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**COMMUNITY PARAMEDICS' PERCEPTION OF THEIR ROLES
IN COMMUNITY PARAMEDICINE PROGRAMS**

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Dedication

I dedicate this book to God Almighty for His unconditional love and continual protection. Also, I dedicate this book to my family especially my late mum who taught me to always be true to myself and aim for the stars. Mum, you are greatly missed!

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My immense gratitude goes to my advisor, Dr. Moczygemba for her continual support, invaluable feedback, and mentorship. Also, my appreciation to my committee members, Dr. Thurman, Dr. Brown, and Mr. Hanson for their invaluable feedback and support on this project. I would like to extend my gratitude to James Baffoe for his feedback and contribution. I am thankful to my colleagues, Kemi, Chinelo, James, and Owanate, for their support during difficult times. Finally, I appreciate my friend, James, for his immense encouragement and support.

Abstract

COMMUNITY PARAMEDICS' PERCEPTION OF THEIR ROLES IN COMMUNITY PARAMEDICINE PROGRAMS

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Community Paramedicine (CP) is an evolving care model that expands paramedic roles to a focus on non-emergent and preventive health services tailored to local community needs. Though acceptance of CP is gradually increasing, there is limited research on how community paramedics (CPs) perceive their expanded roles. Thus, the study aim is to assess CPs' perceptions about their training, roles, role clarity, role readiness, role satisfaction, professional identity (PI), and interprofessional collaboration (IPC).

The results from a cross-sectional, web-based survey of 57 eligible members of the National Association of Emergency Medical Technicians (NAEMTs) were evaluated. Respondents worked as a CP for 29.0 hours/week (SD 15.8), and 30.8% had 4 years or more of CP experience, had 18.0 years (SD = 9.9) of EMT/paramedic experience, and majorly performed health assessments (96.5%). There were variations in perceptions of role clarity (M=15.5; SD=4.3), PI (M=46.8; SD=6.1), and role satisfaction (M=4.4;

SD=0.9)). Eighty percent completed didactic and/or clinical training. Participants were neutral about their role readiness (M=3.3/5; SD=0.8), mostly collaborated with physicians (94.3%), and viewed IPC as very important (M=9.5/10; SD=0.9)).

There was a positive, significant association between PI and role clarity ($p=0.0013$), and PI and IPC ($p=0.0015$). Role satisfaction was higher ($p=0.0114$) among participants that completed training (M=29.4, SD=39.3) compared to those that did not (M=16.7, SD=39.3). There were significant differences in the extent of IPC in performing patient navigation ($p=0.0023$), health promotion ($p=0.0037$), and injury prevention/safety assessments ($p<0.0001$). Participants with at least weekly performance of respective roles reported greater IPC compared to those who did not perform the respective roles.

Sustainable payment models, a shift to CP models as EMS standard of care, and expansion in service delivery and geographic reach, and a more standardized training curriculum are important to the future of CP. COVID-19 challenges included CPs wellbeing, inadequate funding to meet service needs, and keeping up with an emerging understanding of policies/procedures; opportunities included expanded service delivery, enhanced telehealth utilization, and CPs being flexible to meet community needs. Future studies should focus on understanding factors that impact CP role clarity and how role clarity, role readiness, role satisfaction, PI, and IPC could be improved.

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Chapter 1: Introduction & Literature Review

1.1 BACKGROUND

Community paramedicine (CP) is an evolving community health-based model that utilizes community paramedics to provide patient-centered care to address the needs of the local community in non-emergent expanded roles.¹⁻⁴ Due to the complex and fragmented health care system in the United States (US),⁵ in 1996, the National Highway Safety Traffic Administration (NHSTA) and the Health Resources and Services Administration published a consensus document titled “Emergency Medical Services (EMS) Agenda for the Future.”^{6,7} The EMS Agenda for the Future outlined a vision statement that proposed that EMS will contribute to the appropriate utilization of health care resources and increase community-based health services by integrating with health care providers and agencies.^{6,7} The statement also highlighted that EMS will have “the capacity to identify and modify illness and injury risks, provide urgent illness and injury care and follow-up, and contribute to the treatment of chronic conditions and community health monitoring.”^{6,8} In 2001, the term “community paramedicine” was coined, which refers to a community-based care model that aims to increase access to primary and public health services, mitigate uncoordinated health care systems and decrease health care costs.^{5,9}

Though other care models (e.g., Community Health Aides, Community Health Workers, Community Care Teams and recently, Primary Care Technicians) with similar objectives as CP exist,² unique features that differentiate CP from other care models have been described.¹ O’Meara et al. (2016) characterized CP as situated care practice where community paramedics conduct in-home visits and facilitate patient coordination and referrals, while building community trust and engagement.¹ During in-home care, patients express health concerns and challenges, and potentially harmful factors (e.g., medication adherence issues, inappropriate medication use, safety hazards) may be revealed and

addressed by community paramedics. Patients' health care providers are updated on these findings, thus improving communication, patient safety, and outcomes.¹⁰ In-home care also presents an opportunity to educate patients on their health conditions, provide support, and suggest strategies for improved care.^{11,12} Also, patients' home environments can be assessed for potential risk factors (such as fall hazards and safety issues) to prevent exacerbation of their health conditions or new problems from occurring.^{11,13,14} Another feature of CP discussed by Bridges et al. (2016) is that community paramedics are actively involved in their patients' health, therefore building trust, a sense of security, and positive connections.^{1,10} This positive relationship stimulates self-management of health conditions, thereby build patient confidence and autonomy.¹⁰

The unique attributes of CP mentioned above create an avenue for community paramedics to deliver a variety of health services such as health promotion, falls prevention, in-home safety checks, referrals, patient navigation, chronic disease management, and medication management.^{1,9,10,15,16} From this range of health services, based on the community needs, CP programs can be tailored to either address a specific community need such as diabetes management, or a broad range of services like health promotion activities.^{17,18}

The application of the CP care model is spreading globally especially in the United Kingdom (UK), Canada, New Zealand, Australia, and the US.¹⁵ A 2017 national survey revealed that 129 CP programs exist across 33 states in the US.¹⁹ Despite this growing number, there is an underlying pressure for CP programs to demonstrate how CP adds value to the health care system.¹⁸ Therefore, many CP programs in the US are in development or pilot stages to assess their effectiveness.^{15,20} Also, the sustainability of CP programs is dependent on CP outcomes which are influenced by practice regulations/legislation, funding, and data accessibility.² Irrespective of these challenges,

studies of CP programs show that CP programs address overutilization of emergency departments (EDs) and 9-1-1 non-emergent calls, facilitate care coordination, and decrease health care costs.^{2,21,22} Improved clinical outcomes and patient satisfaction have also been reported.^{13,15,23}

Typically, community paramedics undergo additional education and training to provide expanded non-emergent services under medical supervision.^{1,24,25} It has been proposed that training programs for expanded roles should equip community paramedics to demonstrate capabilities such as “clinician, team member, leader, health/social advocate, educator, reflective practitioner and professional.”²⁵ Therefore, community paramedics are required to possess patient care and interpersonal skills for these expanded roles.^{13,19} Patient care skills include performing health assessments (e.g., vital signs, neurological assessments, physical activity assessments, nutrition assessment), medical history/physical assessments, laboratory specimen collection (e.g., blood draws, urine collection), minor medical procedures (e.g., peripheral intravenous access, wound care), immunization administration, and health screenings.¹⁹ Interpersonal skills like communication, emotional intelligence, leadership, managerial skills, respect for other professional roles, and cultural receptiveness facilitate collaboration with health providers and build lasting relationships with patients.^{1,20,25,26}

Though acceptance of CP is gradually increasing,²⁷ the transition to expanded roles and collaboration with health care professionals can impact how community paramedics perceive their professional identity. Furthermore, the roles and responsibilities of community paramedics may be questioned by some health professionals as community paramedics deliver non-emergent services and interact with providers in new ways.¹⁸ In particular, there may be concerns about overlapping roles with some health professionals and community paramedics’ education and training to take on such roles.²⁸

Little is known about how community paramedics perceive these expanded roles, professional identity (PI), and the effect of training on role readiness as community paramedics transition from the provision of acute care to the delivery of non-emergent expanded roles.

Therefore, the purpose of this study is to assess the perceptions of community paramedics on their training, roles, role clarity, role readiness, PI, and role satisfaction as they transition from traditional acute roles to expanded non-urgent roles. Also, the type of health professionals they collaborate with, the extent of interprofessional collaboration, and the characteristics of CP programs will be assessed.

1.2 CP OVERVIEW

The CP overview consists of five sections that provide a summary of CP. Sections one and two cover definitions of CP and community paramedics. Section three gives a brief description of CP practice settings. CP program reach will be discussed in the fourth section. In the final section, CP education and training will be addressed.

