

Baccalaureate Emergency Medical Services Education in North Carolina: History, Challenges, and Opportunities

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Emergency medical services (EMS) is a critical component of the public health response system, treating and transporting 25 to 30 million patients per year.¹ The number of patients treated by EMS is expected to continue to increase, and for some of these patients, their prehospital treatment will have a dramatic impact on their clinical outcomes. Consequently, a well-educated and competent prehospital workforce is an essential component of community health.

Prior to 1976 all paramedics received nondegree “certificates” as opposed to degrees to verify their training. Today these certificate programs exist alongside associate in applied science (AAS) and bachelor of science (BS) degree programs. For some, this raises questions about the necessity of simultaneously offering both degreed and nondegreed paramedic programs. Unfortunately, there is a paucity of research about the influence of educational preparation on patient outcomes.

However, some evidence suggests that education improves the delivery of EMS health care. One study noted that paramedics who held degrees, although not EMS degrees specifically, were better able to calculate drug dosages than nondegree paramedics.² There is also evidence that students who attend an accredited program are more likely to pass the National Registry of EMT-Paramedic exam,³ and by extension, are better prepared for roles as field clinicians. This same study also found pass rates to be higher for those holding an AAS degree and baccalaureate degree. A separate investigation found a link between pass rates and the instructor’s educational level. The first-time pass rate was 62.7% for students taught by an instructor with an associate degree, 69.4% for bachelor’s degree, 72.7% for master’s degree, and 78.5% for doctoral degree, which suggests the need for baccalaureate and/or graduate-prepared educators.⁴ Moreover,

Brown et al found that although the EMS administrators rated both degree and nondegree paramedics equally, 46% preferred hiring AAS degree paramedics over nondegree paramedics, and 40% reported promotion preference for degree paramedics.⁵

In addition to the perceived clinical advantages of EMS degrees, degree programs also prepare the future generation of EMS leaders including researchers, administrators, and educators. The *EMS Education Agenda for the Future* (EMSEAF) recommends that all EMS programs attain national accreditation. At the baccalaureate level it will be particularly

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important to expand opportunities for degrees for EMS educational program directors because that credential is crucial for the community colleges to be able to meet the Committee on Accreditation of Educational Programs for the Emergency Medical Services Professions (CoAEMSP) accreditation requirements.

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The Role of Western Carolina University in EMS Education

College level paramedic education in North Carolina began in 1976 when Western Carolina University (WCU) established the Emergency Medical Care (EMC) program as the nation's first baccalaureate program for EMS. Concurrently, Guilford Technical Community College established North Carolina's first paramedic program leading to an AAS degree. Since then, 13 additional community college degree programs have been established in North Carolina. Accredited in 1988, WCU's EMC program remains the only baccalaureate program in North Carolina and one of only 12 similar programs in the US.

As a baccalaureate program, the EMC program has a unique dual educational role: to educate paramedic practitioners and future EMS leaders. Broadly defined, future EMS leaders include EMS administrators, educators, advanced practice clinicians, and researchers. To achieve these goals, the curriculum requires two years of general education and preprofessional coursework followed by two years of the paramedic core curriculum and area of concentration. Unique to baccalaureate degrees, the general education component develops skills in writing, thinking, and analyzing. These, along with two semesters of chemistry and two semesters of anatomy and physiology, serve as the foundation for the paramedic curriculum. The junior and senior years constitute the professional course sequence and in addition to the core paramedic curriculum, require 17 semester hours in one of two areas of concentration: science or health services management. The science concentration is essentially premedicine and includes upper level courses in biology, chemistry, and physics. The management concentration prepares graduates to assume management roles and incorporates courses in personnel administration, marketing, accounting, finance, and health policy. Both concentrations require a course in research methods and biostatistics because of the increasing role of research in EMS.

Building upon the preprofessional courses in chemistry and biology, the paramedic curriculum promotes clinical reasoning as opposed to rote memorization of signs, symptoms, and treatment algorithms. In addition to addressing state and national paramedic learning objectives, the curriculum is heavily influenced by evidence-based medicine and Bayesian clinical decision making. Furthermore, in an effort to facilitate integration into the overall health care system, students are introduced to epidemiology, injury and illness prevention, and occupational health. The curriculum is also buttressed by an extensive clinical program that includes rotations through coronary intensive care unit (ICU), neurotrauma ICU, neonatal ICU, pediatrics and pediatric ICU, labor and delivery, operating room, cardiac catheterization lab, psychiatry, and dialysis rotations, in addition to emergency department, helicopter, and ambulance rotations. Because paramedics are increasingly choosing to practice in nontraditional venues such as urgent care clinics and emergency departments, broad-based clinical experiences are crucial for well-rounded clinicians.

Challenges and Opportunities

The National Standard Curriculum (NSC) describes the knowledge base for EMS in the United States.⁶ The curriculum proved useful during the formative years of EMS, however, the NSC is being replaced by a new approach to EMS education as outlined in the *EMS Education Agenda for the Future*.⁷ Once implemented, the EMSEAF recommendations will define the EMS general body of knowledge, delineate the technical skills within an EMS scope of practice, provide education standards for instructors and educational programs, and define procedures for national certification of paramedics and accreditation of educational programs. The EMSEAF is EMS education's guidebook for advancing the profession.

North Carolina has many opportunities to advance EMS education. Likewise, there are many challenges to delivering educational opportunities for current and future North Carolina paramedics. Due to changing demographics in the US, the demand for paramedics is expected to climb. The National Bureau of Labor Statistics estimates that between 2004 and 2014 an additional 21 000 paramedics will be needed to meet demand.⁸ This will be a serious challenge because North Carolina and the nation as a whole are currently experiencing a paramedic shortage.

