous breathing trials has the potential for further shortening the duration of mechanical ventilation and reducing morbidity (Ely et al. 1996).

Pharmacists' Contributions

Many of the errors occurring in the ICU are from drugs. Preventable adverse drug events (ADEs) are more frequent in the ICU than on acute patient wards. ADEs occur as high as 19 per 1000 patientdays in the ICU (Cullen et al. 1997). Adding a senior pharmacist to the ICU rounding team reduces this problem. In one unit, the ADE rate fell 66% following addition of a pharmacist to ICU rounds (Leape et al. 1999). See also Dr Bourne's article on the developing role of critical care pharmacists in the UK in this issue of **ICU Management**.

Team Interaction Impacts Quality

While most benefits of care by a multiple professional team have been shown with individual members, the question remains whether the team actually makes a difference. In reporting the actual to predicted mortality in the 13 units used for the original APACHE data set, one unit was found to perform significantly better (only 41 deaths when 69 were predicted) and one unit was significantly worse than average (58% more deaths than predicted; Knaus et al. 1986). Comparison of the organization of care in these units demonstrated increased coordination of care at the better performing unit. Physicians and nurses worked better together in the best unit. When caregivers work as a team, patient outcome improves.

Zimmerman and colleagues studied structural and organizational characteristics of nine ICUs selected for their different performance in patient mortality and efficiency (Zimmerman et al. 1993). Superior units demonstrated patient-centred culture, strong medical and nursing leadership, effective communication, coordination of care, and an open, collaborative approach to problem solving and conflict resolution. The best units experienced more than the average amount of conflict, but they had effective and open means for achieving resolution. No particular structure in this observational study was predictive of superior performance, but the factors in table 1 were associated with unit performance.

Caregiver Shortages Threaten Quality

Despite the accumulation of supportive data, little progress has been made towards increasing the number of ICUs with an intensivist led team of dedicated experts. A recent survey by the American College of Critical Care Medicine noted that only 25% of general medical/surgical ICUs had a full-time, board-certified intensivist as a medical director. This is little changed from a survey in 1991 (Groeger et al. 1992). Less than 50% of physicians staffing the 5,800 US ICUs had any specialized training in critical care medicine and less than 25% of ICU nurses were ICU certified.

Increased demand for critical care beds has resulted in caring for a larger percentage of these patients outside traditional ICUs with resultant prolonged stays in post operative care units (PACU) and the emergency department. The number of ICU beds has expanded significantly since the survey of 1991; there are about 30% more ICU beds in the US now. This expansion may account in part for the failure of a larger percentage of beds to be staffed by certified practitioners.

The major threat to sustaining ICU quality is the diminishing workforce in the United States (Buerhaus et al. 2000). The average age of bedside caregivers continues to rise and exceeds 45 years for nurses. Retirement and burn-out are further affecting the quantity of ICU nurses (Chen and McMurray 2001; Odem 2000). There is a projected short fall in trained and certified intensivists and fewer individuals in the US are entering the medical workforce (Ewart et al. 2004). This is an ongoing and increasing issue for all concerned parties that will affect quality and safety of critical care treatment in the future.

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