1.2.1 Definition of CP

Presently, there is no standard definition of CP. However, several definitions of CP have been proposed (Table 1.1). The definitions are similar in their description of CP as a community-focused care model where paramedics and EMTs practice beyond their traditional roles of providing acute treatments to providing non-urgent primary, public health, and preventive community-based care.^{3,18} Services provided are flexible to the local community health needs and utilize available health resources while avoiding duplication.^{18,29}

Table 1.1: Definitions of CP

Organization	Definition
The First International Roundtable of CP, Nova Scotia in Canada (2005) ³⁰	“...a care model whereby paramedics apply their training and skills in the non-traditional community-based settings, often outside their usual emergency and transportation model.”
National Association of States EMS Consensus Conference (2012) ³	“...an emerging health care delivery model that increases access to basic services through the use of specially trained EMS providers in an expanded role.”
National Highway Safety Traffic Administration: EMS Agenda for the Future ⁶	“...an organized system of services, based on local need, which is provided by EMTs and paramedics integrated into the local or regional health care system and overseen by emergency and primary care physicians.”
Rural Health Information Hub ³¹	“...an evolving health care model that utilizes paramedics and EMTs to operate in expanded roles in assisting with public health, primary care, and preventive services with the aim of increasing access to health care.”

CP = community paramedicine; EMS = emergency medical services; EMTs = emergency medical technicians

Mobile integrated health (MIH) is sometimes used interchangeably with CP, although they are not the same.^{1,19} Unlike CP programs that utilize only community paramedics in the provision of health services, MIH is much broader in employing any type of health care provider.^{1,20,31,32} MIH involves the use of a triage professional to assess patient’s needs and connect them to the most appropriate health resources.³¹ Therefore, MIH systems can function without a community paramedic. However, recent trends in the US show that community paramedics are the most highly utilized health providers in MIH programs.^{19,20,31,33,34} In MIH programs, community paramedics address health gaps and mitigate inappropriate use of EMS resources for non-urgent care in highly fragmented health care systems.^{1,19}

1.2.2 Definition of a Community Paramedic

Community paramedics are EMS professionals that have an expanded role to deliver non-urgent primary, public health, and preventive community-based services under

medical direction to fill the health care needs of the community.^{35,36} Though no standard definition of a community paramedic exists, several definitions have been put forward (Table 1.2).

Table 1.2: Definitions of a Community Paramedic.

Organization	Definition
The First International Roundtable of CP in Nova Scotia, Canada (2005) ³⁰	“...EMS providers that practice within an expanded scope which includes the application of specialized skills and protocol beyond the base paramedic training and engaging in an expanded role which involves working in non-traditional roles using existing skills.”
The Joint Committee on Rural Emergency Care ³¹	“...a state-licensed EMS professional that has completed an appropriate educational program and has demonstrated competence in the provision of health education, monitoring, and services beyond the roles of traditional emergency care and transport and in conjunction with medical direction.”
Institute of Health Economics Report. Canada. (2017) ³⁷	“...a paramedic or EMT who already operates in their service area or community, and who has taken advanced didactic and clinical education in a number of areas, enabling them to identify the healthcare needs in underserved communities.”
Boykin et al (2018) ³⁸	“...a provider who has obtained paramedic certification, gained experience on an ambulance responding to EMS calls, and completed a training course (300 or more hours) offered by an accredited program including completion of clinical rotations to gain additional disease management experience in the primary care setting.”

CP = community paramedicine; EMS = emergency medical services; EMT = emergency medical technician

Globally, several terms have been used to describe community paramedics such as emergency care practitioners (ECP), extended skills paramedics (ESP), and paramedic practitioner (PP).¹⁵ ESP and community paramedics are commonly utilized in parts of the US, Australia, and Canada, while ECP and PP are majorly utilized in the U.K.^{1,15,37,39}

1.2.3 CP Practice Settings

Although CP was initiated to address community health care gaps in rural populations, CP has gradually expanded to non-rural settings.^{15,16,18,19,40} This subsection presents an overview of CP practice in rural and non-rural settings.

1.2.3.1 CP in Rural Settings

About 25% of the US population are rural residents.^{20,32} Rural residents exhibit poor health outcomes compared to urban populations due to limited access to health care, inadequate physician volume, far distances from health centers, and lower socioeconomic status.³² Other factors are a higher incidence of chronic disease and disability, low nutritional diet, obesity, mental health issues, high health risk behaviors, and a greater number of older adults.^{20,32} Currently, 10% of the nation's physicians practice in rural communities with 80 physicians per 100,000 rural residents compared to 380 physicians per 100,000 non-rural residents.³² Physician shortages, long-distance from health care facilities, and low socioeconomic status create major challenges to rural residents accessing health care services on time.^{32,40}

CP programs in rural settings are strategically utilized to fill the health gaps due to an inadequate number of physicians and far distances from health centers by increasing access to primary health care, public health, and preventive services in convenient locations.^{32,40} In most situations, CP programs are the only source of medical services across far distances.¹⁹ Therefore, CP programs employ strategies that promote care in locations convenient to the patients.^{2,17} Presently, 44% of CP programs in the US are in rural settings,^{1,2,19,41} with Colorado having the longest history of CP development in rural settings.²

1.2.3.2 CP in Non-Rural Settings

As of 2017, more than 50% of CP programs in the US are present in non-rural settings.¹⁶ Typically, non-rural communities are characterized by frequent use of emergency systems as a safety net for non-urgent care, thereby increasing the burden on the health care system.⁴⁷ Frequent users typically make 4 or more ED visits per year.^{41,42} Frequent users may be homeless individuals, individuals with a disability, the uninsured, older adults, persons with chronic diseases, and persons with substance abuse and mental health issues.^{41,43}

Due to the overutilization of emergency systems for non-urgent services,^{41,43} most CP programs in non-rural settings focus on specific services that target the reduction of frequent 9-1-1 utilization, ED visits, and readmission rates, while providing patient care coordination and navigation to alternative non-urgent locations.^{19,33} For instance, community paramedics refer frequent ED users to facilities such as social service agencies, public health agencies, primary care facilities, mental health care facilities, community health clinics, care management organizations, home health facilities, nursing homes, law enforcement agencies, and/or addiction treatment centers.^{17,34,44,45} These facilities provide specialized care, thus providing patient-centric care with lower costs.^{15,21} In urban settings, in-home post-discharge follow-up visits are conducted for patients with high-risk of readmissions such as older adults with congestive heart failure (CHF), myocardial infarction, and pneumonia.^{34,38,46}

1.2.4 CP Program Reach

The CP care model is gradually gaining ground globally^{1,15,25,37} and the US is not an exception with CP programs established across 33 states.¹⁹ Of these, about 20 states have CP programs in pilot stages⁴ including Colorado, Minnesota, Nebraska, Texas, California, North Carolina, and Maine.^{19,40,47} For instance, in Colorado, the Eagle County

Paramedic Services, formally known as Western Eagle County Health Services District (WECAD), formed a partnership with local ambulance services and public health departments to deliver a CP program serving over 54,000 rural residents.⁴⁸ In 2016, in Minnesota, there were 16 fully operational CP programs and 8 CP programs in pilot stages.⁴⁹ The MedStar program in Fort Worth, Texas provides health services to over 1 million residents in 14 cities to improve post-discharge visits, cost savings, and patient satisfaction.^{50,51} Additionally, Maine piloted 12 CP programs in 2013, of which 2 programs were established in a rural setting.² This evidence shows that the CP care model is spreading across various settings and proactively meeting targeted community health needs across diverse geographic locations and age groups.

The CP care model has gained international attention especially in England, Australia, and Canada.^{16,26,48,52} In Australia, community paramedics provide training and support for EMS volunteers of the St. John Ambulance System.⁵³ The St. John Ambulance in Western Australia utilized 3,400 EMS volunteers trained by community paramedics to provide health coverage in 22 rural communities.⁵³ This ambulance system provides the largest health coverage (a third of Australia's landmass) in the country.⁵³ This demonstrates the potential of a community paramedic as an educator, team leader, and capacity builder.^{25,26} In Australia, community paramedics are stationed to operate EDs and clinics in geographically isolated settings that lack medical personnel like physicians and nurses.^{4,37} Canada strategically utilizes the CP care model in health education, fitness/wellness programs, remote home monitoring services, and 24/7 support line systems.⁵³ Also, MIH systems are positioned in areas where primary care centers are underutilized with a daily rotation of location sites.⁵³

1.2.5 Community Paramedic Education & Training

Community paramedic training can be either formal or informal. Training takes place under medical supervision (e.g., physicians, nurse practitioners, or other health care providers).^{7,8,49,54,55} Various learning formats (classrooms, distance learning, and clinical placements) and instructional settings (e.g., universities, technical schools, community colleges, fire departments, EMS agencies, in-house) are available.^{7,56} This section presents an overview of community paramedic education and training. Table 1.3 outlines a summary of CP education and training.

