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Addressing the underutilization of trained paramedics in U.S. emergency departments: a review of their adjunctive role and emergency nurse alternatives

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BOSTON UNIVERSITY

ARAM V. CHOBANIAN & EDWARD AVEDISIAN SCHOOL OF MEDICINE

Thesis

**ADDRESSING THE UNDERUTILIZATION OF TRAINED PARAMEDICS IN
U.S. EMERGENCY DEPARTMENTS: A REVIEW OF THEIR ADJUNCTIVE
ROLE AND EMERGENCY NURSE ALTERNATIVES**

by

JOSEPH PAUL McELWEE

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Approved by

First Reader

Keith Tornheim, Ph.D.
Associate Professor of Biochemistry

Second Reader

Gwynneth D. Offner, Ph.D.
Associate Professor of Medicine

“Preparation through education is less costly than learning through tragedy.”

– Max Mayfield, American meteorologist

DEDICATION

To my mother and father, who have always supported me in everything I've ever attempted to do, even the not-so-wise things; to my grandmother, for always rooting for me from the sidelines; and to the amazing emergency medicine family I've found at the St. Vincent Hospital Emergency Department.

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ABSTRACT

Registered nurse (RN) insufficiency is both a major contributor to and effect of emergency department overcrowding (EDOC) in the United States and is implicated in increased patient mortality, ED wait times, and general congestion of the healthcare system. Licensed paramedics represent a viable solution to this crisis given their extensive training in emergency care by serving as RN adjuncts and alternatives in the ED setting. Paramedics utilize high-level clinical judgment and patient assessment skills to form detailed clinical impressions and employ a wide range of therapies to initiate treatment. Although they less frequently possess a college degree than their RN counterparts, paramedics complete a comparable study of medical science principles, patient assessment, and pathophysiology, and devote significantly more time to critical care and emergency medicine than RNs.

Implementation of paramedics in U.S. EDs in the 1980s and 1990s highlighted their manual and technical skill prowess as well as their ability to rapidly assess emergency situations, including their unexpectedly widespread use in pediatric EDs. Modern implementation includes expansion of the psychomotor skills available to ED-based paramedics, with emphasis on medication administration and emergency

procedures, but there is a significant lack of research into paramedic assessment and triage skills in the ED.

Barriers to further implementation of ED paramedics include resistance from nursing advocacy organizations, regulatory and legal challenges, and public opinion and attitudes of nurses and paramedics. Nursing advocacy groups have historically opposed paramedic integration, fearing job encroachment and increased autonomy for non-nursing healthcare professionals. Regulatory challenges involve certification vs licensure discrepancies, limitations on paramedic scope of practice, and the wide-reaching effects of state Nurse Practice Acts. Societal resistance, cultural factors, and attitudes within the nursing and paramedic communities also impede further ED paramedic implementation.

Practice recommendations are proposed, including the development of standardized ED orientation programs for paramedics, and redefining the minimum education for paramedics at the associate degree level. Legislative recommendations involve eliminating statutory restrictions on paramedic practice, reevaluating language in state Nurse Practice Acts, and clarifying the legal relationship between RNs and ED paramedics. The limitations of this literature-based thesis include a lack of large-scale studies, regional variability, and the absence of empirical examination of paramedic integration in reducing ED overcrowding. Future suggestions for study include randomized controlled trials comparing ED patient outcomes between RNs and paramedics, interrater reliability studies on assessment and triage skills, and comparisons of scope of practice and education between paramedics in different countries.

TABLE OF CONTENTS

DEDICATION.....	v
ACKNOWLEDGMENTS	vi
ABSTRACT.....	vii
TABLE OF CONTENTS.....	ix
LIST OF TABLES.....	xii
LIST OF FIGURES	xiii
LIST OF ABBREVIATIONS.....	xiv
INTRODUCTION AND CONTEXTUALIZATION.....	1
Emergency department staffing models.....	2
Emergency department overcrowding	3
Statement of the research problem.....	7
Research objective	8
METHODOLOGY.....	9
EDUCATIONAL AND EXPERIENTIAL PROFILES OF RNs AND PARAMEDICS... 9	
Workforce structure of the emergency medical services system	11
Educational and experiential profiles of paramedics	14
Educational and experiential profiles of emergency RNs.....	17
Identifying disparities in emergency RN and paramedic education	19
ADJUNCTIVE ROLE OF PARAMEDICS IN NORTH AMERICAN EMERGENCY DEPARTMENTS	22
Historical implementation of paramedics in the hospital setting	23

Modern role of hospital-based ED paramedics.....	26
Triage, clinical judgment, and assessment of paramedics	27
Medication administration and emergency procedures	30
Collaborative teamwork and interprofessional coordination	32
BARRIERS TO IMPLEMENTATION.....	34
Resistance from nursing advocacy organizations	34
Regulatory and legal challenges	36
Certification vs licensure concerns	38
Scope of practice limitations.....	38
Nurse Practice Acts.....	40
Societal resistance and cultural factors	41
Attitudes and perceptions within the nursing and paramedic communities	42
DISCUSSION.....	43
Recommendations for practice.....	46
Educational recommendations	46
Regulatory and legislative recommendations	49
Limitations	50
Future suggestions for inquirers.....	52
CONCLUSION.....	53
APPENDIX A.....	56
LIST OF ABBREVIATED JOURNAL TITLES	57
BIBLIOGRAPHY.....	60

CURRICULUM VITAE..... 74

LIST OF TABLES

Table 1. Input, throughput, and output contributors to EDOC.....	4
Table 2. Content coverage comparison between the NHTSA Standard Paramedic Curriculum and the CEN.....	21

LIST OF FIGURES

- Figure 1. Visual representation relating the depth and breadth of knowledge of EMRs, EMTs, AEMTs, and paramedics. 12
- Figure 2. A typical associate degree program for paramedics (*upper*) and RNs (*lower*), composite from multiple programs. 19
- Figure 3. The four necessary constituents of the paramedic scope of practice.⁴⁶ 37
- Figure 4. Overlap of RN and paramedic scopes (*horizontal axis*) and depths (*vertical axis*) of knowledge prior to hypothetical ED orientation and growth in role.⁸² 45

LIST OF ABBREVIATIONS

ACEP	American College of Emergency Physicians
ACP.....	advanced care paramedic
AEMT	advanced emergency medical technician
ALS.....	advanced life support
AMI.....	acute myocardial infarction
ASN.....	Associate of Science in Nursing
BON	Board of Nursing
BSN.....	Bachelor of Science in Nursing
CEN.....	Certified Emergency Nurse
ECG, EKG	electrocardiogram
ED	emergency department
EDOC.....	emergency department overcrowding
EDVR.....	emergency department visit rate
EMR.....	emergency medical responder
EMS	emergency medical services
EMT, EMT-B.....	emergency medical technician
ENA	Emergency Nurses Association
ETT	endotracheal tube
ICU.....	intensive care unit

IV intravenous
IO intraosseous
NHTSA National Highway and Traffic Safety Administration
NPA..... Nurse Practice Act
NREMT.....National Registry of Emergency Medical Technicians
NRP..... nationally registered paramedic
PED.....pediatric emergency department
RN..... registered nurse
UAP.....unlicensed assistive personnel

INTRODUCTION AND CONTEXTUALIZATION

Emergency departments (EDs) serve a complex and multifaceted role in the United States healthcare system, providing sophisticated emergency, urgent, primary, and preventive care services. Oftentimes, EDs are conceptualized as core safety net providers due to their legal obligations to provide care (i.e., the Emergency Medical Treatment and Labor Act, EMTALA) as well as the high frequency with which ED patients are uninsured, underinsured, or receive majority healthcare coverage from Medicaid.^{1,2} Thus, in the wake of the ever-growing shortage of healthcare professionals, especially registered nurses (RNs), and worsening patient overcrowding of clinical spaces in the current age, it is reasonable to assume that EDs are particularly affected. It has been borne out in multiplicity that overcrowded, understaffed EDs increased the risk of poor clinical outcomes, complications, readmission, and increased wait times.^{3,4} With that in mind, it is reported that 37 of 50 states will experience a nursing shortage by 2030⁵; it is also anticipated that this shortfall will be intensified by the increasing age and medical complexity of those in the Baby Boomer generation.⁶

For this reason, exploring alternatives that mitigate the effects of high patient census and low RN staffing is crucial. One possibility could include standardizing the incorporation of licensed or registered paramedics into the ED setting as nurse adjuncts—and during times of extreme staffing insufficiency, nurse alternatives. While the practice of in-hospital paramedic utilization has been recognized in Australia and the United Kingdom for the past several years, societal and economic trends in the U.S. have yet to normalize the widespread integration of paramedics in the inpatient or ED setting.⁷

Though state licensing and certification requirements and scopes of practice for paramedics are largely heterogeneous, they all follow the minimum guidelines for competency and practice set forth in the National EMS Education Standards and the National EMS Scope of Practice Model by the U.S. National Highway and Traffic Safety Administration (NHTSA), which are incorporated into educational programs by a certifying body, the National Registry of Emergency Medical Technicians (NREMT). That is to say, while many jurisdictions extend paramedics' scope of practice, very few constrict it. Thus, the nationally registered paramedic (NRP) will be considered in this discussion for ease of generalizability. To fully contextualize the issue of in-hospital paramedic utilization, the problem that this utilization seeks to address will first be examined in depth: the contributors and outcomes of ED overcrowding.

Emergency department staffing models

ED staffing structures in the U.S. often include RNs, physicians of various training levels (interns, residents, fellows, and attending physicians), ED technicians (EDTs), registration personnel, respiratory therapists, and case managers, among other roles. The Emergency Nurses Association (ENA) has recommended that RN staffing levels be determined dynamically by patient census, acuity, boarding status, and the skill mix of the nursing staff (i.e., RNs vs licensed practical nurses [LPNs] vs unlicensed assistive personnel [UAP]); skill mix is defined as the relative numbers of staff with various levels of licensure.⁸ In nursing literature and legal theory, unlicensed assistive personnel are those unlicensed patient care providers that assist the nurse with patient

care activities as delegated by the RN; these include both “direct care” (e.g., hygiene, ambulation, feeding, etc.) and “indirect care” (e.g., stocking of patient rooms, changing of linens, etc.).⁹ In the ED, EDTs are typically UAP.

