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Nurses' Role in the Joint Theater Trauma System

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■ ABSTRACT

Nurses' role within the Joint Theater Trauma System's trauma performance improvement program spans the entire trauma continuum. Nurses serve as trauma nurse coordinators at combat zone medical treatment facilities, flight nurses within the US Air Force Aeromedical Evacuation system, multidisciplinary trauma teams at overseas and stateside military and Veterans Affairs

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■ KEY WORDS

Military, Nursing, Performance improvement, Trauma

Shortly after the terrorist attacks of September 11, 2001, the United States had vast numbers of soldiers committed to armed conflict with subsequent battlefield wounds. In response, the medical leadership of the joint military forces enacted a plan to develop and implement a trauma system modeled after the successes of civilian systems but modified to account for the realities of combat. Since the implementation of this Joint Theater Trauma System (JTTS), a trauma system director and a team of 6 trauma nurse coordinators (TNCs) have been sent to Iraq and Afghanistan to address trauma system components and initiate a formal system performance improvement process.¹ This article briefly describes the nurse's role within JTTS and highlights some of the nurse-facilitated trauma performance improvement initiatives that have helped reduce the casualty mortality rate. The casualty mortality of less than 1% once in the Aeromedical Evacuation (AE) system is in part due to the performance improvement initiatives within the JTTS.²

■ NURSES ROLES WITHIN THE TRAUMA CONTINUUM

Nurse involvement is present across the entire JTTS. Nurses serve as TNCs in far forward medical treatment facilities located in Afghanistan and Iraq, flight nurses within the US Air Force (AF) AE system, members of the multidisciplinary trauma team at Landstuhl Regional Medical Center (LRMC) in Germany, and staff members on trauma services across the Continental United States (CONUS) in both military and Veterans Affairs (VA) healthcare organizations.

Nurses serving within the JTTS use the essential elements of a concurrent performance improvement methodology to identify and reduce the occurrence of any potential care gaps across the trauma continuum. Given the significant numbers of patients with severe polytrauma, nurses provide continuous educational outreach programs addressing safe transport and clinical injury prevention. Clinical lessons learned, obtained from patient care settings, is used by nurses to develop and revise clinical practice guidelines (CPGs) targeted at reducing mortality and morbidity.

■ **TRAUMA NURSE COORDINATORS**

Trauma nurse coordinators serve as active trauma team members within the JTTS. Prior to deployment, TNCs receive military and civilian trauma training and the Trauma Outcomes and Performance Improvement Course—Military (TOPIC-M). This preparatory course takes the well-established concepts of the Society of Trauma Nurses “Trauma Outcomes and Performance Improvement Course” (TOPIC) and adds a military focus. The TOPIC-M course breaks down the performance improvement cycle from issue identification to issue resolution by using military case scenarios. Underscored during this course are practical strategies for implementing performance improvement processes and use of a multidisciplinary approach to improving patient outcomes. Trauma nurse coordinators use this training to help them manage the systemwide trauma performance improvement program and Joint Theater Trauma Registry (JTTR). An integral part of the trauma performance improvement program and the JTTR involves participation on a standardized weekly JTTS theater-wide patient teleconference. This “virtual medium” serves as an additional data source for the JTTR and provides a means to communicate near “real-time” patient feedback across the trauma continuum. Trauma nurse coordinators also ensure that all wounded patients are entered into the JTTR, initiating their tracking within the JTTS.

■ **USAF AEROMEDICAL EVACUATION**

Flight nurses and technicians working with flight surgeons evaluate patients prior to flight. Casualties are “stabilized” (airway secured, shock treated, hemorrhage controlled, fractures immobilized) prior to aeromedical evacuation, and then transferred out of Iraq and Afghanistan for further surgical and medical care by using the USAF fixed-wing AE system. Aeromedical Evacuation professionals are highly skilled, active duty guard and reserve flight nurses and AE technicians trained to safely transport patients on the USAF cargo aircraft configured and equipped to meet en route care requirements. The patient’s ability to tolerate the “stressors of flight” (barometric pressure changes, decreased

partial pressure of oxygen considerations, thermal stressors, decreased humidity, vibration, gravitational forces, noise, and fatigue) and en route care requirements during flight are determined. For patients requiring en route intensive care, a USAF Critical Care Air Transport Team, a US Army Institute of Surgical Research Burn Flight Team, or an LPMC Lung Rescue Transport Team augmentation is incorporated and staffed with specialty trained physicians, cardiopulmonary technicians/respiratory therapists, critical care, and emergency nurses.