1.2.5.1 Overview of EMT & Paramedic Training

The required education and training for EMTs and paramedics are similar as outlined in Table 1.3. EMTs and paramedics undergo education in an approved accredited program that meets state EMS board requirements. Certificates or associate degrees are typically issued upon successful completion of the training program. In order to practice, licensure is required.⁵⁷ Licensing requirements vary by state. In some states, successfully passing a nationally-approved certification exam is a requirement for licensure, while other states provide their own licensing exams.^{7,36,49} The National Registry of Emergency Medical Technicians (NREMT) is nationally-recognized by 46 states in the US for licensure, national certification, and national recertification.⁵⁷ To obtain national certification from NREMT, a certification exam is required within two years of successful completion of educational requirements.⁵⁷ The NREMT certification exam is made up of patient care (clinical skills) and cognitive (clinical knowledge) sections. NREMT administers the cognitive section, while the state EMS agency or the training program administers the patient care section.⁵⁷ A national certificate in EMT or paramedic is awarded upon passing the national exam.

To renew their license, EMTs and paramedics typically recertify every two years.⁵⁷ NREMT offers national recertification exams but requires either continuing education or a cognitive exam.⁵⁷ The recertification process also varies by state requirements.

1.2.5.2 Formal (Accredited) Community Paramedic Training

Community paramedics can undergo training in an accredited program approved by their state EMS.^{49,57} Usually, entry requirements include current EMT or paramedic certification, two years full or part-time work experience, and a recommendation letter from the EMS medical director and/or chief EMS officer.^{49,57} Upon successful completion, a community paramedic certificate is issued.^{49,57} Certification and licensure requirements vary by state legislation.

Most accredited programs tailor their training program based upon the international standardized community paramedic training curriculum.^{48,49,54,58,59} Through national and international partnerships, the Community Health Care and Emergency Cooperative compiled an international standardized curriculum that was developed and tested in Minnesota and consists of 100 hours of didactic training and 15 to 146 hours of clinical rotations.^{31,54,59} The curriculum covers primary health care, public/preventive health care, disease management and prevention, wellness, mental health, the social determinants of health, home safety, professionalism, health and community assessment, advocacy, and cultural competency.^{48,49,54,58,59} Typically, the course duration is about six in-class presentations and 2-3 weekly online sections but varies based on the previous degree held, community health service experience, and the EMS provider level.^{49,59}

Some institutions like Hennepin Technical College in Minnesota and Colorado Mountain College in Colorado have developed certificate programs that have been adopted in several states.^{2,20,49} Currently, Minnesota is the forerunner of community paramedic

certification and the first state to make legislative reform on the community paramedic certification status.⁴⁹

1.2.5.3 Informal (Non-Accredited) Community Paramedic Training

EMTs and paramedics can undertake non-accredited training and still render services in expanded roles without obtaining community paramedic certification.²⁰ Training varies based upon community health needs, previous experience of EMS providers, and available resources.¹¹

Most CP programs use an internal curriculum developed by staff,^{3,18,19,60} as illustrated in Maine where 12 CP programs utilized in-house training.² Other programs use either a curriculum obtained from an external source, a curriculum developed with partner agencies, or a combination of the two.³ For instance, the EMS system of a critical access hospital (CAH) in Prosser, Washington partnered with Heritage University to develop a curriculum that covered conversational skills, wound care, and health/patient education.^{2,19,61} However, approval of curriculum by the EMS Medical Director, EMS chief, and/or partner agencies may be required.⁴⁹

Training is typically delivered by disease or health services experts, EMS staff, and/or partner agencies such as hospitals, public health agencies, nursing homes, and care management organizations.^{19,44} Training duration varies with reports indicating a range from < 24 hours to >240 hours of individual didactic and clinical components.^{13,19,34,38,61–64} The instructional style could be in-person, internet-based, self-directed learning, webinars, seminars, on-site training, and/or shadowing of experts. Training sessions can be didactic, clinical, or a combination of the two. Examples of training topics include physical and medical assessment, patient history documentation, patient education, interpretation of the electrocardiogram (EKG), cardiopulmonary resuscitation (CPR), communication, home safety inspections, pediatric injury prevention, health counseling, implementation of

injury prevention survey, heart failure pathophysiology, medication management, and nutrition.^{10,44,61,62,65–67}

1.2.5.4 Recertification

Certified community paramedics typically undergo recertification every two years.^{57,68} Recertification requirements vary in the US with no specific agency overseeing the process. However, a few agencies such as the Commission on Accreditation of Prehospital Continuing Education have an established system of accrediting community paramedic continuing education credits.^{49,69} All recertification education is approved by either the accreditation agency or the state EMS agency.⁴⁹

Irrespective of certification status, community paramedics are subject to all certification, disciplinary, renewal, and legislative requirements mandated for EMT and paramedic licensure.^{49,57} Therefore, EMT or paramedic recertification is also required every two years.⁴⁹ Community paramedic recertification modules are available and continuing education credits are awarded by various agencies such as Minnesota Ambulance Association, International Roundtable on CP, EMS World Expo, and EMS Today.⁴⁹

Table 1.3: Overview of Community Paramedic Education & Training^{4,36,49,59,68,70-72}

EMS Provider Types		
EMT	Paramedic	Community Paramedic
Education Types		
Formal	Formal or Informal	
Prerequisite		
18 years or above; high school diploma or equivalent; CPR-certified; pass a criminal background check and drug test	EMT certification; CPR and ALS certificate; at least six months full time or approximate part-time work experience	Certified EMT or paramedic; at least 2 years EMT or paramedic full time or an equivalent part-time work experience
Course Work		
Patient assessment, basic life support, airway management 120-700 credit hours (at least 6 months)	Anatomy, physiology, cardiology, advanced life support. At least 1200 credit hours (at least 2 years)	<p>Formal</p> <ol style="list-style-type: none"> 1. National standard curriculum <ul style="list-style-type: none"> • Didactic training (100 hours) • Clinical rotations (15-146 hours) 2. Certificate programs <p>Informal</p> <ol style="list-style-type: none"> 1. Internal (most common) 2. External (e.g., curriculum from other CP programs) 3. A combination of internal, external, and/or with partner agency <ul style="list-style-type: none"> • Didactic training (< 24 hours to > 240 hours) • Clinical rotations (same as above)
Degree Type		
Certificate or diploma	Certificate or associate degree	Certificate (if applicable)

Table 1.3 Continued: Overview of Community Paramedic Education & Training^{4,36,49,59,68,70–72}

EMS Provider Types		
EMT	Paramedic	Community Paramedic
Education Types		
Formal	Formal or Informal	
Certification/Licensure		
Certification (varies by state) • Completion of a board-approved training program State licensure (varies by state) • Completion of a board-approved training program • National certification (e.g., NREMT) National certification exam (patient care and clinical sections) OR State-issued licensing exam • Current CPR and/or ALS certificate; updated immunization record; background check; approval by program directors		Certification (varies by state) • Completion of a board-approved training program State licensure (varies by state) • Completion of a board-approved training program • Current certification as EMT or paramedic • Completion of the EMS board-approved application
Recertification (Typically, every two years)		
EMT or paramedic (varies by state)		Community paramedic (varies by state) • EMT/paramedic recertification • Community paramedic recertification (if applicable)

EMS = emergency medical services; EMT = emergency medical technician; ALS = advanced life support; CPR = cardiopulmonary resuscitation; NREMT = National Registry of Emergency Medical Technicians

1.3 COMMUNITY PARAMEDIC EXPANDED ROLES

Community paramedics, through expanded roles, provide health services that span primary health care, care coordination, public health, and preventive services.^{55,70} This section provides a description of these expanded roles. Also, Table 1.4 provides a comparison of CP expanded roles with acute roles of other EMS providers.

1.3.1 Primary Care Services

To increase access to primary health care services, community paramedics, under medical supervision, extend services in a variety of community-based settings, especially in the patient's home.^{37,49} Primary care services range from reviewing a patient's medical history to performing health assessments to medication and chronic disease management.^{10,14,44} The sub-sections below describe primary care services commonly performed by community paramedics.

