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Using an evidence-based care bundle to improve Thai emergency nurses' knowledge of care for patients with severe traumatic brain injury

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ABSTRACT

There is known variation in Thai nurses' knowledge regarding the best available evidence for care of patients with severe traumatic brain injury. The purpose of this study was to examine the impact of an evidence-based care bundle on Thai emergency nurses' knowledge regarding management of patients with severe traumatic brain injury. A pre-test/post-test design was used. The study intervention was an evidence-based care bundle for initial nursing management of patients with severe traumatic brain injury. Data were collected from 31 Registered Nurses using multiple choice questions. Results revealed a statistically significant improvement in overall knowledge scores after care bundle implementation ($p < 0.001$). There were statistically significant improvements in five areas of knowledge: understanding of target end-tidal carbon dioxide levels ($p < 0.001$), implications of hypocapnia in severe traumatic brain injury ($p = 0.01$), implications of hypercapnia in severe traumatic brain injury ($p = 0.02$), importance of maintaining head and neck in neutral position ($p = 0.05$), and administration of sedatives and analgesics in severe traumatic brain injury ($p = 0.01$). This study suggested that implementation of an evidence-based care bundle improved emergency nurses' knowledge regarding management of patients with severe traumatic brain injury.

Introduction

Severe traumatic brain injury (TBI) is a major cause of mortality and disability in young adults around the world, and is involved in nearly half of all trauma deaths (WHO, 2006). The incidence of severe TBI varies greatly in different parts of the world, and ranges from 18 per 100,000 population in the US (Faul et al., 2010), 15 per 100,000 in Europe (Tagliaferri et al., 2006), and 12 per 100,000 in Australia (Crowe et al., 2010). In Asia, the mortality rate from TBI per 100,000 population varies from 20 in India to 38 in Taiwan (Tagliaferri et al., 2006). It is estimated that severe TBI comprises around 10–20% of all TBIs (Tagliaferri et al., 2006; Wu et al., 2008). Deaths and disabilities resulting from severe TBI not only have an effect on the individuals but also on their families (Blake, 2008; McCartan et al., 2008; Turner et al., 2010). Severe TBI is associated with great financial burdens for individuals, families and society (Berg et al., 2005).

Guidelines for the management of patients with severe TBI have been established in most Western countries (BTF, 2007a, 2007b; NICE, 2014; NZGG, 2007; SIGN, 2009). These evidence-based guidelines aim to improve the outcomes of all brain injury patients especially those with severe TBI. Implementation of the guidelines for the management of severe TBI has been shown to improve outcomes in terms of mortality rates, functional outcomes, length of hospital stay, and healthcare costs (Arabi et al., 2010; Faul et al., 2007; Gerber et al., 2013; Talving et al., 2013; Watts et al., 2004).

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In Thailand, incidence of hospitalisation from TBI is increasing (Bureau of Policy and Strategy, 2011), mostly due to road traffic injuries (Bureau of Epidemiology, 2007). The increasing number of persons suffering TBI and specifically severe TBI, means that the management of severe TBI is a continuing challenge for Thai emergency department (ED) clinicians who provide initial care for these patients. Thai emergency nurses play a vital role in the initial care of patients with severe TBI and frequently make independent decisions regarding the emergency care of patients with severe TBI. These decisions include patient positioning, cervical collar application, and type and frequency of physiological monitoring (Mittal et al., 2009; Price et al., 2003). Emergency nurses' decisions directly impact on patient outcomes and can either increase or decrease the risk of secondary brain injury (Gemma et al., 2002; Mittal et al., 2009; Price et al., 2003; Wong, 2000).

Currently, evidence-based guidelines for the management of severe TBI initially developed in Western countries have been adapted for use in Thai ED settings (Somporn and Ratanalert, 2011), however, the guidelines to date focus on physician care. Nursing practice based on evidence-based standards requires nurses to be knowledgeable about research findings supporting their areas of expertise (McNett et al., 2010). However, research has shown variation in Thai nurses' knowledge regarding the best available evidence for management of patients with severe TBI (Damkliang et al., 2013). The major areas of knowledge deficit shown in this study were target end-tidal carbon dioxide ($ETCO_2$) monitoring, administration of sedatives and analgesics, and nursing interventions to prevent complications following severe TBI, and suboptimal clinical care in these areas puts patients at risk of harm particularly increased intracranial pressure and risk of secondary brain injury.

