

Utilizing paramedics for in-patient critical care surge capacity

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Abstract

Introduction: While many hospitals have developed preliminary emergency department and in-patient surge plans, the ability to surge is often limited by critical resources. The resource which is often the most limited is usually the human resource and within this category the limiting factor is almost universally nursing. As a result, nursing shortages can result in an inability of a hospital or emergency department to create surge capacity to deal with large numbers of ill or injured patients. Utilizing paramedics in acute-care hospitals or at alternate care sites could serve as expansion staff to supplement existing nursing staff, allowing fewer nurses to care for a larger numbers of patients during a disaster, act of terrorism, or public health emergency. While the procedures performed for nursing do vary from hospital to hospital, there are national certifications for both emergency nursing (CEN®) and critical care nursing (CCRN®) that can be used to establish a standard for comparison.

Methods: A detailed review and curriculum mapping of the specific educational objectives and competencies of the US Department of Transportation National Standard Curriculum for the Emergency Medical Technician-Paramedic as well as the competencies and criteria for board certification as a Certified Emergency Nurse (CEN) and Critical Care Registered Nurse (CCRN) was performed.

Results: Approximately 90 percent of the CEN and CCRN knowledge skills and competencies are met or exceeded by the National Standard Paramedic Curriculum.

Conclusions: With appropriate training and orientation, paramedics may be used in an in-patient

setting to augment emergency and critical care nursing staff during a disaster, act of terrorism, or public health emergency.

Key words: surge capacity, paramedic, nursing, critical care, education, training, standard of care

Introduction

In 2003, the Institute of Medicine (IOM) Committee on the Future of Emergency Care in the United States Health System was formed to examine the strengths, challenges, and barriers to the effective delivery of emergency care in the United States. In 2007, the IOM released three reports summarizing their findings, analysis of the problems, and suggestions for moving toward a better system of emergency care delivery in the 21st century.¹⁻³ One specific report titled, "Hospital-based emergency care at the breaking point" detailed the problems of US hospitals in handling day-to-day operations and patient volume, as well as issues concerning emergency preparedness to respond to a disaster, act of terrorism, or public health emergency.¹

A particular issue that was discussed by the IOM committee was workforce shortages. In addition to certain types of specialty physicians, the committee discussed the shortage of registered nurses, particularly in the emergency department. They stated that this is a problem that can "disrupt hospital operations, complicate attempts to deal with ED crowding..." and ultimately is "detrimental to patient safety and quality of care."¹ Although the IOM points out that the nursing shortage is an important factor in providing emergency care, it is also a major impediment to surge capacity for disasters, terrorism, and public health

emergencies. In fact, hospitals and healthcare facilities have developed internal coping mechanisms to deal with the shortages. These conditions contribute to a general lack of readiness and lack of capacity of hospitals to respond to the community's needs during a disaster, act of terrorism, or public health emergency.

During a major incident, these problems are compounded and day-to-day nursing shortages can result in the inability to create surge capacity necessary to deal with large numbers of ill or injured victims. This is not only true for emergency departments but also for the entire hospital. Reports have described the issues complicating staffing during catastrophic disasters.⁴ The inability or willingness to report to duty during these events may result in critical understaffing that could impact the health system's ability to respond to a medical crisis. Identifying appropriate practitioners who may augment the nursing staff during disasters is essential in mounting an effective response to these incidents.

Utilizing paramedics in acute-care hospitals or at alternate care sites could serve to increase the patient care capacity by supplementing healthcare staff, thus allowing fewer nurses to care for a larger numbers of patients. Paramedics are routinely supervised by emergency physicians and trained to operate independently in austere conditions with little supervision and to perform highly skilled medical procedures similar to many of those performed in a hospital by an emergency or critical care nurse or emergency physician. Studies have shown that the majority of paramedics would be willing to perform additional duties during disasters when EMS services are not required.⁵⁻⁷

The competencies required of a nurse and the procedures they would be allowed to perform in a critical care unit or emergency department may vary from hospital to hospital. As a result, it is important to determine what would be considered a minimum national standard for emergency and critical care nursing. This information could be obtained from either a national professional organization or a national certifying examination. The professional organization for emergency nurses is the Emergency Nurses Association (ENA) and the American Association of Critical-Care Nurses (AACN) for critical care nurses. In addition to these

professional organizations, there are recognized national certifications for both these areas. The certifications are the Certified Emergency Nurse (CEN) and Critical Care Registered Nurse (CCRN). These board certifications provide the best national standard of competency, education, and procedural knowledge for these two areas of nursing. There is no equivalent national certification for a general staff nurse, but as both the CEN and CCRN state that they demonstrate additional competencies that are built upon core training as a general staff nurse, one could reasonably state that if meeting the educational standards of the CEN or CCRN level, a provider could function at the general staff nurse level.