1.3.1.1 Health Assessment

Community paramedics assess the physical and mental health status of patients to identify specific health needs and connect patients with community health resources, such as social services, public health, home health, and mental health agencies, to address these needs.¹⁸ The type of health assessments conducted by community paramedics includes health risk assessments,^{10,67,73} quality of life assessments,¹² medical history review,^{14,44} physical assessment, and depression screenings.^{11,12,14,34,44,65,74} During health assessments, community paramedics identify health abnormalities or risks and collaborate with patients and health providers to develop a care plan to set achievable health goals.^{10,67} This provides an avenue to track a patient's health behavior and develop healthy habits while mitigating disease complications.^{10,16,67,73} During this process, patients become more informed about their health leading to increased management of health conditions.^{10,16}

1.3.1.2 Medical Procedures

Medical procedures such as laboratory specimen collection (e.g., blood draw, urine test), airway maintenance, wound dressing and sepsis prevention, peripheral intravenous access maintenance, in-home transfusions, urinary catheterization, and maintenance are conducted by community paramedics.^{13,49,61,74,75} These services are beneficial for patients

with chronic diseases and mobility limitations because care is provided conveniently in the patient's home. Community paramedics performing in-home medical procedures improve appropriate utilization of 9-1-1 and emergency services.⁴⁹

1.3.1.3 Chronic Disease Management

Community paramedics assist patients in managing their chronic disease conditions (such as hypertension, congestive heart failure (CHF), stroke, chronic obstructive pulmonary disease (COPD), asthma, and diabetes) to prevent or minimize complications while preventing hospital readmissions or ED visits.^{19,64,65} Community paramedics identify and treat disease-related symptoms such as shortness of breath, hypoglycemia, or allergic reactions,^{64,76} conduct point of care testing (such as A1C for diabetes, lipid levels for cholesterol),^{14,38,64,74,77} and educate patients on specific diseases.^{14,34,38,46} Post-discharge follow-up visits and in-home care such as respiratory care and transfusions are also conducted by community paramedics.^{61,77}

Another goal is to encourage patients to proactively manage their health conditions.^{12,67,76} For instance, community paramedics educate patients to self-measure health indicators (e.g., blood pressure (BP), glucose level, body weight, dietary intake),^{10,11,14,67,73} set health goals and adhere to them,^{12,77,78} as well as provide health maintenance strategies,^{11,46,76} and lifestyle modification instructions.¹⁴

1.3.1.4 Medication Management

To enhance appropriate medication use, community paramedics assist patients in the safe and effective management of drug therapy.^{12,38} During this process, factors that could have unfavorable consequences such as adverse effects, suboptimal doses, duplicate doses, improper medication storage, poor adherence, and possible drug interactions could be identified.^{46,48,76} Community paramedics work with the patients to overcome

medication-related issues by employing strategies such as providing patient education about medications and side effects,^{11,12,38,46} identifying reasons for nonadherence and developing potential solutions,^{38,76} and performing medication reconciliation.^{11,34,65,77,79} Medication reconciliation is usually conducted using a medication list and discrepancies resolved with the prescribing physicians.²³

Medication management can play a key role in reducing potential adverse events during patient care transitions across the health care system.^{46,76} This is especially relevant in older adults and chronically ill individuals with complex medication regimens and comorbidities.^{44,79}

1.3.1.5 Urgent Care Services

While community paramedics are carrying out their non-emergent roles in a patient's home or community settings, unexpected acute and episodic health issues could occur.^{1,61} As emergency care experts, community paramedics are a great resource during such unpredictable situations and may prevent unnecessary ED visits.^{1,4,10} In some programs, based on a patient's chief complaint, community paramedics are dispatched as physician extenders to provide urgent in-home care especially for home-bound individuals with multiple chronic conditions.^{41,61,80} Community paramedics administer acute care and make a decision for a referral or follow-up care by consultation with a physician.^{15,61,81} Evidence from studies shows that CP urgent care services decrease unnecessary referrals to EDs while improving patient's clinical outcomes and care satisfaction.^{15,80} Community paramedics can also provide transportation services from the patient's home to a health facility, thus fostering timely intervention.^{61,78}

1.3.2 Care Coordination Services

Community paramedics engage in care coordination activities to facilitate the connection between patients and health care providers and health resources.^{1,4,37} The subsections below describe the care coordination roles of community paramedics.

1.3.2.1 Patient Care Coordination

To increase the continuity of health care, community paramedics serve as a bridge between patients and health care services.^{1,52} To achieve this, community paramedics communicate with the health care team about a patient's test results, treatment plans,^{11,67,73,74,78,79} and medical records.^{11,61} Community paramedics utilize referral systems, where patients are linked to health agencies as needed.^{11,12,16,16,34,38,64,67,77,79} Typically, prior authorization is required from the ordering physician before patients are referred to other health care facilities.^{40,82} Community paramedics also assist patients in making in-home care management requests such as a request for a home nurse for palliative care, and enrollment of patients in health programs.^{19,38,77}

Some examples of patient care coordination in CP programs have been described. A CP program in Minnesota established a free mobile health clinic for underinsured populations in urban and suburban areas.⁴⁹ The mobile clinic evaluated, treated, and referred 1,000 patients to primary care clinics for further out-of-hospital follow-up.⁴⁹ Another CP program in Minnesota employed a coordination hub free-clinic system to reduce cardiovascular diseases and diabetes among an underserved population.^{49,83} In San Diego, a CP program collaborated with law enforcement agencies to connect chronic homeless alcoholics to detox centers, thus diverting them away from the ED or jail.¹⁹ Resources to address financial stability and long-term recovery were also provided.¹⁸ In North Carolina, more than 300 patients were triaged to alternative treatment facilities.²⁰ A free clinic on cardiovascular diseases and diabetes in Minnesota connected 2,500 patients

annually to community resources on physical exercises, nutrition, and diabetes, and performed in-home visits.^{49,83} In 2015, the Abbeville CP program in South Carolina provided 773 in-home visits to 75 residents with chronic diseases leading to 62 patients connected to a medical home.⁸⁴

1.3.2.2 Patient Navigation

The US health care system is complex and some patients may experience psychological, physical, financial, linguistic, geographical, and informational barriers that could impact health care.⁸⁵ Community paramedics assist patients in overcoming these barriers by providing personalized guidance which could range from counseling/assistance with financial resources, accessing disability payments, and resolving health insurance issues,^{14,34,65} assisting with medications and medical devices ordering/delivery,¹⁴ and providing transportation.^{12,14,65} For instance, in 2015, the Abbeville CP program provided 773 in-home visits to 75 residents with chronic diseases leading to 22 patients obtaining health insurance.⁸⁴ Community paramedics also advocate for patients by communicating patients' fears, doubts, and possible barriers to other health providers.¹⁰

1.3.3 Public Health & Preventive Services

CP programs provide public health and preventive services that range from wellness programs and screenings to health education and promotion activities.^{10,14,39,55,73} The sub-sections below outline these expanded roles of community paramedics.

1.3.3.1 Health Promotion

Health promotion activities are conducted by community paramedics to educate patients and communities on risk factors and various behaviors that are associated with diseases or conditions. The goal is to encourage proactive participation in healthy habits.⁸⁶

Community paramedics are increasingly utilized in health promotional activities.^{21,73} Community paramedics provide healthy lifestyle education (e.g., physical activity, nutrition, alcohol moderation, smoking cessation, obesity programs, nutritional education),^{12,14,16,26,38,65} and disease prevention programs (e.g., cardiovascular health, diabetes).^{9,26,49,52,53,86,87} Safety education and practices such as the use of seat belts and helmets, first aid training, road safety campaigns, emergency health resources including poison control helplines are also provided.^{38,52,62} For instance, community paramedics in rural Livingston County in New York provide health education, referrals, screen for falls, and assess depression and medication management risks in medically underserved older adults to improve geriatric health.^{47,87} This program resulted in over 1,200 older adults being screened and assessed.^{47,87}

1.3.3.2 Immunizations

Community paramedics are being utilized to administer vaccines in mass immunization programs especially in rural settings.^{18,40,51,88,89} These immunization programs often target high-risk populations such as children and older adults who are vulnerable to infections like pneumonia and flu.¹⁸ For instance, the Eagle County CP program in Colorado utilized community paramedics to immunize rural residents on influenza and pneumonia.^{31,90} Presently, the MedStar CP program in Texas initiated a flu vaccine program with mobile flu vaccine clinics at convenient locations with an option for on-site scheduling.⁹¹ The MedStar Program also responds to callers reporting symptoms of influenza-like illnesses to reduce ED overcrowding.¹⁵

1.3.3.3 Injury Prevention & Safety Assessment

To identify potential hazards in patients' homes, community paramedics conduct home safety assessments,^{11,12,14,34,38,46,62,65,77} fall risk assessments,^{10,11,67} injury prevention

education,^{26,66} and infant safety checks.³¹ Prior to discharge from the hospitals, patients' homes are usually assessed to address any safety concerns, and findings are typically documented using safety checklists.⁵⁵ Factors such as water temperature, smoke detectors, first aid kits, light intensity, trip hazards, kitchen safety, adequate lighting in the home and walking areas, grab bars and lift handles are assessed.⁴⁸ Additionally, in-home equipment (such as sliding benches and in-home lifts) can be installed for patients with high fall risks to facilitate easier mobility and reduce complications and readmissions.¹⁴