Typical RN staffing ratios in the ED range from one nurse to one patient, or possibly 1:2 when managing unstable, urgent intensive care-level patients to 1:5 or 1:6 when managing stable, non-urgent patients (Nicole Collins, MSN, RN, oral communication, September 2022); the most commonly recommended ED staff ratio by professional nursing organizations is 1:4, which is enforced in California by the only state law in the U.S. mandating ED staff ratios.¹⁰

Generally, EDTs also have a set of patients they are assigned to as well, or in some cases, a set of RNs, to assist in completing physician orders, providing routine patient care such as assistance with activities of daily living (i.e., hygiene, eating, elimination, etc.), and completing technical tasks under the direction of the RN. EDTs come from various educational backgrounds, including emergency medical technicians (EMTs), certified nursing assistants, LPNs, and, as is the topic of this thesis, paramedics.¹¹ In most cases, EDTs are considered to be UAPs due to their lack of nursing licensure. Thus, as the RN-to-patient ratio decreases and the EDT-to-patient ratio increases, the skill mix of the department skews from a higher level to a lower level.¹²

Emergency department overcrowding

ED utilization has increased significantly over the preceding several decades. While the ED visit rate (EDVR; expressed as visits per 100 people) has remained

relatively steady between 2009 and 2019 (45 visits per 100 people and 47 visits per 100 people, respectively), the annual ED visit count has increased from 108 million visits in 2000 to 151 million visits in 2019.^{13,14} This 39 percent increase over 20 years has occurred in the setting of a decreased growth rate in the number of hospital-based EDs in the U.S. However, the COVID-19 pandemic has introduced additional nuance in these statistics due to social distancing concerns, with a 2020 EDVR of 40.5 visits per 100 people and a 2020 ED visit count of 131 million^{15,16}; it is assumed that this depression is largely pandemic-dependent and doesn't represent true growth trends in utilization.

Table 1. Input, throughput, and output contributors to EDOC.

Input contributors (non-alterable)	Throughput contributors	Output contributors
Long wait times	Insufficient ED staffing	High hospital occupancy
Large ED waiting census	Delayed processing time of diagnostic testing	Inpatient bed shortage
High patient acuity and complexity	Delayed triage and bed placement	Delay in patient transport to inpatient ward
High volume of arrivals by ambulance	Low ED bed availability (and, by extension, low inpatient bed availability)	Small staffing ratios
	High number of boarded patients	Inefficient discharge plans
	Decreased staff experience and training (lower skill mix)	Inefficient transfer of care
	Decreased staff morale and high burnout	

ED overcrowding (EDOC; sometimes termed 'ED crowding') is defined as a situation in which the necessity for emergency care services exceeds the resources available to treat in the ED within a clinically acceptable timeframe.¹⁷ EDOC has been posited both as an indicator metric of the overall functional status of a healthcare system as well as the downstream manifestation of supply–demand disparities (i.e., using a reservoir model, when patient census input exceeds output).^{18,19} Table 1 above outlines

several causes for EDOC to accentuate the multifactorial nature of the issue²⁰; it is theorized that these causes can be categorized according the specific timepoint during a patient's flow through the ED, and that throughput and output contributors are alterable.²⁰

A major, recurring contributor to EDOC appears to be decreased throughput of inpatients from the ED to their intended admission ward. A patient may be "boarded" in the ED, which occurs when a patient that has been admitted to an inpatient ward or observation unit remains in the ED for an extended period of time post-admission²¹; a commonly cited cut-off after which a patient is considered boarded in the ED is 120 minutes post-admission, while the Joint Commission, widely responsible for hospital accreditation in the U.S., recommends patients spend no more than four hours post-admission in the ED.^{22,23}

During this time, the ED nursing staff retain responsibility for patient care, and may be responsible for more complex care than that which is typically rendered in the ED, as well as clinical tasks not otherwise commonplace in the ED. Further, RNs may be assigned a mix of boarders and true ED patients.²⁴ This is not limited to would-be medical-surgical inpatients but often may include intensive care patients, such as those requiring mechanical ventilation or frequent titration of critical care medications.²⁵ Hospitalized patient boarding ultimately leads to access block, a term that the American College of Emergency Physicians (ACEP) describes as the inability for a patient to gain access to a hospital bed within eight hours from the start of care in the ED. This term can describe both patients that are boarded as well as patients that are unable to enter the ED care system from the waiting room due to high census.²⁶

The degree to which input, throughput, and output contributors cause EDOC during periods of high utilization is defined by a system's surge capacity. ACEP describes surge capacity as "a measurable representation of a health care system's ability to manage a sudden or rapidly progressive influx of patients within the currently available resources at a given point in time"²⁷; this is typically the ability for a system to rapidly accommodate 10–15 percent of its baseline capacity. While characteristically used to connote increased demand during mass casualty incidents or other natural disasters, this term has increasingly been used to describe what might otherwise be the typical 'ebbs' and 'flows' of an ED that is at its maximal resource utilization.²⁸

While not as large of a contributor to EDOC as boarding, persistently low ED staffing levels are known to impair ED throughput metrics, particularly RN shortage.²⁹ It appears that higher overall nursing skill mixes and higher nursing ratios (i.e., more RNs working each with fewer patients per shift) result in a reduction in mortality and morbidity.^{30–32}

Unsurprisingly, it has been demonstrated that the downstream effects of EDOC are pervasive across all aspects of the healthcare system, and the consequences can be grave. Both pediatric and adult populations experience significant increases in mortality when admitted during an overcrowded ED shift.^{33,34} Patients presenting to overcrowded EDs with time-sensitive, acute-onset disease states such as acute myocardial infarction (AMI) and stroke experience more adverse events and complications than those in non-overcrowded EDs.^{35,36} EDOC has been associated with increased in-hospital length-of-stay, ED waiting times, and triage times^{37,38}; as a result, EDOC also results in increased

numbers of patients leaving the ED without being seen by a physician.³⁹ Overall, it is in the best interest of patients, healthcare workers, and legislators to devise solutions to EDOC (or mitigate some of its known downstream effects) to prevent some of these deleterious consequences on health and safety.

Statement of the research problem

The failure to properly utilize trained paramedics, a vast and readily available population of the public service sector, represents a significant challenge to addressing optimization of the U.S. healthcare system workforce and delivering adequate patient care in the face of growing EDOC and access block. Despite their specialized, comprehensive critical and emergency care training and diverse skillset, paramedics are often relegated to EDTs, “nursing assistants” or similar functions in-hospital, leaving the prehospital realm as the only opportunity for them to utilize their full clinical repertoire. Having sufficient skilled, direct-care providers is a necessary component to combatting both the contributors to EDOC as well as its downstream consequences.

Thus, the objective of this thesis, in part, is to challenge the paradigm that RNs are the solely competent primary direct-care providers in the ED. In high-census, low-staffing situations that would otherwise leave RN-to-patient ratios low and the overall skill mix depressed due to additional hiring of assistants and nursing technicians, paramedics could intervene given their specialist training. There is a pressing need to explore both the current and potential adjunctive role of paramedics and assess the

feasibility and implications of further expanding their in-hospital role to address insufficiency.

Research objective

The specific objective of this literature-based thesis is to answer the following two, related research questions:

1. What is the current state of paramedic implementation in U.S. EDs, and what barriers preclude more widespread integration?
2. What is the feasibility of paramedics acting as RN alternatives during EDOC and surge events, and what recommendations for practice can be made as a result?

This specific aim will be achieved first through a transitory overview of both RN and paramedic educational programs, and a comparison between them will be made. A brief examination of the manner in which paramedics are currently and were historically implemented in U.S. EDs will be presented. Barriers to implementation, including organizational, legislative, educational, and cultural considerations will be studied, and the potential implications of this change in the healthcare system will be conjectured. Based on this contextualization and analysis of primary literature, policy and practice recommendations will be made, as well as suggestions for further study.

This examination is directed toward ED unit managerial staff, nursing supervision, and hospital administrators considering solutions to the pertinent issue of patient care and flow compromise secondary to understaffing and EDOC. EMS and RN

educators may also benefit from this work as the overlap between the two professions and their similar educational preparations will be discussed.

METHODOLOGY

This study utilized a comprehensive literature review methodology to simultaneously assess the depth of inquiry in this niche field as well as parse out the key issues that would need to be addressed. The review was approached systematically, using PubMed and Google Scholar as the initial primary material repositories. Key word combinations that were applied included “paramedic AND emergency department”, “paramedic AND emergency department AND technicians”, and “paramedic AND unlicensed assistive personnel”. Additionally, relevant articles that considered paramedic or paramedic education returned from “technicians AND emergency department” were included. Only articles in English were selected. Due to the sparseness of relevant results, primary literature published within the last 20 years was used to speak to current trends, while older sources were used to contextualize the history of the field.

EDUCATIONAL AND EXPERIENTIAL PROFILES OF RNs AND PARAMEDICS

Classically, paramedics have been relegated to less-educated “technicians” rather than “clinicians” that focus solely on immediate stabilization and transport of the sick or injured person. In contrast, it is thought that the RN has a more holistic and longitudinal basis for patient care with a markedly advanced training in medical principles.⁴⁰ RNs and

paramedics have traditionally filled very different roles in the U.S. healthcare system, and while both groups seek to individuate their profession based on perceived educational and clinical skill disparities, upon closer inspection, their educational backgrounds are not so different.

The expansion of paramedic scope in the U.S. to encompass skills, tasks, and knowledge not characteristically required for or included in prehospital care is not a new phenomenon. A major, recent development in this niche field is community paramedicine, where community health-trained paramedics work with patients in their homes to address primary and preventive care issues, such as medication adjustments, hypertension screenings, or well-child checks.^{41,42} Efforts like these attempt to decrease the burden upon the emergency care system by selecting alternatives to an ED visit that might better meet the patient's needs. A similar concept, mobile integrated healthcare (MIH), provides pre- and post-inpatient care delivered by a variety of healthcare professionals in a patient's home. This can include post-hospitalization intravenous (IV) antibiotics or wound checks administered by paramedics; these are tasks classically carried out by RNs.⁴³ Thus, while expansion of paramedic care into the hospital realm is considered by some to be inappropriate, evidence of expansion in other settings has demonstrated success. A common misconception, and a barrier to ED paramedic integration that is considered more in-depth later, lies in conflating emergency medical technicians (EMTs) and paramedics, amongst both the general public and various other healthcare professionals.⁴⁴ Addressing this, as well as the full scope of knowledge and practice a paramedic possesses, through an abbreviated overview of American EMS

systems is critical to elucidating the role a paramedic may play in a nontraditional setting such as the ED.

Workforce structure of the emergency medical services system

The emergency medical service (EMS) system in the U.S. is a tiered structure whose workforce is composed of one emergency medical responder (EMR) and three emergency medical technician (EMT) certification levels with successively larger scopes of practice and knowledge. Figure 1 below illustrates the relationship between these levels as it relates to depth of material (the level of detail needed for competent practice) and breadth of material (the amount of material needed for competent practice); in this model, EMS clinicians move from first simply possessing clinical knowledge, to applying it at the fundamental level, to eventually integrating it with other topics in emergency care at the complex level.⁴⁵ While EMTs of all levels are educated in clinical assessment (albeit at some greater detail and complexity at the level of the paramedic), the specific repertoire of diagnostics and interventions at their disposal differs widely. It is also critical to reiterate that while this essay specifically examines the nationally standardized paramedic scope of practice formulated by the NHTSA EMS Education Model and certified by the NREMT for ease of generalizability, local and state protocols supersede national guidelines through physician medical direction, and often supplant these guidelines with additional therapies and diagnostic tools. As a result, with greater interventions available to EMS clinicians, additional education may take place. Appendix A provides a comparison of clinical skills performed by various levels of EMT adapted

from the National EMS Scope of Practice Model, with emphasis on high-level paramedic skills.⁴⁶

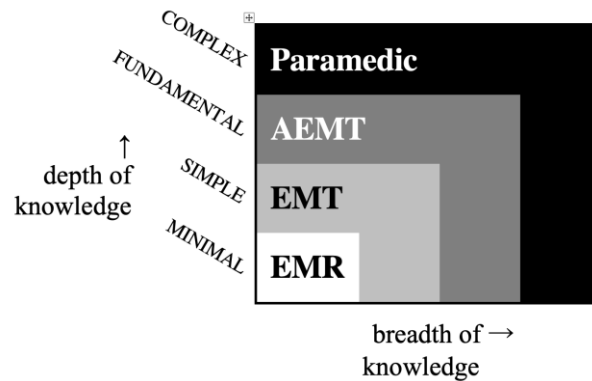


Figure 1. Visual representation relating the depth and breadth of knowledge of EMRs, EMTs, AEMTs, and paramedics.