This investigation attempts to identify the knowledge gaps between the paramedic and critical care nursing scope of practice to determine what training and continuing education programs would be necessary to utilize paramedics in an in-patient setting during surge conditions.

Methods

To determine where competencies and procedural knowledge are the same and where knowledge gaps exist in the education and procedural training of the paramedic when compared with an emergency or critical care nurse, we first undertook an assessment of the competencies and procedural knowledge for each of these professions. For the EMT-Paramedic, we analyzed the EMT-Paramedic National Standard Curricula provided by the US Department of Transportation. While each state has the right to create state-specific curricula, the National Standard Curricula serves as the basis for each state-approved curriculum and provides the minimum level of knowledge, skills, and abilities required by each state for licensure or certification. Therefore, while a paramedic in a state may be trained to a level higher than the National Standard Curricula, all paramedics would have (at a minimum) the knowledge, skills, and abilities contained in the National Standard Curricula. In addition, the US DOT National Standard Curricula forms the basis for the National Registry of Emergency Medical Technicians (NREMT) paramedic examination, which is a national "board certification" as an EMT-Paramedic used by the majority

of states as the certifying/licensing examination for paramedics.

For nursing, we needed to determine minimum competencies and procedural knowledge for emergency and critical care nurses. It is recognized that the exact competencies and knowledge vary from hospital to hospital but there are national benchmarks we can use for comparison and analysis. These benchmarks are obtained from professional organizations and national certifying examinations. For many nursing disciplines, there exist national certifications that provide recognition of achieving and maintaining predetermined and standardized levels of education and competency. For emergency nurse, the national certification is Certified Emergency Nurse (CEN®), and for the critical care nurse, it is the Critical Care Registered Nurse (CCRN®).

Both the ENA and the Board of Certification for Emergency Nursing (BCEN) were contacted and requested to provide a list of the professional competencies necessary to become board eligible as a certified emergency nurse. Similarly, the AACN was also contacted and asked to provide a list of the professional competencies necessary to become board eligible as a certified CCRN. Requests for information were promptly responded to by the ENA. Although we were told that "...there are no emergency nursing competencies published by ENA at this time," we were provided with a scope of emergency nursing practice document and a detailed exam content outline that details the explicit knowledge and content areas tested on the CEN examination.^{8,9} Requests for information on educational competencies were not responded to by the AACN, but for critical care nurse candidates, a detailed CCRN exam review handbook with a section that outlines the specific content areas covered on the CCRN exam was available.¹⁰ As a result, for both emergency nurse and critical care nurse, the competency and certification requirements for the CEN and CCRN were used to determine the minimal national standard for competency and procedural skill knowledge.

A detailed crosswalk was performed using the specific educational objectives and competencies of the US Department of Transportation National Standard Curriculum for the Emergency Medical

Technician-Paramedic versus the competencies and criteria for board certification as a CEN and CCRN. This included competencies provided by the nursing organizations being cross referenced to the learning objectives and content knowledge present in the National Standard Paramedic Curriculum. Areas of cognitive, affective, or psychomotor disagreement between the nursing competencies and the paramedic objectives were recorded and analyzed to determine knowledge gaps. Results are presented as paramedic curriculum vs CEN competencies and paramedic curriculum vs CCRN competencies.

Results

CEN® vs Paramedic

The CEN outline contained specific cognitive, affective, and psychomotor objectives assessed during the CEN examination. Of a total of 210 objectives, 186 (88.9 percent) were met or exceeded by the National Standard Paramedic Curriculum.

Of the knowledge and skills of the CEN that were not covered in the National Standard Paramedic Curriculum, approximately two-thirds were associated with assisting physicians with in-hospital procedures, three involved the administration of non-prehospital medications, and three involved patient education. The specific content areas to the CEN that do not appear in the National Standard Paramedic Curriculum are listed in Table 1.