Table 1.4: Overview of Community Paramedics Expanded

Roles^{10,18,36,39,49,55,70,73}

EMS Providers Types		
EMT	Paramedic	Community Paramedic
Skills		
<p>Patient Care</p> <ul style="list-style-type: none"> • Patient assessment • Respiratory management (CPR) • Cardiac arrest management • Use of emergency equipment (airway adjuncts, ventilation devices) • Administration of emergency medications (oral glucose for suspected hypoglycemia, aspirin for ischemia, assist patients in taking their own prescribed medications) • Trauma Care (bleeding control, shock management, tourniquet application, wound treatment) • Safe transport of patients to hospitals 	<p>Patient Care</p> <ul style="list-style-type: none"> • EMT procedures • Respiratory procedure <ol style="list-style-type: none"> a. Endotracheal intubation b. Gastric decompression • Pharmacological Interventions <ol style="list-style-type: none"> a. Insertion of intraosseous cannula b. Enteral and parenteral administration of approved prescription medications c. Access in-dwelling catheters and implanted central IV ports for fluid and medication administration d. Administer medications by IV infusion e. Maintain an infusion of blood or blood products • Medical/Cardiac Care (perform cardioversion, manual defibrillation, and transcutaneous pacing) • Spinal injury management • Trauma care (wound suturing, burn management) 	<p>Patient Care</p> <ul style="list-style-type: none"> • All EMT or paramedic procedures • More complex skills (varies by program and health needs) • Primary care <ol style="list-style-type: none"> a. Health assessment b. Medical procedures c. Chronic disease management d. Medication management e. Urgent care • Care coordination <ol style="list-style-type: none"> a. Patient care coordination b. Patient navigation • Public Health/Prevention <ol style="list-style-type: none"> a. Health promotion

Table 1.4 Continued: Overview of Community Paramedics Expanded

Roles^{10,18,36,39,49,55,70,73}

EMS Providers Types		
EMT	Paramedic	Community Paramedic
Skills		
		b. Immunization administration c. Injury prevention/safety assessment Interpersonal <ul style="list-style-type: none"> • Therapeutic communication • Health literacy assessment • Interprofessional collaboration

EMS = emergency medical services; EMT = emergency medical technician;
 CPR = cardiopulmonary resuscitation

1.4 CP PROGRAM OUTCOMES

With recent changes in health care policy and payment mechanisms (e.g., Affordable Care Act, Medicare hospital readmission reduction program), health care agencies are required to maintain specific targets for improved health outcomes, quality of care, and cost reduction.^{19,23,40,77,92} Typically, health agencies utilize the CP care model to address rising health needs.^{15,16,19,23,40} Therefore, CP programs should provide evidence of their capability to address these health needs.^{15,20,86} This section provides a description of CP outcomes that have been reported in the literature.

1.4.1 Health Services Outcomes

Health services outcomes such as hospital readmission rates, 9-1-1 utilization, number of ED transports, ED admissions, inpatient admissions and length of stay have

been measured to determine CP program impact on health services utilization.¹⁸ Evidence shows that CP programs have resulted in a reduction in 30-day readmission rates for CHF and COPD,^{11,38,46,65} 6-month rehospitalization rates,^{76,77} admission rates, inpatient length of hospital stays, and ED transports.^{15,71}

The MedStar CP program in Texas initiated a CHF readmission prevention program and a community health program.^{20,82} Community paramedics provided in-home visits, chronic disease management education, and information on health resources (e.g., primary and specialty physician networks) to patients enrolled in the community health program.^{20,82} For patients that require a 9-1-1 response, a triage system was utilized to ascertain whether ED transport was appropriate for the patient leading to avoidance of 1,893 ED transports in 146 patients during a 5-year period.²⁰ However, prior authorization is typically required from the ordering physician before patients are referred to other health care facilities.^{40,82} On the other hand, the CHF readmission prevention program, in consultation with local cardiologists, provided in-home visits and health education to patients with CHF leading to a 16.3% median readmission rate compared to the national median readmission rate of 23%.²⁰

Using a comparison group, Bennet et al. (2018) conducted a pre-post study of 193 frequent ED utilizers (> 2 ED visits per month) with hypertension, diabetes, COPD, and asthma that were enrolled in the Abbeville CP program in South Carolina.⁷⁷ Services such as home safety assessment, patient education, medication reconciliation, physical/medical assessments, respiratory care, cardiovascular care, post-discharge visits, and connection to social services agencies were provided.⁷⁷ Findings revealed a decline in 9-1-1 calls by 48.5%, a decrease in ED visits by 58.7%, and a decrease in admissions by 68.8%. The comparison group showed an increase in ED visits by 4.0% and admission rates of 187.5%.⁷⁷ Also, the Abbeville CP program conducted 773 in-home visits for 75 residents

with chronic diseases leading to a 58.1% decrease in ED visits, a 41.2% decrease in 30-day readmission rates, and a 60% decrease in inpatient stays.⁸⁴

The North Carolina CP program triaged 300 patients to health facilities suitable for addressing specific health or social needs (e.g., mental health crisis stabilization units and community alcohol treatment centers) leading to a 25% reduction in ED transports.²⁰ Furthermore, Nevada initiated CP programs to provide in-home care and patient navigation to locations that provide more appropriate care leading to a reduction of 1,795 ED visits, 354 ambulance transports, and 28 readmissions.²⁰

Nejtek et al. (2017) conducted a pre-post study in 64 frequent ED utilizers (ED visits ≥ 4 within one year).¹² Services such as routine health screening, wellness check-ups, vital signs, medication management, and home safety assessments were provided. Patients had 61% fewer ED transports, 66% fewer ED admissions, and 56% fewer inpatient hospital admissions upon program completion.¹²

1.4.2 Cost Savings

Hospital readmissions and non-urgent utilization of emergency resources are major contributors to rising health care costs in the US.⁴⁰ Some CP programs have reported cost savings. For instance, the Medstar CP community health program utilized a triage system to assess the need for ED transport, prevent inappropriate ED transports, and refer patients to more appropriate care facilities, resulting in a Medicare penalty avoidance of \$21,627 and payment avoidance of \$5,536 per patient due to 1,893 ED transports avoided.^{4,20,77} Also, the MedStar CHF readmission prevention program resulted in a Medicare readmission penalty cost avoidance of \$30,343 and payment avoidance of \$7,620 per patient due to a reduction in readmission rates.^{4,20,77} The Eagle CP program in rural Colorado provided 146 visits upon post-discharge follow-up, home safety checks, post-

injury/illness follow up and medication education and compliance to 52 patients leading to \$1,969 average savings per visit, with \$288,000 total health cost savings in one year due to readmission preventions and health safety practices.⁹⁰

1.4.3 Patient Clinical Outcomes

Although few patient clinical outcomes have been reported for CP programs, there is an indication that CP programs improve clinical outcomes.¹⁶ In 2015, the Abbeville CP program provided 773 in-home visits to 75 residents with chronic diseases leading to a decrease in BP in 72.7% of patients with hypertension and a decrease in glucose levels in 85% of diabetic patients.⁸⁴ Furthermore, using a comparison group, Bennett et al (2018) conducted a pre-post study of 193 high utilizers in the Abbeville CP program with hypertension, chronic heart failure, asthma, and COPD.⁷⁷ This resulted in a significant decrease in average systolic and diastolic BP by 7.2 mmHg and 4 mmHg, respectively, compared to the comparison group. Also, there was an average decrease in blood glucose level of 33.7mmol/L in diabetic patients.⁸³

1.4.4 Patient-Reported Outcomes

Patient-reported outcomes such as patient satisfaction and quality of life have been reported by some CP programs.^{16,71,93} Patients in the MedStar CHF readmission prevention program had satisfaction scores of 4.9 out of 5, which indicates a high level of satisfaction with the CP program.^{20,94} Also, a study conducted by Bennet et. al (2018) of in-home visits (home-safety assessment, medication reconciliation) of 193 frequent ED utilizers (> 2 visits per month) in the Abbeville CP program showed overall satisfaction with 100% of the participants reporting complete satisfaction with the overall program.⁷⁷

A few studies also showed an improved health-related quality of life among patients with COPD, diabetes, CHF, hypertension, and stroke using the EuroQoL5 standardized

instrument.^{12,27,46,73} Using the 3-level dimension of the EuroQoL5 in a pre-post study, Nejtek et al. (2017) reported that upon program completion, 16 of 42 patients (38%) had improved mobility, 14 of 20 (70%) had improved self-care, 20 of 48 participants (42%) reported no pain and discomfort, 26 of 45 (57%) reported improved performance of usual activities, and less anxiety and depression scores.¹² In addition, self-rating of health status showed that 73.4% (n=47) rated that their overall health status improved by 31.5% upon program completion.¹² In an open-label cluster randomized control trial of 65 and 129 older adults in the intervention and control groups, respectively, Agarwal et al. (2018) observed a significant improvement in the usual activities domain in the intervention group (n=26) compared to the control group (n=21).⁷³

Qualitative studies of patients and health providers (e.g., caregivers, physicians) also reported positive responses regarding CP programs. Patients expressed value in community paramedics' in-home personalized visits and appreciated the security, respect, and trust that accompany interactions with community paramedics.^{1,10,14,16,25,61} Patients also expressed appreciation for community paramedic's expertise in handling unscheduled emergency events during their expanded roles.^{1,10} Chellappa et al. (2017) conducted an assessment of a Mount Sinai CP program and found that 89% (n= 32) of physicians positively rated the intervention as "very helpful" or "helpful" and were more likely to positively rate the intervention if they were confident in the community paramedics clinical skills.⁹⁵

CP programs are demonstrating favorable differences in health care utilization, clinical outcomes, health care cost savings, and patient-reported outcomes. As community health needs change, the CP care model has continually demonstrated value in addressing those needs. However, there are limited empirical studies on CP effectiveness and outcomes.²⁰ Therefore, more studies in cost savings, clinical outcomes, and patient-

reported outcomes are required to further demonstrate CP's impact on the health care systems, partner agencies, and patients.