At the lowest credentialed level within the EMS system, EMRs tend not to render medical aid as a primary component of their profession, but often work in higher-risk situations that necessitate some basic knowledge of emergency medical care, such as lifeguards, firefighters, or police officers.⁴⁷ They are typically competent in cardiopulmonary resuscitation (CPR) and other minimally invasive, low-stakes, high-yield emergency procedures that require minimal equipment, as well as the recognition of serious disease states, such as anaphylaxis, shock, cardiac arrest, and diabetic emergency, that require immediate intervention.⁴⁸

The emergency medical technician (EMT), formerly known as the basic emergency medical technician (EMT-B), is the medical professional with the fewest diagnostic and therapeutic modalities available for the management of the undifferentiated emergency patient. EMTs utilize basic airway management, hemorrhage control, shock treatment, and very limited pharmacologic interventions that allow for

immediate transport of a patient to an ED, or stabilization until advanced life support (ALS) services can arrive.⁴⁶ When utilized in a hospital-based setting, EMTs typically function as nursing assistants or technicians.^{49,50}

Advanced emergency medical technicians (AEMTs) are trained to obtain IV and intraosseous (IO) access, initiate unmedicated IV fluid resuscitation with saline and dextrose, administer a slightly larger variety of medications, and insert higher-risk airway devices, such as supraglottic tubes. They also are able to use more diagnostic tests than EMTs, such as waveform capnography and single-lead electrocardiogram (EKG).⁴⁶ Oftentimes, these individuals bridge the gap in rural systems that are otherwise ALS-deficient by providing more definitive care than EMTs.⁵¹

Paramedics (formerly known as EMT-paramedics) represent the highest tier of care available in the prehospital setting, and in some systems, are able to deliver definitive cardiopulmonary care over long transport times. In addition to all treatment modalities at the AEMT level, paramedics may perform endotracheal (ET) intubation, needle decompression of the chest cavity, and manual defibrillation, cardioversion, and cardiac pacing of patients in cardiac arrest or distress using electrocardiographic (EKG) interpretation. Paramedics have an extensive formulary of medications, smaller than but similar in nature to that of an ED, which they can administer to patients, including analgesics, anticonvulsants, antiemetics, antipsychotics, many cardioactive medications (e.g., vasopressors, antiarrhythmics), pulmonary and inhaled medications, corticosteroids, and medicated IV fluids.⁴⁶ In some jurisdictions, paramedics are trained to use point-of-care ultrasound to determine the presence of intra-abdominal hemorrhage in trauma

patients, or initiate broad-spectrum IV antibiotic administration in cases of suspected sepsis.^{52,53} In the most progressive of systems, paramedics are educated and credentialed to perform high-stakes interventions traditionally reserved for physicians, such as finger thoracostomy, emergency escharotomy, and field amputation.⁵⁴

In prehospital practice, paramedics utilize their education and experiential learning to first perform a primary assessment that considers a patient's airway, breathing, and circulation; this is designed to localize and address immediate life threats. Then, a more comprehensive secondary assessment is completed that integrates a patient's history with a focused physical examination that surveys multiple organ systems. After a working clinical impression is made and interventions are selected, including transport, the paramedic performs frequent reassessments of the patient.⁵⁵

As it has been demonstrated, the paramedic is a highly trained, competent healthcare professional with an extensive knowledge of and background in emergency care. They use a comprehensive understanding of medical principles, pathophysiology, and patient assessment to plan and intervene. With that in mind, the education that the paramedic receives will also be reviewed.

Educational and experiential profiles of paramedics

Having a knowledge of what the typical U.S. paramedic's educational background looks like is requisite for analyzing how their training is applicable to non-traditional settings. One of the major points of contention in the EMS community concerning paramedic education is the importance of degree attainment in the profession. It was

revealed in 2014 that 43 percent of paramedics reported having some college courses as their highest level of education, 23 percent reported a bachelor's degree, and 21 percent report an associate degree.⁵⁶ Arguments from those that support making an associate degree a required component for licensure are multifaceted; some seek to legitimize their profession as true medical care providers and less as a means of transportation, while others believe the secondary benefits that come with additional education, such as increased pay and better working conditions, should be prioritized. Those that oppose such a requirement typically cite educational barriers, cost, and that a degree is not currently needed for full, unrestricted practice as a paramedic.⁵⁷

Training programs for paramedics are somewhat geographically disparate, with only 22 percent of rural America and 73 percent of the whole nation within a 30-mile radius of a paramedic training site.⁵⁸ There is additionally a wide discrepancy in duration, intensity, and clinical experiences amongst paramedic programs. Some may include as few as 1,200 hours over 10 months, or as many as 1,800 hours over two years; approximately half of paramedic programs in 2018 offered the associate degree option.⁵⁹ The general structure is often comparable, however, all requiring a high school diploma or GED and the 180-hour EMT certification course culminating in the NREMT cognitive and BLS psychomotor examinations prior to entering the paramedic program.⁶⁰ According to Daniel Bruce, BS, NRP, FP-C, the first half of paramedic training comprehensively covers anatomy and physiology, pathophysiology, pharmacology, patient assessment, cardiology and Advanced Cardiac Life Support (ACLS) certification, airway management and special populations. Integrated with classroom training are

simulation sessions to develop paramedic skills, such as airway management, resuscitation, patient assessment, and vascular access (oral communication, June 2023).

Paramedic students are required to complete multiple in-hospital rotations after the didactic portion of their curriculum has ended. For most paramedics, the majority of this time is spent in the primary adult ED, while other rotations may take place in the pediatric and medical intensive care (ICUs); inpatient psychiatric, telemetry, and medical-surgical wards; inpatient pediatrics; cardiac catheterization laboratory; operating room; and specialty EDs, such as PED and trauma center (Daniel Bruce, BS, NRP, FP-C, oral communication, June 2023). As examples, paramedic interns at the University of Missouri must spend at least 180 hours in the ED practicing clinical skills, equivalent to over 22 shifts, while at Kingsborough Community College in New York, 136 hours in the adult ED are required, with an additional 40 hours in the PED.^{61,62} During surgical and anesthesia rotations, paramedics must complete airway assessments and interventions on both manikin and live patients.⁶³

During these experiences, paramedics often devote their time to developing key psychomotor skills such as IV cannulation, placement of airway devices, and medication reconstitution, titration, and administration, as well as their patient assessment and EKG interpretation skills.⁶¹ This internship also informs the paramedic student of downstream processes after care is handed off to the ED staff, and what definitive interventions for various pathologies looks like, such as cardiac catheterization and balloon angioplasty in a confirmed AMI or targeted IV antibiotic therapy in sepsis.⁶⁴

Overall, paramedics have a well-rounded and comprehensive understanding of emergency care, as their educational programs focus not only on rapid transport and stabilization, but also on the principles of medical science that inform the evidence-based emergency care that they practice.

Educational and experiential profiles of emergency RNs

Similar to paramedicine currently, the nursing profession underwent a major overhaul in its training paradigm to shift the focus away from three-year “diploma” (i.e., certificate-only) licenses and toward two- and four-year-degree programs; however, this movement was started in the 1950s.⁶⁵ In 2019, about 52 percent of emergency and trauma RNs held a Bachelor of Science in Nursing (BSN) degree, while 30 percent held an Associate of Science in Nursing (ASN) degree or equivalent.⁶⁶ This is a rising trend, with overall educational level of RNs increasing and more employers requiring BSN completion to hire.⁶⁷ Education at the Master of Science in Nursing level or higher most often results in licensure as an advanced practice registered nurse; nurse practitioners, clinical nurse specialists, and nursing educators fall under this umbrella.⁶⁸

Some programs (typically ASN programs) may require prerequisite courses in biology, English composition, anatomy, or statistics prior to entry, although these can often be high school-level⁶⁹; many have integrated these basic sciences into the first year of school (some ASN programs, and nearly all BSN programs).⁷⁰ Most ASN programs require the applicant to complete the TEAS Test covering science, reading, and mathematics.⁷¹ Both ASN and BSN programs require completion of courses in anatomy

and physiology, pathophysiology, pharmacology, microbiology, health assessment, and nursing principles. BSN programs may also include additional courses in leadership, research, biostatistics, and healthcare policy.⁷² Interspersed with these lecture components in both degree programs are skills laboratories and simulation to learn critical nursing skills, including patient assessment and nursing decision-making.⁷²

After completion of didactic and simulated components, students often complete at least year of a variety of clinical rotations in various healthcare settings. These often include long-term care facilities, medical-surgical floors, psychiatric floors, labor and delivery, and sometimes outpatient care. In many cases, RNs have limited exposure to emergency care; when the ED is included in an acute care rotation, students are often not given dedicated time, and instead ED nursing is interspersed with other acute care settings. In some programs, there is no clinical time in the ED at all. In many cases, the first time that emergency RNs are taught and allowed to practice commonplace ED skills, such as IV cannulation, is during their ED orientation period.⁷³ This culminates in successfully passing the NCLEX-RN, the national licensure examination for registered nurses. In most facilities, newly graduated novice RNs are required to complete at least one year of medical-surgical nursing before they may be hired as an ED RN, although a growing trend in recent years has seen EDs hiring novice RNs without any additional experience.⁷⁴

Identifying disparities in emergency RN and paramedic education

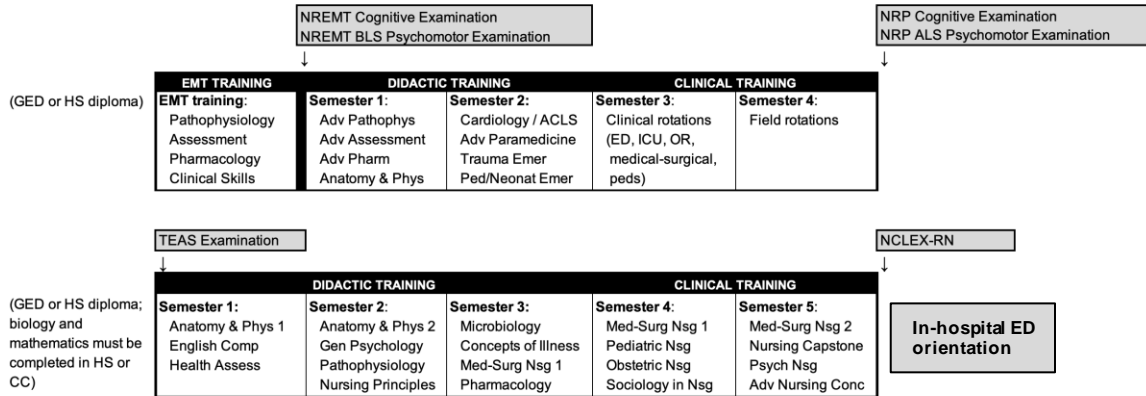


Figure 2. A typical associate degree program for paramedics (*upper*) and RNs (*lower*), composite from multiple programs.