■ **LANDSTUHL REGIONAL MEDICAL CENTER**

Aeromedical Evacuation patients on average are transported within 36 to 48 hours of their time of injury to LPMC in Germany, which is a level II trauma center. Landstuhl Regional Medical Center has served as the primary evacuation site for all combat casualties evacuated from Afghanistan and Iraq since 2003. While at Landstuhl awaiting transport to the United States, wounded warriors may undergo additional stabilizing surgeries and obtain additional wound care. Once stabilizing and definitive care is provided by the multidisciplinary trauma service at LPMC, patients are reentered (manifested) into the USAF AE system and regulated for transport to the CONUS. There they receive further medical, surgical, rehabilitative, and convalescent care by the military and VA healthcare systems, respectively.

■ **TRAUMA CONTINUUM OF CARE SYSTEM WIDE VIDEO TELECONFERENCE**

The Trauma Continuum of Care System Wide Video Teleconference (SWVT) is a virtual trauma care performance improvement initiative that integrates the multidisciplinary expertise of the triservice Department of Defense military and civilian trauma authorities with the Department of Veterans Affairs (VA) polytrauma center professionals. Participants are actively involved in the care of patients injured in Iraq and Afghanistan combat operations. The SWVT is a standardized monthly forum reporting across 12 time zones. It is designed to coordinate broad-reaching, system-wide process improvements, as well as provide constructive feedback and education. Topics of discussion are focused on clinical, medical technology, and healthcare-related logistic and administrative issues.³ Since the inception of the SWVT, there have been numerous clinical practice and policy improvements, as well as new medical technology and system-wide product integration. Many electronic working groups and clinical-related performance improvement initiatives have been led by nurses and have resulted in successful outcomes for the population of patients with polytrauma. The following is a snapshot of some of the nurse-facilitated trauma performance improvement initiatives that were represented on the SWVT.

Improved patient documentation

One recent nurse-initiated performance improvement effort was focused on documentation. The catalysts for this improvement initiative included inherent problems with multiple levels of care coordination, quick patient turnover, a population with high injury severity scores, combat zone considerations, and a multitude of timelines. The adaptation of the Joint Patient Tracking Application (JPTA, Akemika, Maui, Hawaii) software to serve as an interim electronic medical record medium was recommended by a trauma nurse at LRMC, resulting in increased accessibility to medical record data across the trauma continuum. The JPTA started as a Web-based patient tracking and management tool developed at LRMC for patients arriving from Iraq and Afghanistan. Today, the new version of the JPTA called the Theater Medical Data Store (TMDS) is being used to share patient data across the entire trauma continuum.

Aeromedical evacuation nutritional support

Malnutrition of the critically ill patient can have adverse effects.^{4,5} Providing uninterrupted nutrition to the wounded casualty throughout their evacuation process proved to be a challenge because of limited in-flight feeding capability and certain physiological issues (stressors) associated with flight. Although early enteral nutrition is preferred over the parenteral route, it is not without risks to the patient including aspiration.⁶ The concern of interrupting the postpyloric enteral feeding of critically injured patients during flight was presented to the SWVT. A truly collaborative approach between clinical nurses, physician specialists, dietitians, logisticians, the US Transportation Command leadership, and the USAF Air Mobility Command AE experts resulted in real-time changes in policies. Landstuhl trauma nurses led this collaborative effort with the use of an electronic working group to support collegial discussions and facilitate rapid policy change recommendations. The Air Force Instruction 41-307, AE Patient Considerations and Standards of Care, and clinical practice were updated to ensure patients requiring enteral feeding had the following items addressed prior to flight: distal placement of jejunal feeding tubes beyond the ligament of Treitz, a kidney-ureter-bladder radiograph to confirm jejunal tube placement 24 hours prior to flight, the addition of a nasogastric or oral gastric tube, continuous low-flow feeding delivery, and head forward placement on the aircraft to ensure patients' received nutrients to promote healing and recovery.

Skin breakdown prevention

Patients with polytrauma have a potential for skin breakdown and pressure-related alopecia while in the trauma continuum. Risk factors include periods of prolonged immobility, cervical spine clearance requirements, sedation

effects, edematous states, microcirculatory compromise and other comorbidities, etc. Nurses took an active role in developing and implementing a surveillance program to bring workable solutions to the system. Nurses initiated the use of a new NATO litter mattress during AE transports as well as the Waffle mattress in theater to improve patient comfort and prevent these problems. In addition, a VA clinical nurse specialist, in collaboration with a JTTS TNC, collected and reported data on wound-related findings and established the Wounded Warrior Pressure Ulcer Prevention Task Force with TNCs from Iraq, LRMC, Walter Reed Army Medical Center, National Medical Center Bethesda (US Navy), and Brook Army Medical Center.