1.5 CP PROGRAM FUNDING & REIMBURSEMENT

Funding and reimbursement of CP programs is a major challenge, especially for less established programs, because there is not currently a reimbursement mechanism for community paramedics to deliver non-transport services.^{2,3,19,96,97} Therefore, some CP programs have shut down because they are not financially viable in the long term.^{19,37}

CP programs obtain funding through various mechanisms. Typically, EMS agencies fund CP programs by allocating operational budgets (e.g., taxes, payment for urgent transport services).^{2,49,98} A few programs are state-funded such as Minnesota's Medicaid reimbursement program where community paramedics are reimbursed for non-transport services.^{77,97,99} CP programs in pilot studies are primarily funded from grants, local ambulance systems, or other short-term funding.^{2,20,37} Federal grants are also available, but are usually utilized for start-up processes and do not provide long-term solutions.^{2,20,100} For instance, in 2013, the Regional EMS Authority in Washoe County, Nevada received a Center for Medicare & Medicaid Services (CMS) innovative grant of \$9.6 million to improve appropriate utilization of ED, in-home care and establish a permanent nurse helpline for telephone evaluations, to save \$10.5 million during a 3-year period.^{20,101} This resulted in the avoidance of 1,795 ED visits, 354 ED transports, and 28 readmissions with \$7.9 million cost savings and \$2.8 million Medicare readmission penalty avoidance.²⁰ Other CP programs are funded by foundation grants (e.g., in Colorado and South Carolina),² and typically require that the program continually show effective outcomes.⁹⁸ The program may cease if outcome goals are unmet or funding runs out.

Some hospitals establish and maintain CP programs through their hospital operating budgets for improved clinical outcomes (e.g., reduced readmissions, and reduced ED visits).^{2,40,96} CP programs also partner with other health care agencies (Accountable Care Organizations (ACOs), CMS, and commercial insurers) to provide services that align with those of their partner agencies.¹⁹ The MedStar CP program in Texas negotiated a shared savings model with health agencies and ACOs to prevent 30 days readmission rates and is currently reimbursed through the fee-for-referral mechanism.^{2,50} The Anthem Blue Cross Blue Shield is currently reimbursing community paramedics for non-transport services in about 14 states including California, Connecticut, Georgia, New York, and Wisconsin.^{19,98,102}

With the increasing utilization of the CP care model, community paramedics continually tackle health care gaps and community needs. However, funding and reimbursement challenges could hinder the advancement of the CP care model.^{2,3,19,96,97} Therefore, well-structured reimbursement systems are required to optimize the CP care model and improve health outcomes.

1.6 CP PROGRAM SUSTAINABILITY

The sustainability of CP programs typically depends on the value that the local communities place on CP programs, partnerships with health agencies, and state legislation.^{2,98} Health care agencies (such as hospitals, commercial insurers, ACOs and care management agencies) are finding value in utilizing CP to address their organizational goals of improving health services utilization and cost savings.^{19,98} Some states such as Nebraska and Minnesota authorize the use of Medicaid funds for CP non-transport roles

due to evidence that demonstrates CP value in the reduction of health cost and better health outcomes for Medicaid enrollees.^{2,49,98}

Effective collaboration with health care providers and health agencies also plays a role in sustaining CP programs.^{19,65} Collaboration typically creates opportunities for financial support (payment for services), resources (staffing, training), and/or medical oversight for CP programs.¹⁹ For instance, the Colorado rural CP program has partners (Colorado Department of Health and Environment, Colorado Rural Health Center, the Nursing Association, and the Medical Society) that provide financial support, resources for organizing conferences, and opportunities for continual discussions and learning.^{2,19} CP programs in Minnesota collaborate with the Hennepin County Health Center, Wadena County Public Health, Mayo Clinic, and Allina Health Systems to provide a variety of health services across settings. This provides funding opportunities and data sharing, therefore, promoting sustainability.⁴⁹

State legislation affects funding, reimbursement, and CP scope of practice.¹⁹ CP legislation and scope of practice vary across states, which leads to variation in reimbursement mechanisms across the US.^{19,20} Community paramedics in states with restricted legislation may be limited in the types of expanded roles they can perform.¹⁹ Less restrictive legislation allows a comprehensive set of expanded services to be delivered. This is exemplified in the state of Texas which has no restricted legislation on CP, thereby allowing medical directors to determine the medical procedures to be performed by community paramedics. Also, states like Minnesota, Arkansas, Nevada, Nebraska, Missouri, Washington, Colorado, Tennessee, Washington, Wisconsin, and North Dakota have successfully advocated for reform on reimbursement for non-transport services which has increased the sustainability of CP programs.¹⁹

1.7 CP COLLABORATION

Community paramedics collaborate with health agencies and engage in interprofessional collaboration (IPC) to promote team-based patient-centered care.^{7,99} This section discusses CP collaboration.

1.7.1 Integration with Health Care Organizations

Community paramedics integrate with health services agencies (e.g., hospitals, private/commercial insurance companies, Medicare/Medicaid managed care organizations) and usually participate in collaborative care to enhance patient-based care.^{18,19} Typically, this involves a bidirectional referral process where CP programs may receive referrals from health agencies and, in turn, refer patients to these agencies as needed.¹⁹

Though CP programs receive referrals from a variety of health agencies, referrals from hospitals are increasing as partner agencies (e.g., commercial insurance companies, health maintenance organizations, and care management organizations) expect hospitals to meet certain outcome standards such as reduced readmission rates and ED visits.^{19,98} CP programs also refer patients to alternative locations (e.g., social services and mental health facilities) away from the emergency rooms where more appropriate patient-centered care can be provided.¹⁹ However, referrals require prior authorization from designated physicians.⁴⁰

Patient data access between community paramedics and health professionals can be an issue.^{4,19} CP is data-driven as data is required to evaluate and provide updated information on patient care.^{18,19} Yet, data accessibility and sharing depend on the type of services provided by the CP program and affiliation with health care agencies.² Typically, CP programs share patient data internally between staff and partner agencies.¹⁹ Data are usually documented using EMS electronic patient care reports, shared electronic patient

record systems from hospital or physician health systems, EMS regional health information exchange systems, electronic records systems (e.g., spreadsheet software), and manual records (pen and paper).^{2,19} Present trends show that CP programs are expressing the need for better data accessibility and sharing to optimize patient outcomes.^{2,15,19}

1.7.2 Collaboration with Health Professionals

Interprofessional collaboration (IPC) is gaining attention in its capacity to break down barriers between health providers and improve health outcomes, patient satisfaction, and cost savings.^{103,104} IPC merges different expertise and knowledge from diverse disciplines to address complex health care problems.¹⁰⁵ Frost et al. (2018) and similar studies suggested that IPC enhances communication and improves patient safety and satisfaction while optimizing patient outcomes.^{44,106–108} IPC is developed in work settings and/or during training with other health providers.⁷⁵ Effective collaboration entails that health care providers work as a team, share knowledge, expertise, and patient data to provide patient-centered care.^{107,109}

Community paramedics work collaboratively with health care providers such as physicians, pharmacists, nurses, counselors, physical therapists, dental hygienists, social workers, and community health workers in their expanded roles.^{2,18,44,61,79} Typically, community paramedics' expanded roles are accompanied by a change from critical and time-sensitive interactions with health providers and patients to longitudinal collaboration.^{2,18,44,61} Community paramedics have to interact in new ways with other health care providers while taking into account the patient's needs and providers' professional differences (e.g., professional ethics, roles, belief, values).^{105,107,110} To provide patient-centered care, a positive, mutual and respectful relationship between community paramedics and health care providers is necessary.⁴⁰

1.7.2.1 Theoretical Models of IPC

Various models of IPC in health care have been proposed.¹⁰⁵⁻¹⁰⁷ Bronstein (2003)¹⁰⁵ incorporated four theoretical frameworks (multidisciplinary theory of collaboration, service integration, role theory, and ecological systems theory) and derived the following IPC constructs: interdependence,^{111,112} newly created professional activities,¹¹³ flexibility,^{114,115} collective ownership of goals^{111,112} and reflective processes.^{111,112} Bronstein (2003) proposed that IPC entails working as a team,^{111,112} engaging in collective ownership of goals,^{111,112} integrating diverse knowledge and expertise,¹¹³ adapting to changing team goals and being accountable for failures and successes. In addition, the team should meet periodically and engage in collaborative reflections,¹¹⁵ while incorporating feedback to strengthen collaborative and effective patient-centered care and deliver services in new, creative ways.¹¹³ Bronstein (2003) also highlighted certain influences on IPC such as the perception of professional roles (e.g., professional identity), structural influences^{105,114,115} (organizational structure and support e.g., resource allocation, role assignment), personal characteristics (e.g., personal perceptions),¹¹⁶ and history of collaboration (e.g., work experience).¹²⁴ The presence of these variables positively impact IPC, whereas their absence could be barriers to IPC.¹⁰⁵

D'Amour et al. (2005) conducted a literature review on conceptual frameworks of IPC and proposed two main concepts: collaboration (sharing, partnership, power, interdependency, and process) and teamwork (multidisciplinary, interdisciplinary, and transdisciplinary).¹⁰⁷ Successful IPC is a dynamic and interactive process that involves a multidisciplinary team with a common goal of addressing the patient's needs and mutual dependence on one another. This team transcends professional boundaries by incorporating their knowledge, skill, and expertise, while collectively sharing responsibilities, decision-making, values, data, power, planning, and intervention. Also, the team communicates

honestly and openly with one another, while respecting professional opinions and suggestions. In addition, conflicts are managed strategically.