Figure 2 above compares a typical course sequence for paramedic and RN associate degree programs; it was compiled from the specified curricula of multiple programs.^{69,75-77} In the modern era, even though both professions reflect a growing number of individuals attaining bachelor and associate-level educations, the average formal education of an RN is greater than that of a paramedic. This is qualified in a 2015 comparative observational study by Phelps demonstrating some amount of parity between RN and paramedic professional education programs. It was observed that while RN license-holders more often were degreed at the associate or bachelor’s level, paramedicine education programs required more college credits than nursing education programs (41 credits vs 37 credits) at U.S. community colleges that offered both associate-level programs.⁷⁸

This could indicate that while their respective educational programs are quite similar in comprehensiveness, nursing authorities have chosen to formalize their learning requirements in the form of a degree, whereas paramedic educational delivery is

compartmentalized into a certificate. Additionally, Phelps goes on to classify the education that RNs receive as generalist compared to the critical care-focused nature of paramedic training.⁷⁸ This implies that while paramedics may have significant competency or knowledge gaps in non-emergency settings, such as inpatient wards, observation units, or specialty care units, their education is well-suited to emergency care. This is borne out by the comparison of clinical education seen above, where it appears that paramedics spend more time in the ED than their RN counterparts during rotations.

This is further supported by a 2010 comparative study which found that 88 percent of the curriculum covered by the Certified Emergency Nurse (CEN®) certification course is also covered at the same level or more comprehensively by the NHTSA National Standard Curriculum for Paramedics.⁷⁹ The CEN certification is offered by the ENA to any RN that successfully passes a written examination, with the recommendation that the RN has worked for at least two years in the ED prior to sitting for the test. The CEN examination is designed to comprehensively test RNs on various psychomotor, affective, and cognitive aspects of emergency nursing; as such, it was treated as a surrogate for the minimum required knowledge and skill for competent emergency nursing practice in this study.⁸⁰ Table 2 isolates areas of deficiency in the NHTSA Standard Curriculum compared to the CEN curriculum as identified by Reilly and Markenson.⁷⁹

Table 2. Content coverage comparison between the NHTSA Standard Paramedic Curriculum and the CEN.

CEN content areas not covered by the National Standard Curriculum for Paramedics	CEN content areas partially covered by the National Standard Curriculum for Paramedics
<ul style="list-style-type: none"> - Procedural assist for the emergency physician with open thoracotomy, lumbar puncture, arterial line insertion, pericardiocentesis, FAST exam, joint aspiration - Performance of arterial puncture for blood gas sample - Management of ED/critical care devices, such as rapid transfuser, chest tube drainage systems, and arterial pressure monitoring apparatus - Administration of specialty pharmaceuticals and agents, specifically thrombolytics, gynecological agents, and blood products - Specimen collection from vagina or cervix - Irrigation of ear canals - Patient education concerning crutch-walking and pain management. - Discharge planning - Application of wound adhesive - Assessment of arteriovenous fistula patency in dialysis patients 	<ul style="list-style-type: none"> - Forensic evidence collection from sexual assault patients (limited to only clothing and on-scene evidence) - Administration of a stroke scale (limited to Cincinnati and Los Angeles, not NIH) - Collection of laboratory specimens (limited to blood) - Interpretation of laboratory testing (limited typically to blood glucose, arterial blood gas, and alcohol level)

There is also some evidence that there are deficiencies in curricula in interprofessional communication, documentation, and longitudinal care of the ED patient that derive specifically from the patient population paramedics are intended to treat.⁸¹ Given that paramedics complete more clinical time in the ED than RNs during their training, it is reasonable to deduce that they are at least as-well suited for ED care as RNs.⁸² Of note, a well-established career trajectory in emergency care typically involves paramedics, having interacted frequently with emergency RNs and sharing a similar level of training, continuing their postsecondary education, and becoming ED RNs themselves. Some may go as far to say that RN licensure is the natural career progression for the paramedic, given the ubiquity of paramedic-to-RN bridge programs.⁸³ Whetzel and

Wagner note that this unique population of emergency nurses often comes prepared with several of the clinical skills (IV skills, EKG interpretation, assessment) and certifications (Advanced Cardiac Life Support, Pediatric Advanced Life Support, CPR) already necessary for competency in ED care and presents encouragement and nurturing of this group as a possible remedy for the ED nurse shortage.⁸⁴

While it is not a direct research interest of this thesis, the disparities in instruction that exist between emergency RN and paramedics are largely not characterized in a quantitative manner and remain an area of further study.

ADJUNCTIVE ROLE OF PARAMEDICS IN NORTH AMERICAN EMERGENCY DEPARTMENTS

The utility of paramedic integration in the emergency department has been recognized for several decades, at the very least since the early 1980s. While the specifics of their roles, in-hospital scopes of practice, and their working relationships with ED RNs and physicians have varied considerably, several investigators have reported on the idiosyncrasies of their institutions' paramedic programs. In what appears to be the majority of cases, paramedics are functioning at an intermediate level between EDT or nursing assistant and RN. Generally, it seems that the integration of paramedics in the ED setting tends to follow not the actual educational experiences, clinical skills, or abilities of paramedics, but instead, local attitudes and politics.⁸⁵

In the first subchapter, the history of in-hospital paramedic employment will be explored; the following subchapter will consider current trends and examples in ED

paramedic usage. Given the similarity between the Canadian and American paramedic scope of practice, both will be considered here; foreign models will be considered as comparanda.

Historical implementation of paramedics in the hospital setting

To characterize the growth of this niche field, literature from the 1980s through the 1990s will be considered. In 1985, an ENA national survey noted that 27 percent of EDs employed EMTs, including paramedics, to carry out tasks that historically were completed by physicians or RNs, including casting, ECG interpretation, and suturing of lacerations.⁸⁶ A 1990 report describing ENA opposition to growing in-hospital EMT and paramedic integration describes a wide range of scopes of ED-based paramedics, from their full repertoire of paramedic skills and abilities in Missouri, Colorado, and Virginia, to only attendant or orderly roles in New York, North Carolina, and California.⁸⁷ No additional surveys or large-scale studies characterizing this era could be discovered; however, the time period is rich in case reports detailing how this utilization of EMTs and paramedics may look.

One Detroit, Michigan, paramedic describes the evolution of his role as an ED paramedic starting in 1979, first only being allowed to answer the radio for incoming ambulance traffic to the ED, to the mid-1990s, at which point he was permitted to pass indwelling (Foley) urinary catheters, administer medications, complete patient assessments, and interpret 12-lead ECGs. In this model, the author describes team-based nursing care, where a team of either two RNs or an RN and a paramedic would each carry

out all aspects of treatment for a group of patients. The major prohibition in this hospital for paramedics was triaging of new ED patients.⁸⁵

A 1988 report documents the utilization of paramedics as suture technicians in a large, tertiary-care Level I trauma center in New Mexico. The authors described a tiered competency-based advancement system where new-hire technicians, either former military medic or paramedic, started with a multiweek wound assessment and suture course. This was followed by three weeks of procedural observation, and then supervised performance of all procedures by either a faculty physician or “master” technician. Here, suture technicians were responsible for all aspects of the wound repair process, including wound assessment, materials selection, administration of local anesthesia to the site, and the placement of sutures; this was in addition to traditional nursing skills such as radial arterial blood gas draws and IV cannulation. Other procedural duties included draining and packing of abscesses, burn debridement, and application of plaster splints.⁸⁸

Another 1997 anecdotal article describes a Jacksonville, Florida, hospital-based ED paramedic position that included all of the above, as well as cardioversion, defibrillation, and triage; the author writes that his notes became part of the nursing medical record. However, intubation was still reserved as a physician-only skill.⁸⁹ Surprisingly, many older case studies concern pediatric EDs (PEDs) benefiting from the services of paramedic-certified ED technicians. As may be expected, in all cases, paramedics performed highly technical tasks with limited clinical assessment, impression formation, or care planning. In a 1995 compilation report, an Atlanta, Georgia, children’s-center based PED documented calling in paramedics as “emergency care

partners” during shifts with low RN staffing; these paramedics calculated dosages for and administered medications as well as inserted orogastric tubes and Foley urinary catheters, with the paramedics’ medical record notes cosigned by RNs.⁹⁰

Apolo and DiCocco document the experiences of paramedic suture technicians in an Ohio hospital-based PED and the improvement in patient flow and delivery of high-quality procedural care that was observed.⁹¹ They described a suture technician system where paramedic-certified personnel or military medic corpsmen begin with an extensive classroom didactic experience on the relevant anatomy and physiology of trauma, continue with a surgical laboratory involving the closure of lacerated pigs’ ears, and complete an apprenticeship involving first the closure of several trunk and extremity lacerations. The apprenticeship concludes with the repair of wounds on the face and hands.⁹¹

Zempsky and Haskell went further to describe paramedics as “allied health care providers” in a Connecticut children’s center-based PED.⁹² They described a survey-based observational study of 112 pediatric emergency medicine directors’ understanding of their PED’s implementation of paramedics. It was found that there were major advantages to paramedic employment, including their cost effectiveness compared to RN utilization and their clinical aggressiveness, and the most commonly utilized skills by paramedics included procedural assisting, patient transport, and acquiring IV access.⁹² These few PED cases are unexpected, as pediatric ED nurse managers tend to be more conservative with hiring practices concerning otherwise “unlicensed” healthcare workers with lower perceived skill levels and scopes of practice.⁹⁰ Aside from these few

examples, however, no other reports of PEDs utilizing paramedics could be found, historic or contemporary.

Overall, case reports prior to 1997 often demonstrated the technical skills that paramedics utilized in EDs at a time when there was much uncertainty as to how EMS providers as a population could contribute to ED care. However, some models also demonstrated the utility of paramedics using their clinical assessment skills in ED practice.

Modern role of hospital-based ED paramedics

The 2019 NHTSA National EMS Education Standards assert that a paramedic should “serve as a patient care team member in a hospital or other health care setting to the full extent of their education, certification, licensure and credentialing.”⁹³ The most common model of utilization in the modern era employs paramedics under RN supervision in an EDT-like function; in many contexts, “paramedic” is not included in the position name for this role.