Like most community college programs, WCU responded to the paramedic shortage by expanding enrollment capacity for initial paramedic training. In addition, WCU has been supportive of increasing access to baccalaureate and master degree programs using distance learning venues. It has allocated faculty and technical support to expand online access at both levels over the past 7 years. However, a stronger collaborative approach to recruitment and education is needed. A successful network should include the public school system, local EMS systems, community colleges, and WCU to consistently recruit students and deliver efficient, effective, and coordinated educational services at the associate and baccalaureate levels.

Articulation

Western Carolina University supports the paramedic programs within the North Carolina Community College System and recognizes the need for seamless articulation of students from the community college programs. To facilitate this transition, WCU has established articulation agreements with all North Carolina associate degree EMS programs. These agreements are particularly important for the distance learning program which is offered only to practicing paramedics who hold AAS degrees. The distance learning technologies enable paramedics across the state to access the program without displacing them from the communities in which they serve.

Student Support

Many students come to a university setting unprepared for the rigor of university-level academic work. While our distance learners are older and bridging from an associate degree, they

face some of the same challenges as our traditional college-aged students. Many must strengthen writing, math, and science skills. To address these needs, WCU has a writing and math tutoring center that is available to all resident students and has been extended to distance learning students through distributed learning technologies.

Increasing tuition costs, coupled with limited scholarships and shrinking financial aid for students in general, have negatively impacted both student recruitment and retention. From 2001 to 2005, the cost of attending a public university in North Carolina increased 33%, and a year in school now consumes 25% of the average North Carolinian's household income.⁹ To put this increase in perspective, the urban consumer price index rose only 18% during the same period. A dedicated scholarship for students interested in EMS would help attract students into the profession and make the EMS educational programs more affordable. Furthermore, graduation rates would be improved if students were not obligated to work while in school to pay for tuition and other financial obligations.

Clinical Support

The cornerstone to any paramedic training program is its clinical rotations. Unfortunately, EMS programs at WCU and the community colleges must compete for clinical space with nursing and other allied health programs. While EMS agencies recognize the recruiting benefit of entering into clinical agreements with paramedic educational programs, most hospitals have a less clearly-defined benefit.

Clinical rotations are guided by the National Standard Curriculum which recommends a minimum number of patient contacts and skills for paramedic students, but these recommendations are not based upon empirical evidence. Furthermore, in a recent analysis of paramedic graduates across the US, only 6% completed all of the clinical experiences recommended by the current National Standard Curriculum and less than half of the graduates completed the required geriatric, trauma, psychiatric, obstetric, and pediatric patient assessments.¹⁰ Complicating matters, more recent research indicates that the NSC recommendations may underestimate the true number of repetitions necessary to attain clinical competence. Wang et al reported that up to 25 intubations were necessary to attain competence, despite the recommendation of 5 by the NSC.¹¹ Many EMS education programs encounter difficulty gaining access to the operating room to perform intubations.¹² To ensure the clinical competence of paramedics, it is imperative that hospitals and the physician community recognize the importance of their participation in clinical rotations for paramedic programs.

Research Support

The *National EMS Research Agenda* (NEMSRA), published in 2002, noted the lack of scientific evidence in support of most prehospital interventions.¹ The NEMSRA specifically noted the lack of cost-effectiveness and outcome studies. This widely disseminated report recommended, among other

things, that educational programs include an introduction to the research process as part of the paramedic curriculum. It also recommended that academic institutions develop programs to train EMS researchers and to establish organizational partnerships that promote collaboration between academia and EMS agencies to advance the EMS scientific body of knowledge.

Recognizing the research opportunities afforded by its unique location in a university setting, WCU's EMC program is committed to promoting research in EMS. A research methods and biostatistics course is a required component of the undergraduate curriculum. At the most basic level, this course promotes an appreciation for the scientific method and the use of scientific evidence in clinical medicine as well as EMS administration. The course also prepares students for designing and implementing their own studies.

In an effort to increase the number of EMS researchers as recommended by the NEMSRA, the EMC program is launching a graduate program in the fall of 2008. The graduate program will offer tracks in EMS administration and EMS education. In addition to courses specific to each track, the curriculum requires substantial course work in research methods, epidemiology, quantitative methods, and biostatistics. This degree program will be entirely online in an effort to make it widely available to practicing EMS professionals.

To facilitate the research process for faculty and graduate students, the EMC program developed the Consortium for the Advancement of Research in EMS (CARE). The CARE consortium is composed of 15 EMS systems and 15 EMS education programs, and its goal is to facilitate EMS research by forming a partnership between academic settings, community college EMS programs, and EMS agencies. Launched in 2007, the CARE consortium will focus on the research priorities described in the NEMSRA Implementation Plan including clinical outcomes assessment, cost-effectiveness analyses, professional competence, and EMS systems.¹³

Although these research efforts are designed to advance the body of knowledge specific to EMS, they cannot occur in a vacuum. The investment of faculty time must be valued by academic institutions, and EMS agencies must also be willing to commit staff time and resources. Furthermore, an adequate funding stream for EMS research must be identified, which will likely include public and private funding.¹

Conclusion

Although many challenges lie ahead, Western Carolina University is committed to taking the necessary steps to address the paramedic shortage, meet EMS research needs, and offer undergraduate and graduate level education for the future leaders of the paramedic profession. However, these efforts will be successful only to the extent that effective partnerships can be established and maintained with the EMS community, the North Carolina Community College System, hospitals, and the medical community at large. **NCMJ**

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