The Interprofessional Education Collaborative (IPEC, 2016) expert panel comprised of representatives from 6 health professions (dentistry, nursing, medicine, osteopathic medicine, pharmacy, and public health) proposed that teamwork and team-based practice, communication, values and ethics, and roles/responsibilities are core competencies for IPC practice.^{108,117} Therefore, an IPC consists of a multidisciplinary health team that enhances effective communication (within the team, and between patients and their families), while practicing the values and ethics of individual professions and ensuring timely completion of all assigned roles and responsibilities.^{108,117}

In summary, to provide patient-centered care, improve quality of care and enhance patient safety, community paramedics are required to collaborate with health professionals as a committed team, while continuously communicating, and strategically proffering solutions to address varying patient needs. This collaboration could be affected by professional identity, personal perceptions, and work experience. Also, these variables have individually been shown to exhibit a positive relationship with IPC.¹⁰⁵

Figure 1.1 summarizes key concepts from Bronstein et al. (2003), D'Amour et al. (2005), and Frost et al. (2018).¹⁰⁵⁻¹⁰⁷

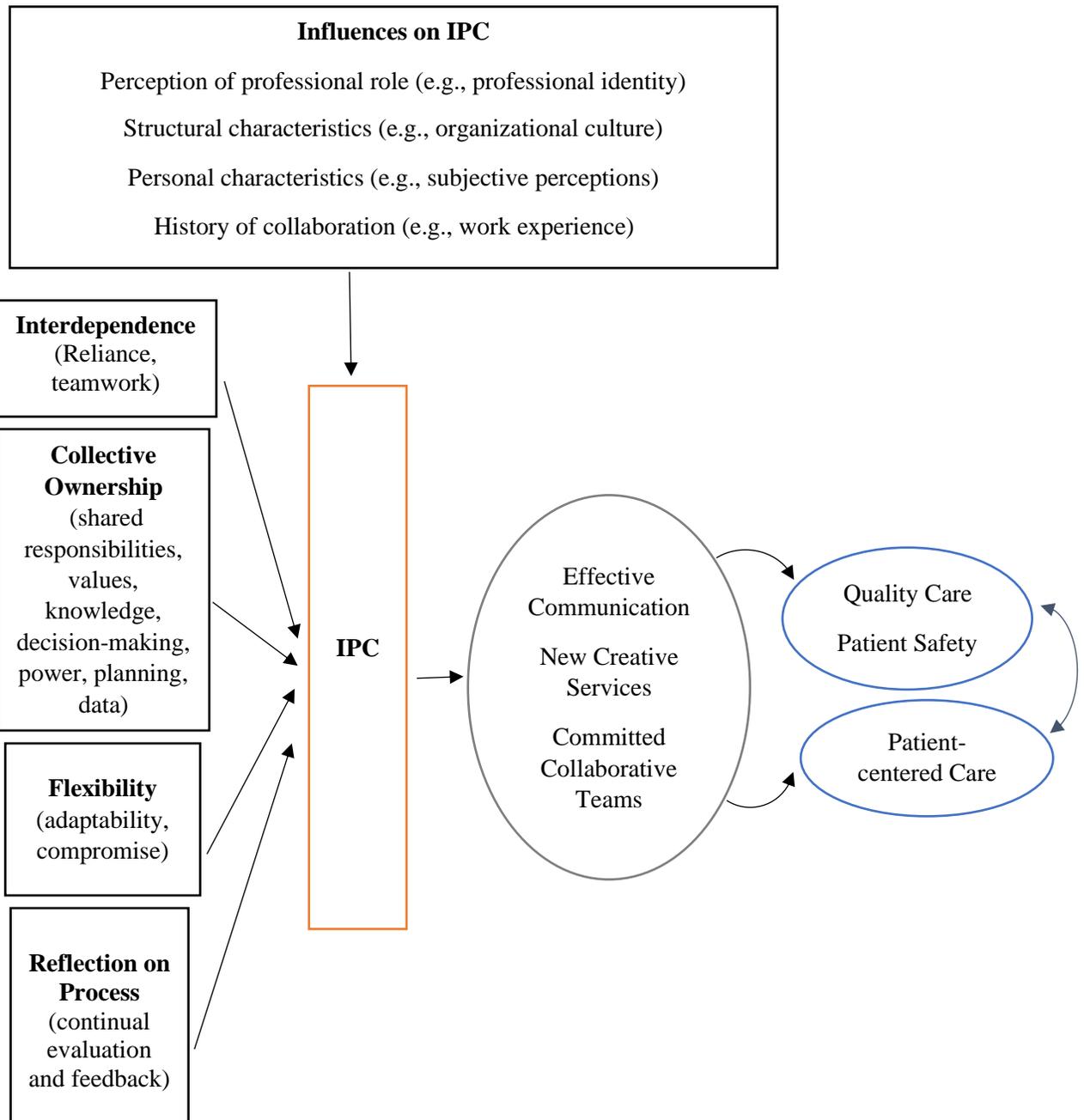


Figure 1.1: Model of Interprofessional Collaboration (IPC)¹⁰⁵⁻¹⁰⁷

1.7.3 Community Paramedic Professional Identity (PI)

Professional identity (PI) is defined as the attitudes, values, knowledge, belief, and skills that are shared with others within and beyond professional settings.¹¹⁸⁻¹²⁰ PI determines how an individual compares themselves with other professional groups and depends on the extent to which work roles, responsibilities, experiences, values, ethics, and norms of a profession intersect with the personal belief system.^{118,119,121} PI is linked to self-efficacy and determines how an individual identifies with their professional roles, thus shaping behavioral and psychological processes in professional settings.¹¹⁸ Typically, PI develops over time and is a mix of education, professional training, interprofessional socialization, and personality.^{105,106,118,120}

PI determines work meaningfulness and influences work attitudes and behavior in professional settings and beyond.^{118,122,123} Since PI is the foundation for professional role functioning and interprofessional collaboration (IPC), it could influence IPC and the implementation of professional roles.^{118,124} Studies indicate that role clarity (clear perception of one's distinct professional roles) and high values for professional roles lead to strong PI, while the reverse could lead to loss of PI.¹²¹ Therefore, clear and appropriate acceptance of professional boundaries and roles is required for PI.¹²¹ Other influencers of PI include gender, type of profession, knowledge of the profession, cognitive flexibility (willingness and belief in adapting to various situations), previous work experience, and understanding of collaborative teamwork.¹²⁰ Studies show that PI is a determining factor of job satisfaction.¹²¹

Like other health professionals, PI of community paramedics is constantly evolving due to social and personal influences.^{110,118,122} Typically, community paramedics perform expanded roles, collaborate with health care professionals, undertake specific organizational tasks, and may perform urgent roles when unscheduled acute and episodic

events occur.^{61,95} In the midst of all this, they are required to still maintain discrete PI.¹²⁵ Understanding PI of community paramedics is essential as it could impact participation in professional roles, IPC, and patient outcomes.¹²²

1.7.3.1 Theoretical Models of Professional Identity

Caza et al. (2016) proposed that the construction of PI entails personal and professional identification which determines how individuals associate with their profession.¹¹⁸ Personal identification consists of subjective cognitive and behavioral influences, while professional identification is comprised of interpersonal interactions with a professional group with which an individual is associated.¹¹⁸ Caza et al. (2016) explained that individuals actively participate in the formation of their PI, while interpersonal interactions have a passive influence.¹¹⁸ Professional identification provides a picture of the perceptions that others have of one's professional roles, and this determines how an individual adapts to meet their expectations.¹¹⁸ Therefore, PI is an intersection of personal identification, professional identification, and work roles and ethics.¹¹⁸