Unfortunately, studies that consider overall trends in paramedic utilization are scarce and outdated. In a 1999 ACEP-commissioned survey of 1,377 EDs, it was found that paramedic ED technicians tended to be found in non-teaching community-based hospitals in a variety of geographic settings, with about 20 percent of all U.S. EDs employing paramedics in some capacity. In 89 percent of cases, RNs provided on-the-job training to newly-hired ED paramedics, with a smaller amount of paramedics being primarily precepted by physicians.⁹⁴ ACEP has previously and continues to advocate for

expansion of paramedic roles, with the stipulation that other involved parties (i.e., nurses, EMTs, respiratory therapists, other public service persons) be considered.^{95,96}

There have been major positional advances over the last few years. In 2019, the North Carolina Board of Nursing (BON) and Office of Emergency Medical Services (OEMS) jointly stipulated that while RNs should retain ultimate responsibility for patient care and outcomes, paramedics are approved to administer an unprecedentedly wide array of medications and perform high-level emergency procedures in nontraditional settings. These include higher-risk pharmacotherapeutics such as potassium, thrombolytics, heparin, insulin, tranexamic acid, whole blood and its components, as well as some types of assessment such as stroke screenings, preoperative (reperfusion) checklists, and general patient assessment.⁹⁷ These interventions have historically been off-limits to paramedics working in EDs.

Similarly, in 2022, the State of Washington voted to make permanent the ability for EMTs to provide emergency public health interventions during the coronavirus disease (COVID) pandemic in 2019.⁹⁸ While this currently only endorses immunizations by EMTs, this could open the door to expanding the role of other EMS providers as well. The following considers several isolated case studies of paramedic utilization in the modern day organized to consider three facets of ED care: triage, clinical judgment, and assessment; technical skills; and interprofessional collaboration.

Triage, clinical judgment, and assessment of paramedics

Triage is the act of sorting patients based on acuity, which in turn is assigned based on a patient's symptoms, presentation, medical history, and physical appearance;

this allows for more sick or injured patients to receive care first.⁹⁹ The Emergency Severity Index (ESI) is the most commonly employed five-level system in the U.S. that categorizes based on the ED resources needed to treat the patient and their vital signs.¹⁰⁰ In most American EDs, this is done by an RN either with or without a provider present. The ENA recommends that this assessment be done by an emergency RN with at least one year of nursing experience and specialty certification in trauma, emergency nursing, and critical care.¹⁰¹ Assessment, as it relates to paramedicine and nursing, differ slightly, but both consider the integration of a physical examination, history-taking, risk factors, presentation, and vital signs to stratify a patient population based on their acuity and likelihood of requiring advanced care.^{55,102}

In-hospital assessment of any kind, including triage, is typically classified as a “protected”, non-delegable skill that must be completed by a licensed nurse, not a paramedic¹⁰³; although, as posited by Amy Meredith in her response to an article concerning “turf wars” between paramedics and RNs, the job “title [of the triage clinician] probably doesn’t matter”, as long it is “done by the most experienced ED professional.”¹⁰⁴ That is to say, as long as the individual triaging is experienced in emergency care, it should not matter if that person is a paramedic, nurse, or physician. On the other hand, in the prehospital setting, paramedics triage patients on every call, and concordance between prehospital triage and the ESI in predicting severe patient outcomes has been established.¹⁰⁵ Thus, while triage and assessment are considered atypical for a paramedic to perform in the ED setting, they will be briefly explored here.

In a 1997 thesis considering the appropriateness of ED paramedics for the triage role at a New York State hospital, it was found that the typical assessment documentation completed by a paramedic when transporting a patient to the ED mirrors that which is completed by the emergency triage RN when a new patient arrives to the ED. In other words, the assessment completed by a paramedic is similar in depth to that completed during triage by an RN.¹⁰⁶

While there is limited American exploration of paramedic-completed ED triage in the U.S., it has been studied at length in other countries. In a 2012 Turkish comparative study, moderate agreement (45–47 percent) was demonstrated between untrained ED paramedics and ER residents in triaging walk-in patients, with over 60 percent of the paramedic-triaged patients assigned an acuity score that was deemed “expected” by the research team based on strict application of the triage criteria.¹⁰⁷ Another group similarly discovered that ED paramedics’ abilities to visually determine if a patient was seriously ill or not significantly increased after a triage-specific educational session.¹⁰⁸

Canada has also diversified its application of paramedics in the hospital setting. The advanced care paramedic (ACP) is similar to the American NRPs, possessing a similar scope of knowledge and practice; American NRPs can apply for license reciprocity at the ACP level in Canada.¹⁰⁹ In terms of assessment, a 2012 Canadian case study underscored utilization of ACPs in performing procedural sedation in the ED that has not been seen elsewhere.¹¹⁰ Procedural sedation is defined as the administration of analgesic or amnestic agents such that patients may endure otherwise intolerable procedures.¹¹¹ In the ED, these procedures typically include fracture or dislocation

reduction, synchronized cardioversion, and endotracheal intubation. Procedural sedation classically necessitates an RN to closely monitor the patient's vital signs, level of consciousness, and airway patency both during the procedure and during the post-procedural recovery period. Almost exclusively, this implies the RN is unable to provide care to other patients and is completely dedicated to the singular patient.^{112,113} This study is meaningful in two ways: the first, the RN is no longer needed to monitor post-procedurally, and instead is able to complete other tasks and care for additional patients. The second way lies in the latitude extended to paramedics in preoperative airway assessment, drug selection, and post-procedural monitoring.

While it seems that U.S. paramedics may have been afforded some latitude in triage and assessment of their own patients in earlier years, very little is written about this topic in the modern day.

Medication administration and emergency procedures

This subsection will examine the current implementation of paramedics in the ED with respect to their technical skills, including the administration of parenteral and enteral medications and the performance of emergency procedures. Paramedics' technical skills are fairly well-characterized in the field, including IV cannulation, intubation, and needle chest decompression; however, there are fewer studies completed on the topic in-hospital. Given that paramedics often perform these procedures in the least ideal of environments (e.g., the back of a moving ambulance, patient's home, public space) without the luxuries afforded by the hospital setting (e.g., sterility, light, additional resources and personnel

etc.), it is reasonable to conjecture that the in-hospital performance of these tasks may be superior to prehospital.

A 2016 retrospective chart review of patients receiving POCUS-guided IV cannulation demonstrated that trained, paramedic- and AEMT-certified EDTs could successfully obtain IV catheter access in the ED.¹¹⁴ This finding was demonstrated in 2015 as well through a retrospective-prospective combined methodology to assess the effect of paramedic- and RN-placed POCUS-guided IV catheters on central line placement rates.¹¹⁵ In a 2017 pilot study by Schauer and colleagues at a hospital-based ED in Louisiana, oriented U.S. Army combat medics were successfully able to administer a variety of parenteral medications safely to civilian patients under physician or physician assistant supervision.¹¹⁶ No medication-related adverse events or medication administration errors were documented. These combat medics received a training regimen equivalent to the NREMT's AEMT level of certification.¹¹⁶

A Halifax, Nova Scotia, pilot study in 2012 studied the effect on ED throughput of ACPs caring for low-acuity patients under the supervision of an emergency medicine physician. Scope of responsibilities included care coordination, medication administration, application of splints, and placement of sutures. The introduction of this model resulted in a 24 percent decrease in unexpected return ED visits within three days, as well as subjective overall improvements in flow.¹¹⁷ Clarke and team more fully characterize the broad and largely autonomous role of these 'department paramedics' in the same hospital ED aside from their role in treating urgent care-level patients. Department paramedics transport critically unstable patients to imaging studies (MRI,

CT, etc.) and inpatient wards, assist with resuscitation and patient airway maintenance, and manage their own code cart. They also respond to in-hospital cardiac arrests as part of a “code blue” team. These department paramedics were required to have at least three years of prehospital experience, as well as complete multiple airway intervention courses and high-fidelity simulation exercises.¹¹⁸

Similar to historical characterizations of this issue, it is seen that modern examples of ED paramedic integration highlight the manual and technical skills that paramedics offer above other contributions such as clinical assessment and interprofessional care.

Collaborative teamwork and interprofessional coordination

In a fairly radical example of paramedic integration, a rising trend in low-census EDs in rural Nova Scotia, Canada is to reduce overnight staffing to only a paramedic and RN without an emergency physician present on-site. In this “collaborative emergency center”, the paramedic is stationed inside the ED while an on-call RN may be present elsewhere in the hospital. Should it be necessary, as in the case of a prescription refill or an acutely ill or injured patient, a physician is available by phone to provide instruction and orders, and patients are able to be rapidly transferred to a tertiary care center. This model of care was developed to address extremely long wait times and lack of ED access in the Canadian system.¹¹⁹ In this circumstance, the paramedic will triage and assess the patient, and may request the on-call RN in situations requiring additional assistance (i.e., trauma patient, cardiac arrest patient, etc.).

A 2007 opinion piece considers one hospital's experiences with paramedics in ED, ICU, and cardiac care, as well as cardiac arrest response teams and interdepartmental transport. The author specifies that ED paramedics receive direction only from physicians, so concerns relative to nursing delegation of otherwise non-delegable tasks are assuaged; however, the criticality of strong team communication between paramedics and RNs during collaborative care was emphasized as the key to this example's success.⁸¹

While nursing advocacy groups may espouse a fairly unfavorable view of paramedics (and other EMS professionals) in the ED (discussed further in the Barriers to Implementation chapter), individual emergency nurses that work clinically with paramedics may have different thoughts. A 2001 article in *Nursing Management* surveyed staff emergency RNs in a hospital-based ED that utilized EMTs and paramedics to complete higher-level nursing tasks, such as IV cannulation, patient assessment, and indwelling (Foley) catheter insertion and management. Staff lauded EMT involvement, stating EMTs "provide excellent support for the ED nurse," and not only assist with but also "initiate patient care"; emergency RNs cite the extensive knowledge that EMTs enter the ED with as beneficial to both the patient and the entire hospital.¹²⁰

Overall, the exact specifications of how paramedics have been utilized in EDs have varied greatly over hospital system, geographic locale, and time. While both old and recent reports showcase the utilization of the technical aspects of a paramedic's training in the ED, very little modern research exists in the U.S. paramedic's assessment and triage abilities.

BARRIERS TO IMPLEMENTATION

In this chapter, barriers to further ED paramedic integration will be explored as they have been uncovered during the literature review. It has become apparent that these barriers come from three directions: (1) resistance from nursing advocacy organizations, (2) regulatory and legal challenges, and (3) challenges concerning public opinion and the personal attitudes of nurses and paramedics. It is important to note that there is some reinforcement amongst these factors, e.g., individual clinical nurse “turf wars” informing nursing organizational policies, thus lobbying for legislation to support that view.

Resistance from nursing advocacy organizations

Out of all the stakeholders interested in the ED paramedic topic, professional nursing organizations (such as national and regional nurses’ associations, state boards of nursing, and nursing educators) tend to take the most issue. Resistance from nursing advocacy groups has a rich history, although some older documents in the nursing literature portray EMS integration into EDs as a welcome and “creative”, if not cautious, solution to the nursing shortage as it was known at the time.¹²¹ This history is documented primarily through opinion pieces in journals and magazines, practice guidelines, and policy statements. It has appeared that this sort of barrier presents in two forms: specific resistance against job encroachment by paramedics and EMS personnel, and nonspecific resistance against increasing autonomy and scope of practice of non-nursing healthcare professionals, especially UAP.

