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Changing the Organization of ICUs in American Combat Support Hospitals

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The rapid development of novel diagnostic and therapeutic technology found in the evolving stateof- the-art intensive care unit (ICU) requires specialized knowledge, training and skills. Since the inception of the first ICUs in the 1960s, several studies have identified significant improvements not onlyin mortality, but also in hospital/ICU length of stay (LOS) and resource utilization in intensivist-directed or closed ICU models (Blunt and Burchett 2000; Brown and Sullivan 1989; Carson et al. 1996; Hanson et al. 1999; Manthous et al. 1997; Pronovost et al. 1999; Pronovost et al. 2002). Pronovost et al. evaluated the effect of ICU organizational characteristics and found that a large factor in mortality was the lack of intensivist ICU rounds (Pronovost et al. 2002). He noted a threefold increase in deaths, as well as increased risk of cardiac arrest, acute renal failure, septicemia, platelet transfusion and reintubation (Pronovost et al. 2002). Despite these studies, the role of intensivists in organizational models continues to be debated.

The role of intensivists in organizational models is less clear in the modern American Combat Support Hospital (CSH), the highest level of American medical care available in a combat zone. The CSH must manage the full spectrum of combat injuries, including resuscitative surgery, damage control surgery, postoperative care and evacuation for coalition troops, as well as care for host nation personnel. The modular CSH is transportable by semitrailer, railcar, air cargo or ship and include ICUs that can be configured for as many as 96 patients (Burris et al. 2004). Despite the large critical care bed capacity, current organizational characteristics of the CSH do not include critical care physicians and equipment for advanced critical care monitoring. Until recently, the optimal organizational model for a CSH ICU during war operations had not been evaluated.

The development of optimal ICU models, however, has recently been highlighted secondary to interests and efforts dedicated to developing a combat theater trauma system. Probably as a result of improved personal protective equipment and the development of a trauma system, killed in action (KIA) rates, which during previous conflicts ranged from 15-25%, have decreased to less than 12% during Operation Iraqi Freedom (Holcomb et al. 2006). Unfortunately, the number of patients who died of wounds (3-6%) may be increasing and now account for over 20% of all casualties (Holcomb et al. 2006). Today, as a consequence of decreased KIA rates, larger numbers of critically ill patients survive to the CSH. Proportionally increased numbers of casualties subsequently die of potentially preventable death from battlefield injuries in the ICU. In a recent study we performed, the rate of ICU admissions from trauma-related combat injuries was 35% (Grathwohl et al. 2006). By contrast, in civilian centers that manage trauma primarily related to motor vehicle crashes, stab wounds and lower-velocity gunshot wounds, less than 20% of civilian trauma patients are admitted to the ICU (Grathwohl et al. 2006). These factors make optimal ICU care in the CSH imperative to realize continued improvements in survival of combat injured patients.

As a result of this imperative, we also compared organizational differences at a CSH in Iraq to evaluate mortality. First, we compared the effectiveness of both intensivist consultation and intensivist- directed teams to a total lack of intensivists. We found that mortality decreased more than 10% when an intensivist consultant model was implemented and almost 15% with an intensivist-directed ICU team model. Additionally, compared to the no-intensivist group, ICU length of stay was decreased by two days with the presence of an intensivist-directed ICU team. The resultant reduction in mortality was over 35% when ICU-directed teams were compared to an intensivist consultation (Grathwohl et al. 2006). While many surgical and medical therapies occur simultaneously, and it is difficult to definitively determine which of these resulted in improved outcomes, undoubtedly the presence of an intensivist makes a difference. As a result, intensivists are now deployed to the busiest CSHs to act as consultants or develop teams and have also been included in the organization of the medical re-engineering intitative (MRI) CSH, scheduled to deploy in 2010.

The Army is also exploring alternative solutions in the future to provide optimum care on the battlefield, including adopting novel technologies such as the electronic ICU (eICU) and remote presence, wireless robotic telemedicine technology. High acuity, utilization of important resources and optimum care provision makes the organizational characteristics of the ICU an important factor in the continued development of an Iraqi Theater Trauma system.

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