Four content areas for the CEN that are partially but not totally met by the National Standard Paramedic Curriculum involved the collection of evidence from sexual assault victims, the administration of stroke scales, the collection of specimens for laboratory analysis, and the interpretation of laboratory results. The specific content areas to the CEN that were partially met by the National Standard Paramedic Curriculum are listed in Table 2.

CCRN® vs Paramedic

As mentioned earlier, the AACN did not respond to a formal request for information on CCRN educational competencies; however, their web site contains a detailed CCRN exam review handbook with a section which

Table 1. CEN content areas not met by the National Standard Paramedic Curriculum
• Assist with insertion or arterial line
• Monitor arterial line pressure
• Assist with open thoracotomy
• Administer fibrinolytic (thrombolytic) infusions
• Assist with pericardiocentesis
• Assist with focused abdominal sonogram for trauma (FAST)
• Prepare vaginal or cervical specimens
• Administer gynecological pharmacologic agents
• Irrigate ear canals
• Teach crutch-walking techniques
• Assess patency of dialysis arteriovenous fistula
• Prepare and manage patients undergoing joint aspiration
• Prepare and assist with application of wound adhesive
• Perform arterial puncture for arterial blood gas sample
• Manage chest tube drainage system
• Teach pain management techniques
• Implement discharge planning
• Administer banked blood products
• Perform autotransfusion
• Assist with lumbar puncture

outlines the specific content areas covered on the CCRN exam.¹⁰ This outline was used in lieu of a formal competency document provided by the AACN. Of a total of 195 content areas, 179 (91.8 percent) were met or exceeded in the National Standard Paramedic Curriculum.

Of the knowledge and skills of the CCRN that did not appear in the National Standard Paramedic Curriculum, about half involved the monitoring and care of postoperative patients and the remainder discussed pathophysiologies not often seen in the pre-hospital arena. The specific content areas of the CCRN that do not appear in the National Standard Paramedic Curriculum are listed in Table 3.

Table 2. CEN content areas partially met by the National Standard Paramedic Curriculum
• Collect forensic evidence from sexual assault victims Limited to clothing and on-scene evidence
• Administer stroke scale Cincinnati and Los Angeles Not NIH
• Collect specimens for laboratory analysis Limited to blood
• Interpret laboratory results Generally limited to glucose, arterial blood gasses (when available), and ETOH

Three content areas for the CCRN that were partially met by the National Standard Paramedic Curriculum involved active invasive monitoring of intracranial pressure and pathophysiologies only partially covered in the paramedic curricula. The specific content areas to the CCRN that were partially met by the National Standard Paramedic Curriculum are listed in Table 4.

Discussion

Although there are clearly knowledge gaps between the education and training of the CEN, CCRN,

Table 3. CCRN content areas not met by the National Standard Paramedic Curriculum
• Cardiac surgery (postoperative management)
• Hemodynamic monitoring (invasive)
• Thoracic surgery (postoperative management)
• Diabetes insipidus
• Syndrome of inappropriate secretion of ADH
• Organ transplantation (postoperative management)
• Hyperbilirubinemia
• Anemia of prematurity
• Spinal fusion
• GI surgeries (postoperative management)
• Congenital renal-genitourinary abnormalities
• Hemolytic uremic syndrome
• Neurosurgery (postoperative management)

Table 4. CCRN content areas partially met by the National Standard Paramedic Curriculum
• Cardiomyopathies (eg, hypertrophic, dilated, restrictive, idiopathic)
• Intracranial pressure (ICP) monitoring
• Encephalopathy (eg, hypoxic-ischemic, metabolic, edema, infectious)

and the paramedic, they do not appear to be insurmountable. The majority of these are not likely to overlap with care provided during times of disaster, terrorism, or public health emergencies. These competencies and skills that a paramedic does not possess may be required for patients who are in the hospital unrelated to disasters, terrorism or public health emergencies but would not represent patients who would be assigned to a paramedic. In the cases where knowledge or skill gaps exist that would need to be utilized to help provide hospital care for patients from the disaster, act of terrorism, or public health emergency, we could most likely bridge these with advanced or in-time training or targeted continuing education programs.