Minton has described resistance from nursing organizations to ED paramedics as early as 1980, citing that these groups often viewed paramedics as either “underqualified for ED work” or a threat to the positions of emergency RNs.⁸⁵ In her 1997 master’s thesis referenced previously, Zennick documents extensive specific resistance from nursing advocacy organizations of the preceding decades starting in 1983. Historically, these concerns were centered around possibly decreased quality of patient care, increased fragmentation of care, and increased registered nurse liability, especially in situations where nurses act in a supervisory role for paramedics.¹⁰⁶

Concerns surrounding “scope dilution”, as referenced by Bruser and Whittaker in 1998, have been regurgitated and echoed various times over the previous two decades; this chiefly refers to other healthcare workers and UAP performing tasks that were once limited to nurses, therefore reducing the number of tasks that must be carried out by an RN.¹²² Polly Zimmermann, a nurse educator, has written extensively about the dangers associated with gratuitous UAP employment in acute care settings, and while her writings don’t explicitly comment on paramedic use, the tendency of the nursing profession to lump paramedics in with UAP in the hospital setting results in the same effect. Her concerns regarding inadequate training, inconsistency in the quality of task completion rendered, professionalism, and overall understanding of care are largely anecdotal.^{123,124} This lumping occurs due to the nursing profession’s lack of recognition of paramedics as licensed individuals. Another clinical nurse educator, in response to a 2008 editorial on the use of paramedics in hospitals, wrote that “paramedics view their jobs in the emergency department as temporary and are not motivated to do their best.”^{81,125}

In 2003, the Massachusetts Nurses' Association claimed that hospitals were attempting to replace RNs with "lesser qualified, unlicensed personnel", namely, paramedics in the ICU and ED. Naturally, the article comments that the only "skill mixes" that work are those with a large proportion of RNs, but similarly concedes that no research has been conducted on the care rendered by and practice of paramedics.¹²⁶

Some resistance is more nuanced than these unilateral examples. Margaret Freda conceded in the *American Journal of Maternal-Child Nursing* that patient education is the true defining characteristic of nursing, and that the trend in more technical nursing skills being performed by UAP, such as IV insertion and urinary catheterization, is par for the course.¹²⁷

Regulatory and legal challenges

Paramedics, like other healthcare professionals, may only practice under specific circumstances, dependent on the clinical setting, population, supervision, presentation of the patient, their scopes of practice, their educational backgrounds, and their credentials. The 2019 NHTSA National EMS Scope of Practice Model details that safe, competent, and effective care within their scope of practice can be rendered by paramedics with the requisite education, credential, license, and certification. Figure 3 is adapted from the Scope of Practice Model below, detailing the interrelation of these four notions.⁴⁶

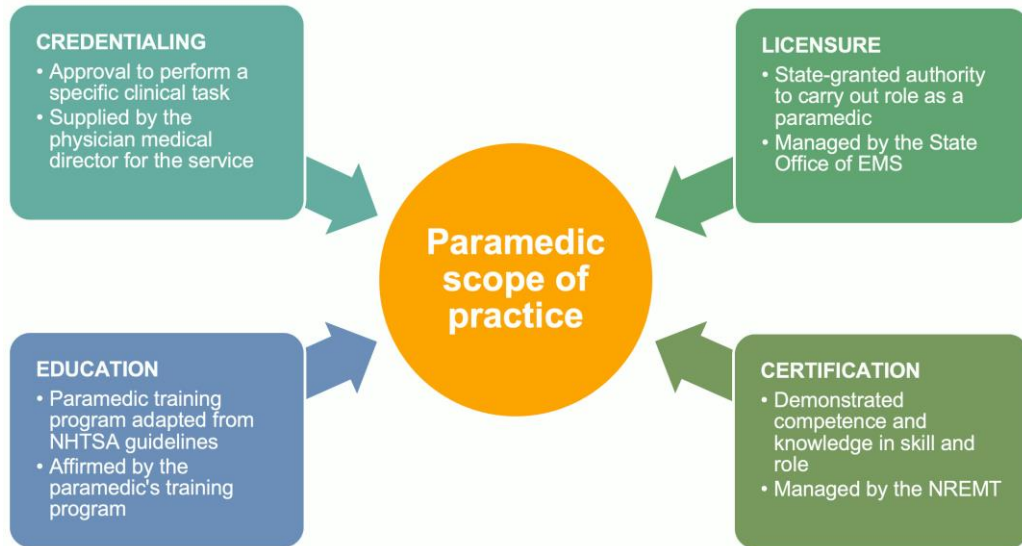


Figure 3. The four necessary constituents of the paramedic scope of practice.⁴⁶

Education chiefly refers to the sum total of a paramedic's training, including didactic and clinical exposure, continuing education experiences, and previous EMT courses. Licensure, regulated by a state's Office of EMS, determines if a paramedic is legally permitted by state authority to carry out their duties. Certification, most notably managed by the NREMT, affirms that the paramedic is minimally competent in their skills and knowledge for safe practice. Finally, credentialing considers the authorization by a physician medical director to a paramedic to complete a specific clinical task.⁴⁶ Thus, a given clinical activity is only within the paramedic's scope if the paramedic is simultaneously educated about it, certified to do it, credentialed to do it, and licensed to do it. Oftentimes, even though the other three components of this model are intact, the licensure aspect serves a barrier to integration.

The state-level legislative issues that undermine ED-based paramedic integration can generally be divided into three categories: certification vs licensure discrepancies,

scope-of-practice restrictions imposed by a state's EMS regulations, and overregulation imposed by a state's Nurse Practice Act.

Certification vs licensure concerns

To add an additional layer of complexity, there is often confusion among EMS clinicians and educators, nurses and other healthcare professionals, and some legal specialists concerning a paramedic's status as a certified or licensed individual in a certain state.¹²⁸ This derives from the large variability that exists in how state legislation refers to EMS personnel. For example, the Massachusetts OEMS states that while *licensed* ambulance services may employ an EMT, the EMT is *certified* by OEMS; additionally, no mention is made of an EMT or paramedic's license, only of their certification.¹²⁹ Other states may use both terms in reference to EMS personnel.

A unique situation is seen in Texas, where licensed and certified paramedics are separate entities; licensed paramedics (LPs) are those that have attained an associate degree in paramedicine or EMS, or a bachelor's degree in any field, while certified EMT-paramedics do not have a college degree.¹³⁰ While this incongruity doesn't seem to affect the practice of EMS clinicians in the prehospital setting, it generates uncertainty with regard to liability when additional licensed healthcare workers, such as RNs and respiratory therapists, collaborate with paramedics during patient care.

Scope of practice limitations

As one might be able to deduce, even if a paramedic is educated on a skill, has certified their competency in said skill, and is credentialed to perform said skill, and their

license is explicated in state law, a paramedic's scope may only support performance of said skill in a specific and limited clinical context, namely, the prehospital environment. Clinical activities similar to those performed by emergency RNs are typically legally endorsed when they are performed by paramedics (e.g., medication administration, assessment, emergency procedures, clinical judgment and decision-making, etc.), assuming they are within the paramedics' scope of practice. However, many jurisdictions heavily constrict the context in which paramedics may render care to the prehospital setting; to complicate matters, state laws vary widely in how specifically or vaguely such restrictions are written.¹³¹ For example, California law only allows licensed paramedics to render authorized patient care during emergency transport, on scene, and during interfacility transfer. Only during training, such as a clinical internship in the ED or intensive care unit, may the paramedic provide care under the supervision of an RN, physician assistant, or physician in another setting.¹³²

In contrast, other states such as Georgia and Utah specify that a paramedic may treat any patient that presents with an "emergency medical condition" without reference to the clinical context in which care may be initiated^{133,134}; however, the limiting factor here is not necessarily the location of care, but the specification that the patient's presentation must be emergent. Georgia defines an "emergency condition" as one that would lead a reasonable individual of average medical knowledge to believe that lack of treatment for said condition would result in serious jeopardization of a patient's health, "serious impairment of bodily functions", or "serious dysfunction of any bodily organ or part."¹³⁵ In 2018, 86 percent of ED visits resulted in treatment followed by discharge,

with the two most common chief complaints among visits being minor injuries and abnormal laboratory findings¹³⁶; it has also been determined that 13–27 percent of ED visits could be managed effectively in an urgent care or primary care office.¹³⁷ As such, the prevalence of non-emergency care administered in the ED may prevent paramedics from rendering advanced care in this context.¹³¹

There have been major advances in legislation supporting scope of practice expansions for ED-based paramedics recently. In 2015, two Texas bills (H.B. 2020 and companion S.B. 1899) were proposed and passed that explicitly allow for licensed paramedics to function in EDs at their full, unmodified scope under the supervision of a licensed physician.¹³⁸

Nurse Practice Acts

State Nurse Practice Acts (NPAs), generally formulated into practice guidelines issued by a state's Board of Nursing (BON), specify the scope of nursing practice, define the process for nursing licensure, as well as delineate disciplinary procedures for nurses that violate the NPA. In this way, BONs are given the authority to regulate nurses that fall under its purview with the intent of protecting the public from individuals engaged in dangerous, unprofessional, or incompetent nursing practice.¹³⁹

However, NPAs also frequently legally define the practice of registered nursing as a series of specific attributes, actions, skills, and knowledge possessed or done by an RN. Typically, the practice of registered nursing includes patient assessment, health promotion, patient advocacy, data analysis, planning, enactment of a medical regimen prescribed by a physician (including medication administration, procedures), and

collaboration with other members of the patient’s healthcare team.¹⁴⁰ As stated previously, some NPAs also specify what clinical tasks can be delegated to UAP and what tasks must be completed by an RN; the latter typically involves assessment and critical thinking.¹⁴⁰

Naturally, as stated previously, many of the responsibilities attributed to the practice of registered nursing are also attributed to the practice of paramedicine, particularly the non-technical skills such as planning, clinical judgment, analysis of patient data, and application of scientific knowledge to patient care. Given that laws that regulate EMS personnel often fail to explicitly stipulate both the specific activities that are carried out by a paramedic and that such activities are lawfully protected, there is concern that in-hospital integration of paramedics could result in the unlicensed practice of nursing.

Some NPAs actually do specify what roles paramedics may have, if any, in the ED; for example, the Arkansas NPA exempts “[h]ospital-employed professional paramedics...administering medication for diagnostic procedures under the direction of a physician” as a violation of this act.¹⁴¹

Societal resistance and cultural factors

In a 2021 article in *The Atlantic*, Marion Renault writes that “[t]he misconception that emergency medics provide transportation, not medicine, leaves them to cope with all sorts of indignities.”¹⁴² While limited research exists concerning public opinion of EMS providers, it appears this unfortunate perception persists; the public consistently

underestimates the training paramedics get and level of care they can provide, and often conflates the skill and knowledge of EMTs with that of paramedics.⁴⁴ This is inconsistent with perception of paramedics in other countries where oftentimes paramedics are thought to be held in high social regard as health professionals.¹⁴³

Likely, these more negative notions in the U.S. arise from the predecessor of the professional paramedic, the medically-untrained “ambulance driver” of the 1960s and 1970s.¹⁴⁴ Naturally, public opinion informs and controls public policy and legislation, thus outdated notions of paramedic as technician rather than healthcare professional have probably contributed to the inability of EMS professionals to “breach” the in-hospital setting. As mentioned previously, while Texas has legally endorsed ED paramedic practice in the hospital-based ED under a physician’s supervision, and a cursory look at ED paramedic job descriptions in Texas reveals language mirroring this legislation, many examples continue to require RN supervision with restrictions preventing the use of advanced skills.^{145–147} This demonstrates that even when there is legal facilitation for ED paramedic integration, older attitudes may dominate in practice.

