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Transforming Care in the Intensive Care Unit

Practitioners in intensive care units (ICU) are challenged to deliver care to critically ill patients presenting with a wide variety of diagnoses and co-morbidities. Care in ICUs should be based on the best evidence-based literature (EBL) available and delivered by a collaborative team of practitioners working from the same 'framework'. This implies a unified, consistent approach to patient management embedded in a work environment that promotes interdisciplinary respect and collaboration amongst all practitioners. ICU nurses are consistently present at the bedside of critically ill patients and are vital members of this interdisciplinary team. Their skills, clinical insight, and critical decision-making transform the evidence based protocols and physician orders from paper to practice.

Optimising the ICU nurse's presence at the bedside with physician ordered nurse-driven protocols enhance the power of the interdisciplinary team to achieve coordinated, collaborative patient care leading to improved patient outcomes. In 1997, Mission Hospital's (Mission Viejo, California) Trauma/Neuro Surgical ICU team acknowledged the need to change the practice environment. Outcomes for patients with severe traumatic brain injury (TBI) were less than optimal with a high mortality and morbidity in this population (Palmer et al. 2001). Upon analysis of practice patterns, there was great disparity amongst physician providers in delivering care and a lack of team guidelines based on the scientific literature. ICU nurses identified diverse practices for managing increased intracranial pressure (ICP) due to individual physician preferences. This led to confusion amongst team members and an inconsistent approach to a multitude of patient management issues. With the hiring of a Neuro/ICU advance practice nurse (APN), meetings were held to discuss changing the environment of care. The team focussed on creating a collaborative practice team by unifying management strategies, translating evidence- based guidelines into hospital-based protocols, integrating standardised physician order sets, and developing nurse driven protocols with critical thinking algorithms.

Transformation of Care

Following a retrospective review of 3 ½ years of severe TBI patients and identification of a high mortality and morbidity, a group of physicians, nurses, pharmacists, and respiratory therapists met to review the Brain Trauma Foundation (BTF) "Guidelines for managing severe TBI" (Bullock et al. 1995). Consensus was obtained amongst the practitioners to translate the BTF guidelines to practice and standardise care amongst all practitioners. Neurosurgeons, trauma surgeons and intensivists agreed on the major treatment goals for severe TBI. New technology was introduced including monitoring oxygen levels in the brain. Pre-printed physician order sets were created. Education of all team members occurred with 24/7 support provided by the Neuro/Critical Care APN. A TBI nurse competency was developed by the nursing leadership team and nurses were selected based on the skill, ability to critically think and problem solve. Physician ordered nurse-driven protocols were implemented. Critical thinking algorithms were developed, tested and implemented to enhance decision-making at the bedside. These algorithms are continually revised as new knowledge, technology, or changes in the EBL occur. Consultation with the Neuro/Critical Care APN facilitated decision making by the bedside nurse. Prospective data collection began in June of 1997 and is ongoing today. Results of this approach led to a statistically significant improvement in patient outcomes with a reduction in mortality (43% to 14%) and severe disability (30% to 14%) and an increase in good outcome/moderate disability (27% to 72%) (Palmer et al. 2001; Bader et al. 2008).

The use of nurse driven protocols was expanded to other facets of care in the neurosurgical population. The TBI protocol mandated the maintenance of normothermia, core body temperature of 37 degrees Celsius, for the first seven days of the patient's ICU stay. Temperature control was difficult due to technology shortcomings as well as shivering. With the introduction of a pad based wrap system to maintain temperature at a constant rate and adoption of a protocol from Columbia Hospital (New York, USA) (Badjatia et al. 2008; Mayer et al. 2004; Badjatia et al. 2007; Mayer 2008), the nursing staff has been consistently successful in maintaining normothermia. The translation of the Columbia's protocol to Mission Hospital's physician ordered nurse-driven shivering protocol involved holding a consensus meeting with neurosurgeons, trauma surgeons, intensivists and nurses to agree upon a step-by-step approach (see Figure 1) to physical and medication interventions to counter shivering and maintain normothermia in the critically ill neuro patient population.

In the aneurysmal subarachnoid haemorrhage (SAH) population, a protocol was developed outlining major care issues and monitoring priorities. One of the most frequent potential complications associated with aneurysmal SAH leading to increase morbidity and mortality is vasospasm (Bederson et al. 2009). The complex management of these patients requires the interdisciplinary team to assess, monitor, intervene, and evaluate for vasospasm. Using the clinical exam in awake patients and invasive technology such as transcranial dopplers, ICP monitors, brain tissue oxygen monitors, and cerebral blood flow monitors in patients with a decrease level of consciousness requiring intubation for airway support, the team outlined important components of an aneurysmal SAH protocol. In order to assist with the translation to the bedside, critical thinking physician-ordered, nurse-driven algorithms were developed and implemented. This approach has led to consistency in care and trouble shooting of clinical scenarios.

Discussion

The use of nurse-driven protocols in critical care has been explored in the literature. In 2003, researchers explored the use of a nurse-driven protocol that allowed the nurse to select and start age-appropriate interventions to control procedural pain in paediatric patients in the emergency department (Meunier-Sham and Ryan 2003). The researchers used a computerised pre-established order set, which was initiated by a physician ordering "PainFree Measures per Protocol". By providing the nurses with the protocol and orders for PainFree Paediatric agents, the team was able to avoid delays in procedure start times by facilitating the achievement of a pain free intervention (Meunier-Sham and Ryan

2003). McKendry et al. 2004 studied whether using a nurse delivered protocol to optimise postoperative circulatory status in the early hours following cardiac surgery compared to standard perioperative care where the nurses would call for individual orders decreased ICU/hospital length of stay. The study results showed a trend towards fewer complications and lower ICU length of stay in the nurse delivered protocol group (McKendry et al. 2004).

In the mechanically ventilated patient population, there are several published studies on strategies using a nurse/therapist driven protocol for weaning patients from mechanical ventilation (Ely et al. 2001; Marelich et al. 2000; Dries et al. 2004; Tonnelier et al. 2005). These studies have found nursedriven protocols safe, reduced mechanical ventilation days and ICU days, reduced ventilator associated pneumonia, and decreased complications.

Studies exploring the use of a nurse-directed protocol with regards to controlling hyperglycemia in critical care resulted in good control of elevated serum glucose with few hypoglycemic episodes. Strategies included physician pre-printed orders with ranges for treatment of elevated serum glucose with insulin as well as computerised protocols with set ranges for treatment (Meynaar et al. 2007; Osburne et al. 2006).

These studies provided validation to the use of a well-constructed hospital based protocol that provides physician directed, nurse-driven interventions used in the ICU. Mission Hospital's experiences with the implementation of these strategies have led to improved outcomes and increased nurse satisfaction.

Conclusion

Properly constructed, evidence based hospital protocols that provide ICU nurses with physician-ordered, nurse-driven interventions enhance the ability of the critical care team to deliver optimal care to the ICU patient population. The interdisciplinary team of practitioners possesses the ability to transform care in the ICU through collaboration and the translation of the scientific literature to practice.

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