In assessing the CEN knowledge gaps, it appears that for mass trauma events, the paramedic would need additional education and training on assisting physicians with invasive procedures they are not familiar with. During other types of disasters or public health emergencies, there seem to be no significant differences in the scope of practice of the CEN and the paramedic. In assessing the CCRN knowledge gaps, it appears that monitoring postsurgical patients would present the most significant challenge to the paramedic. During other disasters or public health emergencies, there seem to be no significant differences in the scope of practice of the CCRN and the paramedic. In addition, as the paramedic operates so closely with the ED staff and they are required to complete the majority of their clinical training hours in the ED, they may more easily adapt to functioning in an emergency department versus a critical care floor.

Because of the specific nature of the knowledge gaps shown in this analysis, creating specified in-time training for the paramedic to operate in the ED and/or

critical care unit may be quite simple. In attempting to bridge these knowledge gaps it is helpful to know what existing continuing medical education (CME) courses are available that may be taken prior to an event. Existing CME programs that begin to address some of these issues include: the Critical Care Emergency Medical Technician Paramedic Program (CCEMT-P), Advanced Trauma Life Support (ATLS), and the Trauma Nursing Core Course (TNCC). However, the two latter programs are typically designed and intended exclusively for physicians and nurses, respectively. ATLS, however, has specifically allowed paramedics to audit the course; it is unclear what enrollment barriers may exist for the TNCC program. Education programs, in general, designed to bridge these knowledge gaps should be focused on assisting physicians with invasive procedures in the ED as well as education on the identification of postoperative complications and their management, as these represent the two largest knowledge gaps between the paramedic and CEN/CCRN scope of practice.

Although we acknowledge that a paramedic is not a nurse, in further validating our hypothesis that paramedics could function (with additional training) as nurses during a disaster, future studies may look more closely at the educational differences between the CEN, CCRN, and paramedic. An evaluation of paramedics taking the CEN and/or CCRN examinations before and after receiving various CME or in-time training programs may allow us to more specifically identify knowledge gaps and improve future training programs designed to allow paramedics to act as in-patient surge staff during a disaster.

Limitations

For the purposes of this curriculum mapping project, we assumed that the knowledge objectives provided by ENA/BCEN accurately reflect the actual scope of practice of the CEN and as such are an acceptable surrogate for a national minimum standard for emergency nurses. We have no reason of belief that this assumption is inaccurate but it still reflects a surrogate marker.

Similarly, we used the educational competencies of the CCRN as a surrogate for the national minimal standard for critical care nurses. This assumption also

appears to be valid but could be faulty if a different set of educational competencies exists that differs from that of the CCRN examination and that is listed for the CCRN examination by AACN; however, this does seem unlikely.

Additionally, the US DOT National Standard Paramedic Curriculum was last updated in 1998. Although this curriculum is still adhered to in the initial provider training of the paramedic, advances in standards of care have evolved, and through continuing education such as ACLS and PALS as well as PHTLS/ITLS, etc, we find that the typical NREMT-P has a higher level of knowledge through their supplemental required education than through the DOT curriculum alone. This may have led to an underestimate of the objectives met by the paramedic curriculum, but would have not under any circumstance led to an overestimate of their knowledge, skills, or abilities.

Lastly, while competency, certification standards, and content outlines may define general minimal standards, they do not reflect the competency or skill knowledge of any individual provider. This applies to all professionals in healthcare as we can only plan for a "generic" provider and then have systems to address those individuals who might not be able to meet the minimal expectations of this generic provider.

Conclusions

Paramedics are not replacements or proxies for board certified registered nurses. However, in the reality of healthcare preparedness planning and with the data available on absenteeism and the ability and willingness of hospital workers to report to work during a disaster, act of terrorism, or public health emergency, paramedics may be a suitable resource to assist in bridging the staffing shortages and meeting patient care needs. Paramedics do lack experience in assisting with surgical procedures, the monitoring of postoperative patients, and the interpretation of laboratory values. In these areas, appropriate pre-event as well as in-time training would be essential to meet knowledge gaps. Paramedics are adept at providing patient care without direct supervision and upon the verbal and standing orders of a physician. In this way, they can be utilized when staffing levels are low and physicians

may be overwhelmed or temporarily unreachable. Considering these providers, particularly in the setting of a hospital-based EMS system, to provide surge staffing in an in-patient environment or alternate care setting may assist healthcare emergency planners in meeting critical staffing needs during a major incident.

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