Attitudes and perceptions within the nursing and paramedic communities

As noted previously by Minton, regional politics and attitudes may be more contributory to preventing integration than actual appraisals of paramedic competence.⁸⁵ Observational research by Palmer and Gonsoulin has showcased that conflicts (so-called “turf wars”) that occur between paramedics and emergency RNs originate from perceived superiority in patient assessment skills on the part of the RN, as well as jealousy of paramedics’ comparatively larger scopes of practice in the field. These interprofessional

skirmishes seem to be largely driven by the manners in which paramedics and emergency RNs communicate with each other.¹⁴⁸

In the case of emergency RN-supervised or -oriented paramedics, there may be some lack of clarity as to who the paramedic is directed by or reports to. Given that the fundamental training of all EMS personnel, as described previously, relies on online, offline, or protocol-driven physician direction, there may be confusion when an RN orients the paramedic to the ED.¹⁰⁶ On the other hand, paramedics on the whole tend to be supportive of the idea that paramedics should have a commonplace role in the ED, but often specify that their scope of practice in-hospital should mirror that in the prehospital setting.¹⁴⁹ There is additionally a small subset of individual paramedics that find that making hospital-based paramedic integration is not a priority, and instead view it as confining paramedics to work conditions that don't allow them to utilize their full scopes of practice.⁸⁷

DISCUSSION

In this thesis, we've explored hospital-based ED implementation of paramedics in the U.S. in the context of addressing ED overcrowding and surge events. A review of the EMS system was provided, with an emphasis on comparing RN and paramedic educational profiles to identify disparities in learning and competence. The historical and contemporary case studies of ED paramedic implementation in North America that demonstrated ED paramedic usage primarily as task-oriented RN adjuncts were then reviewed, with some European comparanda. Barriers that exist to ED paramedic

integration were examined, with the major focus involving advocacy by professional nursing organizations. In this discussion, there will be commentary on the evolving trends in ED paramedic integration, and their viability as RN alternatives in the ED setting during severe EDOC and surge events. Recommendations for policy and practice will be considered, and suggestions for future inquirers into this developing field will be made.

The importance of high-quality patient care delivered by nurses, and in particular RNs, across all disciplines, especially in the ED, cannot be overstated; this is a well-established fact. In many ways, nurses have established the practice of care in the ED alongside physicians in emergency medicine and paramedics in prehospital care. However, nurses', other healthcare providers', and the public's current understanding of the educational preparation of the paramedic in the U.S. is largely constructed from antiquated notions of what a paramedic does and what a paramedic is educated and prepared to do. Out of this misinformation has come fairly aggressive resistance to what could be a feasible solution to ED understaffing.

As suggested by the review of the literature concerning RN and paramedic education and training, in-hospital utilization of paramedics acting as emergency RN alternatives, particularly during times of EDOC and high patient census, is a viable consideration. It has been established that paramedics excel at the technical aspects of ED care given their training, but there has been some question regarding paramedics' non-technical skills (clinical judgment, assessment, planning) as they compare to those of ED RNs. Figure 4 below illustrates this concept that RNs approach competency and

professional growth in ED care from a wide-but-shallow perspective (i.e., a nursing generalist), while paramedics approach from a narrow-but-deep perspective.⁸²

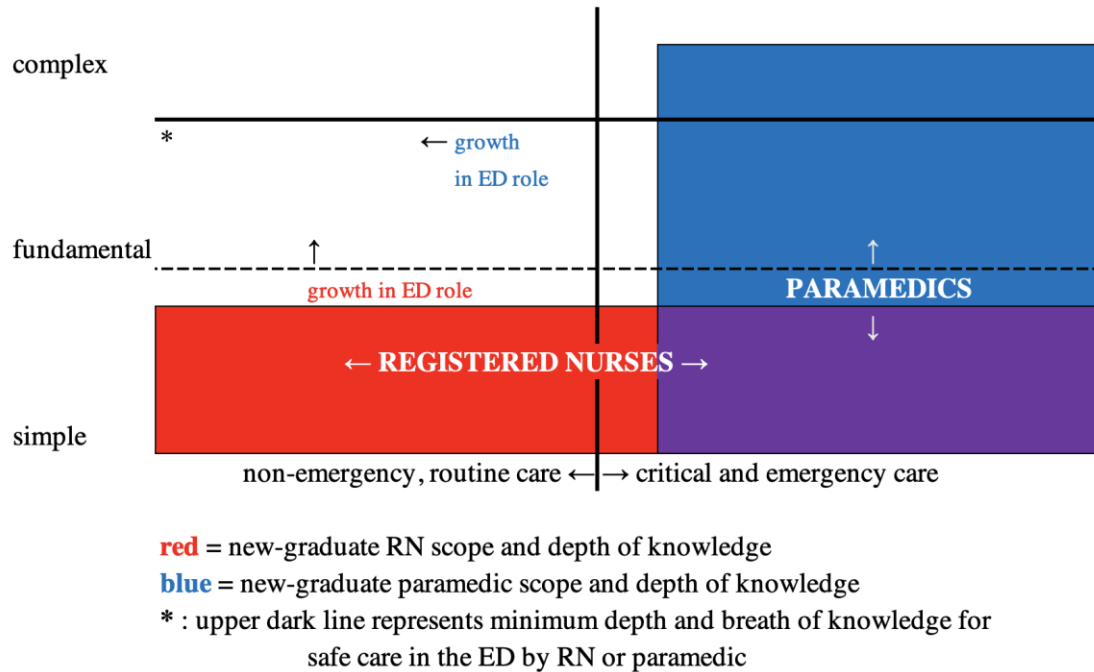


Figure 4. Overlap of RN and paramedic scopes (*horizontal axis*) and depths (*vertical axis*) of knowledge prior to hypothetical ED orientation and growth in role.⁸²

While more research must be conducted in this specific field (as stipulated in Limitations), the similarity in training between the two professionals in these domains suggests that when properly oriented to the ED, paramedics can be effective RN alternatives. In exploring barriers to paramedics working in EDs, it was also apparent that in many cases, concerns and resistance to this new role for paramedics emerged out of pre-existing attitudes and notions rather than actual concern over paramedic competency and education.

Case studies which explicitly investigated ED throughput metrics demonstrated expedited patient flow through the ED when paramedics were implemented as nursing

adjuncts. This likely attributable to modifying multiple throughput contributors delineated in Table 1, such as increased RN satisfaction with the workplace due to increased support, and augmented triaging capabilities when ED paramedics complete this task, in addition to overall increases in staffing. This seems to hold true both in cases where paramedics function as traditional EDTs and where they are able to utilize their manual paramedic skills, such as IV cannulation and medication administration; this was theorized to allow the RN more time to complete nursing tasks, such as assessment and care planning.

Recommendations for practice

In terms of recommendations for practice to address barriers to underutilization of paramedics in the ED that have evolved from this literature-based inquiry, approaches to the issue could be divided into four educational recommendations and four legislative recommendations.

Educational recommendations

First, based on this review comparing paramedic and emergency RN training, the development of a transitional, hospital-based standardized orientation program for paramedics that builds upon the NHTSA Standard Curriculum for Paramedics is encouraged. This would not be a regulatory guideline, but instead assist hospitals with developing ED orientation curricula that accounts for the extensive clinical skills and knowledge the paramedic enters with, while addressing known deficiencies (such as those specified in Table 2). Specifically, the curriculum could emphasize the

management of perioperative care patients, operation of critical care devices, primary care procedures, administration of high-risk IV agents (e.g., thrombolytics, insulin, blood products, potassium solution, etc.), and assisting physicians with emergency procedures.

Additional components that have been cited as lacking include interprofessional interaction and managing patient care longitudinally. Some of this curriculum (such as procedural assist) could be adapted from existing materials for EDTs. Emergency RNs typically receive the bulk of their ED training during orientation and on the job, as opposed to in nursing school, so this seems like a reasonable suggestion; additionally, the ENA has developed a standardized ED orientation for both new-graduate and experienced RNs, so there is some precedent for this.¹⁵⁰ Wake Forest University Baptist Medical Center has had success with a paramedic orientation program at their Level I trauma center. This 12-week-long orientation mirrors that provided to new emergency and critical care RNs, covering pediatric assessment, interpretation of arterial blood gas results and hemodynamic parameters, advanced pharmacotherapy, and ventilator settings. Paramedics in this program also complete several rotations in various critical care areas, such as the pediatric, trauma, and neurosurgical ICUs.⁷

Second, foreign models from Turkey, Canada, and the United Kingdom demonstrate not only extensive utilization of paramedics in nontraditional roles (such as various acute care settings, triage, etc.), but also redefine the minimum education level needed to practice as a paramedic to be significantly higher than in the U.S. In the U.K., paramedics require a bachelor's degree to practice at the entry level with approximately 2,250 hours of in-hospital rotations and on-ambulance exposure completed; additional

master- and doctoral-level study is common.¹⁵¹ Emergency care practitioners (ECPs) are paramedics that have qualified to work at an intermediate level between paramedic and midlevel provider in a wide variety of settings, including EDs and primary care contexts.¹⁵² New Zealand has established a similar role with a scope of practice similar to that of the U.S. emergency nurse called the emergency care nurse/paramedic (ECNP), available to both nurses and paramedics.¹⁵³ While this doesn't directly address the issue of EDOC, it could lead to important considerations regarding who should be permitted to provide care in the ED. Policymakers, hospital administrators, and paramedic educators should look to these systems for guidance in both ED-based paramedic integration, as well as how healthcare roles can be optimized for collaboration and efficiency.

As healthcare providers across the board become more skilled and are challenged at a higher level of competency, it is important that those changes be formalized; EMS is no different. The establishment of NREMT and NHTSA guidance that having an associate degree is preferred for paramedic licensure, with the ultimate goal of this being a minimum requirement (i.e., a paramedic must be a graduate of an accredited school of paramedicine in order to be licensed) is recommended. This could also take the form of regulations mirroring Texas state law as it relates to the licensed paramedic, while additionally phasing out the unlicensed, certified-only role to encourage those to complete a degree program.

Similar to the previous recommendation, public awareness education concerning paramedic knowledge, practice, and competency could also effect change in the legislative sphere, as well as address any public fears that in-hospital paramedic care is

inferior to that of RNs. This recommendation is supported by the public perception that EMS personnel educational profiles are largely unknown, but that EMTs should ideally have some college courses completed and that paramedics should require a two-year degree to practice.¹⁵⁴

Regulatory and legislative recommendations

As alluded to previously, the elimination of specifications in state laws that restrict paramedic practice based on location or presentation of the patient (i.e., emergency vs. nonemergency) is a reasonable recommendation, or amendment of those laws to include the ED. During the start of the COVID pandemic, many states passed legislation to expand the role of paramedics and EMTs to support public health, and in some cases, voted to maintain that scope indefinitely. This example may, in the future, garner support for additional laws that expand paramedic practice into the hospital realm.