Care bundles are one strategy to increase integration of research evidence into clinical practice and facilitate healthcare providers to deliver optimal patient care (Resar et al., 2012). The term 'care bundle' is defined as a small number of evidence-based practice elements; generally limited to three to five key elements, which, when executed together, result in better outcomes than when implemented individually (Resar et al., 2012). Care bundles are being used in emergency care in Australia, United Kingdom, Ireland, the Netherlands, and Singapore to improve the care of patients with stroke and transient ischemic attack (NICS, 2009; Weeraratne et al., 2010), sepsis (Kuan et al., 2013; Nguyen et al., 2011; Tromp et al., 2010), cardiac arrest (Nolan and Soar, 2008), chronic obstructive pulmonary disease (McCarthy et al., 2013), and acute asthma (McCreanor et al., 2012). Implementation of care bundles in emergency care has been shown to improve clinical outcomes (McCarthy et al., 2013; Tromp et al., 2010; Weeraratne et al., 2010).

Although several studies from Western countries have shown that care bundles can be effective in emergency care, little is known about the development and implementation of the care bundles for emergency care in low-income and middle-income countries. In particular, there are no published studies of care bundle use in Thai EDs.

Aim

The aim of this study was to examine the impact of the implementation of an evidence-based care bundle focused on the initial emergency nursing management of patients with severe TBI on emergency nurses' knowledge about caring for this patient group. For the purposes of the study, 'severe TBI' was defined as a Glasgow Coma Scale (GCS) score of 8 or less, and 'initial emergency nursing management' was defined as nursing care delivered to the patients with severe TBI from arrival to the ED until the patient was transferred to other departments.

Methods

Design

A pre-test/post-test design was used and the study intervention was an evidence-based care bundle for initial nursing management of patients with severe TBI. The study was approved by the Human Research and Ethics Committee (HREC) at Deakin University and the Research Committee at the study site. All nurses gave written informed consent.

Setting

The study was conducted in the ED at a regional hospital in Southern Thailand. The ED manages over 54,000 attendances per year; of these approximately 300 patients have severe TBI defined as GCS of 8 or less (BTF, 2007b). The ED at the study site uses a three category triage scale; emergency, urgent, and non-urgent. The majority of adult patients with severe TBI will be triaged as 'emergency' and received into one of two adult resuscitation bays. The adult resuscitation bays have capacity to continuously monitor oxygen saturation, cardiac rhythm, heart rate, and blood pressure (non-invasive). Each resuscitation bay has one ParaPac® transport ventilator and there is one end-tidal carbon dioxide monitor available for the whole ED.

Participants

All 37 emergency nurses working in the ED at the study site were eligible to be included in this study. In the pre-test period, 34 emergency nurses returned surveys giving a response rate of 91.9%, while 31 of the same emergency nurses returned surveys in the post-test period giving a response rate of 83.8%.

Study intervention

The study intervention was an evidence-based care bundle for the initial emergency nursing management of patients with severe TBI. This care bundle was developed by the researchers, focusing on four major elements of emergency care and using a primary survey approach: a) airway management and cervical spine protection, b) oxygenation and ventilation management, c) circulation and fluid balance, and d) disability and intracranial pressure management. Details of the care bundle development process are published elsewhere (Damkliang et al., 2014) and a summary of the care bundle is presented in Fig. 1.

Care bundle development and implementation was supported by key stakeholders, including the ED head nurse, the ED physician, the neurosurgeon, and the Advanced Trauma Life Support certified anaesthetist. Nursing elements recommended in the care bundle were summarised in a one page poster. Implementation strategies included group education sessions and one-on-one discussions. Two large posters of the care bundle were displayed at the area of adult resuscitation bays, while several smaller posters were presented on different education boards around the ED. Leaflets of the care bundle were also given to all nursing staff.

Survey development

Surveys were used to evaluate emergency nurses' knowledge of management of patients with severe TBI before and after implementation of the care bundle. In the absence of pre-existing published tools, the survey was developed by the researchers specifically for this study. The survey consisted of two parts: (i) demographic data and (ii) 21 multiple choice questions (MCQs).