Hypothermia prevention

A temperature drop below 97°F in patients with polytrauma can increase their risk of developing coagulopathies. The "lethal triad" (hypothermia, acidosis, and coagulopathy) can significantly increase mortality in the trauma population. Within the trauma continuum, there is the potential for a trauma patient to be exposed to low environmental temperatures while on helicopters, cargo aircraft, and during the winter months in Iraq, Afghanistan, and Germany. Nurses contributions to prevent hypothermia have included addition of a chemical heating blanket (Hypothermia Prevention & Management Kit, North American Rescue Products, Greer, South Carolina) to AE and USAF Critical Care Air Transport Team equipment packages, system-wide surveillance, and efforts to improve temperature documentation within the trauma patient's "golden hour."

Burn resuscitation

Volume resuscitation of patients with burn injury during the first 72 hours after injury is a significant challenge for providers at all levels. Both over- and underresuscitation of patients with burn injury can lead to serious complications (eg, abdominal compartment syndrome). The challenge is even greater as patients are transferred between facilities, which can be separated by a distance of several hundred to thousand of miles. Collaborative efforts to improve the process included a Web-based publication of consensus guidelines and development of a burn resuscitation flow sheet to be used during the first 24 to 72 hours after injury.⁷ Nursing is actively involved in the development, initiation, and compliance monitoring of this system-wide standardized burn flow sheet. This resuscitation tool has been vital in providing continuity in documentation, as well as system-wide standardization of care.⁸

Infection control consultation

Nursing professionals provide key infection control consultation within the trauma continuum. Nurse consultants have helped establish system-wide standard

operating procedures, policies, and program compliance monitoring for variances. Nurses are actively engaged in ventilator-associated pneumonia and combat-related associated pneumonia prevention across the trauma continuum with the implementation of best practices (closed suctioning systems, frequent oral care, subglottic suctioning capable endotracheal tubes, head-of-bed elevation, etc) and input for ventilator-associated pneumonia and infection control CPGs. In addition, a methicillin-resistant *Staphylococcus aureus* and *Acinetobacter* surveillance program was initiated by JTTS and VA nurses to help identify and track the incidence rates of colonization and active infection across the trauma continuum. The development of a Pin Care Protocol by VA nursing staff caring for patients with polytrauma has been disseminated system-wide, and it has led to a more consistent standard of care.

Pain Management

Nurses are involved in efforts to comfort patients with complex pain syndrome across the trauma continuum. Patients with polytrauma can have a wide variety of pain to include neuropathic, central, and phantom pain. Nurses have incorporated the use of a patient-controlled analgesia device for superior pain control during AE transports. With the incorporation of these portable patient-controlled analgesia infusion devices, AE nurses can safely deliver intravenous narcotics and regional nerve blocks during air transports. In addition, AE nurses recommended the implementation of a standardized pain scale (Wong-Baker FACES Pain Rating Scale),⁹ which has led to improved pain documentation accuracy across the trauma continuum.

Rehabilitation Efforts

In the area of rehabilitation, VA nurses are a vital resource for the comprehensive Family Task Force Program that is provided for families of the wounded warriors. Nursing aided in the design and application of clinical pathways (CPs) for families to help define their unique role in the rehabilitation process. Clinical pathways have a standardized process for orientation that includes Patient Rights and Responsibilities, grievance flow charts, Rancho Los Amigos Scale, and brain injury rehabilitation services. Additional VA nursing efforts include the creation of a *Rehabilitation Orientation Handbook* targeted at providing education for patients with head injury.

Traumatic Brain Injury

Nurses are actively involved in the screening and management of patients with traumatic brain injury (TBI). Using a standardized screening tool called the "Military Acute Concussion Evaluation (MACE),"¹⁰ which assesses

orientation, immediate memory, concentration, and delayed recall; nurses assist the Defense and Veterans Brain Injury Center staff with the screening of patients returning from Afghanistan and Iraq for cognitive deficits symptoms associated with mild TBI. Patients who screen positive with a MACE are transferred to a TBI center in the CONUS for further evaluation and rehabilitation services.

Summary

Nurses serve within the JTTS as coordinators, multidisciplinary team members, and as aeromedical evacuation crew. Nurses continue to be an invaluable source of trauma expertise throughout the trauma continuum. The positive impacts nursing make on improving patient care processes, policy refinements, and CPGs implementation are numerous. This article describes a few. With the use of telecommunication technology, federal and civilian nursing professionals from across multiple time zones can continue to meet virtually on the SWVT, and as members on this multidisciplinary team can positively impact the care and quality services provided to our returning wounded warrior.

The motto of the JTTS "right care, right place, right time, right patient" and that of LRMC "selfless services" epitomize the contributions of these nurses.

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