The modification or elimination of clauses in state NPAs that define the care that paramedics yield in the hospital setting as “nursing” care is suggested. This includes explicitly removing references to assessment, planning, and clinical judgment as nursing care, as well as clarifying exceptions to the NPA that cover paramedic practice. It is clear, based on the professional conduct and responsibilities of the paramedic, that these activities are not solely performed by nurses and should be re-evaluated to that effect.

Statutory successes in Texas should be encouraged in other states that allow paramedics to practice in EDs specifically under the supervision and direction of a physician. This recommendation is in line with the existing framework that paramedics take orders from physicians or otherwise operate under a physician’s protocol in the field.

Ideally, all statutes of this variety would clarify the legal relationship that exists between emergency RNs and ED paramedics, if any, when collaborative care is occurring.

As explored previously, the language surrounding licensure and certification of paramedics at the state level is vague in many instances and can lead to confusion regarding ability to and scope of practice. Given that licensure is a legal authorization to perform a specific role and confers liability for their practice to the licensed individual, it is recommended that licensure be the standard unilaterally, and that state legislature be developed to support this. Due to the frequency with which full ED paramedic integration and service as nurse alternatives during periods of extreme EDOC and RN shortage is prohibited due to their perceived status as UAP, this reaffirmation that paramedics are licensed healthcare providers could encourage hospital systems to consider them for ED integration.

Limitations

Due to the limited state of academic inquiry into this specific topic, there are several limitations attributable to this literature-based thesis. Primarily, the abundance of case reports, opinion papers, and letters and complementary absence of large-scale metaanalyses and experimental trials with control arms degrade the strength of these conclusions. While unfortunate, this fact hopefully encourages future experimentation in this important public health topic. Similarly, there are no reports directly comparing care rendered by nurses versus paramedics in the ED using clinically relevant parameters.

The specificity of the research questions themselves to the ED setting also limits generalizability. The ED is a very unique and clinically challenging setting where professionals of all levels require a vastly different set of skills than those in other medical services. While it wasn't specifically reviewed, little research seems to exist into paramedic integration into other clinical settings, such as urgent care clinic, inpatient medical or surgical ward, operating room, and outpatient clinic. Paramedic applicability to the intensive care unit has been explored in a limited fashion.^{79,155} As such, our discussion here is only applicable to the hospital-based ED.

As mentioned previously, there has been considerable advancement of in-hospital paramedic practice in the U.K., as well as in Turkey and Scandinavia. This is likely attributable to their differential training curricula requiring a baccalaureate or higher degree to practice, as well as the disentanglement of their practice from that of RNs. Thus, while non-North American implementations of paramedics in EDs as cultural comparanda were briefly included, these provide more of a sense of what may be done in the future as opposed to current U.S. trends.

Another major limitation considers regional variability. Extensive research has been done identifying the high variability in prehospital EMS practice between rural, suburban, and urban EMS systems and differences that exist in statewide treatment protocols.^{156,157} Similarly, as seen previously, various hospital systems regulate the functional scope of EDTs and related roles quite differently as well. While the paramedic model stipulated in the NHTSA National EMS Scope of Practice Model was considered here due to its wide adoption by statewide EMS protocols, states that have a wider scope

of practice available to paramedics may be more successful in integrating paramedics in EDs both as RN adjuncts and alternatives. Thus, it is likely that these region- or state-specific practices have strong impacts here.

A final, and possibly most crucial, consideration here is that paramedic integration in reducing EDOC has not been empirically examined. Much work has occurred around the role of the paramedic in reducing EDOC from the prehospital side, such as through mitigating patient offload delay, expediting transfer of care to the ED, and community paramedicine, but very little to none on the in-hospital side.¹⁵⁸ This is to say, while the idea that nursing staff augmentation by ED paramedic is an effective tactic is theoretically sound, this may not be borne out by dedicated studies of that effect.

Future suggestions for inquirers

There are several approaches to remedying the aforementioned limitations, which are primarily a product of the quantity of research available. Randomized, controlled trials (RCTs) are the gold standard for clinical investigation, and their implementation against the research question here could be game-changing. Investigating patient care outcome parity between RNs and paramedics would be a crucial target. A hypothetical experimental setup for a large-scale RCT could include randomizing paramedic versus RN assignment to patient groups matched for acuity, demographic information, and chief complaint. Applicable safety considerations could include direct paramedic supervision by an additional RN during the study.

Measured patient health outcomes could include readmission rate, mortality, complication rate, excess hospital days in acute care, patient safety (i.e., fall occurrence, medication error rate, etc.), and patient experience and satisfaction; these are typical health outcome variables studied by Centers for Medicare Services (CMS).¹⁵⁹ A similar study focusing on the efficacy of implementing paramedics in traditional ED nursing roles on easing EDOC could be done as well, with ED-specific measures being quantified instead.

Given the relative lack of inquiry comparing the assessment and triage skills of paramedics and emergency RNs in the ED setting, an interrater reliability study of this topic could be informative. This study could mirror that conducted by Kahveci and colleagues (2011); paramedics and RNs could both complete a three- or five-level triage assessment on a group of patients, and their agreement could be measured.

Additionally, in order to confirm the applicability of foreign models of ED paramedic integration to the U.S. system, dedicated comparisons should be drawn of scope of practice, knowledge, and education between foreign and American paramedics. A similar comparison should be studied between American civilian paramedics and military medic corpsmen, identifying the extent of applicability of studies that consider this population.

CONCLUSION

Emergency department overcrowding (EDOC) is known to result in increases in patient mortality, adverse events, and ED wait times. Oftentimes, reduced emergency RN

staffing both results in and is caused by EDOC. Paramedics may serve to augment ED staffing by serving as both RN adjuncts as well as RN alternatives given their extensive training in critical and emergency care. Paramedics have historically been integrated in the ED primarily for their previously developed technical skills, with some modern models of ED paramedics showcasing their use of advanced skills and clinical acumen. While much more research is needed in this area of focus, there is evidence that establishes parity between RN and paramedic education in the U.S. as far as emergency care. This implies that paramedics could function as viable alternatives for RNs in the ED setting. The most impactful barrier to further paramedic integration into EDs seems to be nursing professional resistance, partially driven through legislation and regulation, although public and peer perception also seems to play a role.

Recommendations made in response to the literature review address both educational and legislative targets. Educational practice recommendations include the development of a standardized guideline for in-hospital orientation of paramedics, and support for guidelines that emphasize associate degree-preparation as a minimum requirement for paramedic licensure. Legislative and policy-related suggestions considered eliminating components of state regulatory acts that restrict paramedic practice on the basis of treatment location and patient acuity, modifying existing state Nurse Practice Acts, and encouraging state legislation that explicitly permits the ED-based paramedic practice under a physician. Findings were limited by the predominance of opinion pieces and case studies in the primary literature, as well as by state variations

in practice. Future suggestions for study included patient outcomes dependent on emergency RN care contrasted with paramedic care.

APPENDIX A

Comparison of scope of practice of various EMT levels, with emphasis on high-level skills.⁴⁶

SKILL	EMT	AEMT	PARAMEDIC
I. Airway management			
Continuous positive airway pressure (CPAP)	⊙	⊙	⊙
Cricothyrotomy			⊙
Endotracheal intubation			⊙
Needle chest decompression			⊙
Oxygen administration – nasal, oral	⊙	⊙	⊙
Oxygen administration – oral (bag-valve mask)	⊙	⊙	⊙
Supraglottic airway placement		⊙	⊙
II. Cardiac management			
Defibrillation	automated	automated	manual
Electrical cardioversion			⊙
Hemorrhage control	⊙	⊙	⊙
Interpretation of 12-lead ECG			⊙
Transcutaneous cardiac pacing			⊙
Transvenous cardiac pacing monitoring			⊙
III. Musculoskeletal precautions			
Splinting and spinal immobilization	⊙	⊙	⊙
Traction splint for femur fracture	⊙	⊙	⊙
IV. Allowed medication routes of administration			
Intramuscular (IM)	⊙	⊙	⊙
Intraosseous (IO)		⊙	⊙
Intravenous (IV)		⊙	⊙
Rectal (PR), topical (TOP)		⊙	⊙
Subcutaneous (SQ)		⊙	⊙
V. Other skills			
Administration of medicated IV fluids			⊙
Administration of non-medicated IV fluids		⊙	⊙
Glucometry	⊙	⊙	⊙
Blood chemistry analysis			⊙
Orogastric, nasogastric tube (OGT, NGT) insertion			⊙

LIST OF ABBREVIATED JOURNAL TITLES

Acad Emerg Med	Academic Emergency Medicine
Adv Data	Advanced Data
Adv Ther	Advances in Therapy
Am J Disaster Med	American Journal of Disaster Medicine
Am J Emerg Med	American Journal of Emergency Medicine
Am J Matern Child Nurs	American Journal of Maternal-Child Nursing
Am J Med Qual	American Journal of Medical Quality
Am J Nurs	American Journal of Nursing
Am Nurse	American Nurse
Ann Emerg Med	Annals of Emergency Medicine
Australas Emerg Care	Australasian Emergency Care
Australas J Paramed	Australasian Journal of Paramedicine
BMC Emerg Med	BioMed Central Emergency Medicine
BMJ Qual Saf	BMJ Quality and Safety
Bull World Health Organ	Bulletin of the World Health Organization
CJEM	Canadian Journal of Emergency Medicine
Crit Care	Critical Care
Dtsch Arzteblatt Int	Deutsches Ärzteblatt International
ED Manag	ED Management
Emerg Med J	Emergency Medicine Jour`nal
Emerg Med News	Emergency Medicine News

Health Aff	Health Affairs
Health Sci Rep	Health Science Reports
Health Serv Res.....	Health Services Research
Healthc Manag Forum	Healthcare Management Forum
Hosp Health Netw.....	Hospital and Health Networks
Int Emerg Nurs.....	International Emergency Nursing
Int J Emerg Med.....	International Journal of Emergency Medicine
Int J Environ Res Public Health.....
.....	International Journal of Environmental Research and Public Health
Int Paramed Pract.....	International Paramedic Practice
J Am Coll Emerg Physicians Open.....
.....	Journal of the American College of Emergency Physicians (Open)
J Emerg Nurs.....	Journal of Emergency Nursing
J Nurs Regul.....	Journal of Nursing Regulation
J Pers Med.....	Journal of Personalized Medicine
J Public Health Policy	Journal of Public Health Policy
J Rural Health.....	Journal of Rural Health
J Ultrasound Med.....	Journal of Ultrasound in Medicine
JAMA Netw Open	Journal of the American Medical Association Network Open
JEMS.....	Journal of Emergency Medical Services
Med Care.....	Medical Care
Med J Aust.....	Medical Journal of Australian

NEJM..... New England Journal of Medicine
Nurs Adm Q.....Nursing Administration Quarterly
Nurs Econ..... Nursing Economics
Nurs Manag..... Nursing Administration
Nurse Educ Pract.....Nurse Education in Practice
Pediatr Emerg CarePediatric Emergency Care
Prehosp Emerg Care.....Prehospital Emergency Care
Prehospital Disaster MedPrehospital and Disaster Medicine
West J Emerg Med Western Journal of Emergency Medicine

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