Studies across health disciplines (nursing, medicine, pharmacy, social work) proposed that PI is acquired through professional socialization.^{110,118,120,120,122,126} Professional socialization is when an individual unifies the norms, values, and ethics of the professional group with their behavior and personal perceptions.¹²⁰ Formation of PI depends on influences on personal identity, relational identity, and collective identity.^{119-122,126} Personal identity comprises subjective values, norms, perceptions, and experiences. Relational identity includes perceptions from significant individuals (e.g., family members, mentors, and colleagues). The collective identity reflects the professional roles and values of professional groups that an individual is associated with. Therefore, professional socialization takes into consideration personal and social influences.^{122,126}

Figure 1.2 displays the model of PI adopted from studies across health disciplines.^{110,118,120,120,122,126}

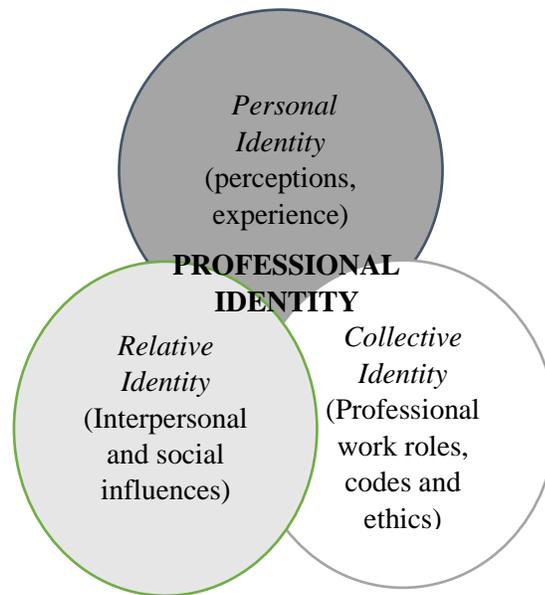


Figure 1.2: Model of Professional Identity (PI)

1.8 STUDY RATIONALE

Community paramedics are increasingly utilized by health care agencies to provide health solutions while optimizing patient outcomes, reducing health care costs, and enhancing the appropriate use of emergency resources.^{15,16,19,23,40} Community paramedics provide an avenue to tackle diverse health care problems and services that are tailored to the health needs of the community.^{1,26} The transition from the provision of urgent care to non-urgent services and engaging in interprofessional interactions could be challenging. As PI could impact IPC, and engagement in professional roles, it is necessary to assess how

community paramedics perceive their transition from traditional acute care to the delivery of non-urgent expanded roles. To our knowledge, no similar studies have been conducted.

Therefore, the purpose of this study is to evaluate the perceptions of community paramedics on their training, roles, role clarity, role readiness, PI, role satisfaction, and IPC. This study will add to the existing literature and shed light on the perceptions of community paramedics on their expanded roles. It will contribute to understanding how community paramedics perceive their professional roles and may drive future reforms that will improve community paramedics' practice.

Chapter 2: Methodology

This chapter describes the methods that were used to assess community paramedics' perceptions of community paramedicine (CP) training, roles, role clarity, role readiness, professional identity (PI), role satisfaction, and interprofessional collaboration (IPC). This chapter contains nine sections: study design & sample, study objectives & hypotheses, study variables, data collection, statistical analyses, sample size determination, institutional review board (IRB) procedures, and study timeline.

2.1 STUDY DESIGN & SAMPLE

This study employed a cross-sectional survey design. The National Association of Emergency Medical Technicians (NAEMT) listserv was used to identify potential study participants. The NAEMT is the national EMS organization that represents the interest of all EMS professionals by advocating on issues that impact the provision of quality patient care.¹²⁷ The NAEMT has been operational since 1975 with more than 72,000 members.¹²⁷ The mission of the NAEMT is to represent and serve all EMS personnel through advocacy, educational programs, and research.¹²⁷ Thirteen committees are entrusted with carrying out the mission of NAEMT.^{127,128} The NAEMT listserv that was used for the study is comprised of 170 to 200 administrators of CP and mobile integrated health (MIH) programs. The administrators forwarded the invitation letter (with survey link attached) and follow-up reminder emails to 372 members in their respective programs.

Participants were currently practicing as a community paramedic or as a paramedic on a MIH team, greater than or equal to 18 years old, and were willing to participate in the study by completing the survey.

To ensure that only eligible participants responded to the survey, two screening questions were included at the beginning of the survey. These questions assessed whether or not potential participants were EMS professionals (EMT or paramedic) and actively practicing as a community paramedic or a paramedic in a MIH team. The study was conducted in the Summer/Fall of 2020.

2.2 STUDY OBJECTIVES & HYPOTHESES

The study objectives and the hypotheses are listed below.

1. To describe
 - a) Community paramedics' demographic/background characteristics (age, gender identity, race/ethnicity, educational level, CP work hours, CP work experience, previous EMT/paramedic experience, CP roles, and CP experiences during the Coronavirus (COVID-19) pandemic).
 - b) CP training characteristics (CP training completion, types of CP training, duration of CP training, training mode, CP certification, certification issuing agency, previous professional license, and type of license).
 - c) CP program characteristics (practice setting, geographical region, CP program duration, delivery model, patient population, funding, data sharing, outcomes documentation, and MIH practice).
2. To assess community paramedics' perceptions of role clarity, professional identity (PI), and role readiness (RR).
3. To determine the type, extent, and perceived importance of interprofessional collaboration (IPC).
4. To determine if PI is related to community paramedic's role clarity.

- H_{1A}:** There is a significant, positive association between PI and community paramedics' role clarity.
5. To determine if PI and community paramedic's role satisfaction differ by CP training completion.

H_{2A}: PI will be significantly higher in community paramedics with CP training completion compared to those without CP training completion.

H_{2B}: Community paramedics' role satisfaction will be significantly higher in community paramedics with CP training completion compared to those without CP training completion.

6. To determine if the extent of IPC is related to PI and if the extent of IPC differs by CP training completion and CP work experience.

H_{3A}: There is a significant, positive relationship between PI and the extent of IPC.

H_{3B}: The extent of IPC will be significantly higher in community paramedics with CP training completion compared to those without CP training completion.

H_{3c}: The extent of IPC will be significantly, positively associated with CP work experience.

7. To determine if the extent of IPC is related to CP roles (primary care, care coordination, and public health & preventive roles).

The relationship between the extent of IPC and individual CP roles will be assessed as indicated in the hypotheses listed below:

Primary Care Roles

H_{4A}: The extent of IPC will be significantly associated with performance of health assessment roles.

H_{4B}: The extent of IPC will be significantly associated with performance of medical procedure roles.

H4C: The extent of IPC will be significantly associated with performance of disease management roles.

H4D: The extent of IPC will be significantly associated with performance of medication management roles.

H4E: The extent of IPC will be significantly associated with performance of medication administration roles.

H4F: The extent of IPC will be significantly associated with performance of disease self-management roles.

Care Coordination Roles

H4G: The extent of IPC will be significantly associated with performance of care coordination roles.

H4H: The extent of IPC will be significantly associated with performance of patient navigation roles.

Public health & Preventive Roles

H4I: The extent of IPC will be significantly associated with performance of vaccine administration roles.

H4J: The extent of IPC will be significantly associated with provision of health education roles.

H4K: The extent of IPC will be significantly associated with provision of health promotion roles.

H4L: The extent of IPC will be significantly associated with performance of injury prevention/safety assessment roles.

H4M: The extent of IPC will be significantly associated with performance of urgent care roles.

Note: Only significant CP roles will be included in the regression model in Objective 8.

8. To examine the relationship between PI, CP training completion, CP work experience, CP roles, and the extent of IPC while controlling for demographic/background characteristics.

H_{5A}: PI will be a significant positive predictor of the extent of IPC while controlling for CP training completion, CP work experience, CP roles, and demographic/background characteristics.

H_{5B}: CP training completion will be a significant positive predictor of the extent of IPC while controlling for PI, CP work experience, CP roles, and demographic/background characteristics.

H_{5C}: CP work experience will be a significant positive predictor of the extent of IPC while controlling for PI, CP training completion, CP roles, and demographic/background characteristics.

H_{5D}: CP roles will be a significant positive predictor of the extent of IPC while controlling for PI, CP training completion, CP work experience, and demographic/background characteristics.

Note: H_{5D} will be assessed for individual CP roles that have a significant association with the extent of IPC (see Objective 7).

2.3 STUDY VARIABLES

Table 2.1 summarizes the study variables, operational definitions, and variable type. The description of the study variables and instruments are listed below:

1. Community Paramedics' Demographic/Background Characteristics

a. Age

A single item was used to assess the age (in years) of community paramedics.

“What is your age?”

The response was provided as free text.

b. Gender Identity

For gender identity, a single item was used.

“With which gender identity do you most identify?”

Gender identity was categorized as male, female, non-binary, transgender male, transgender female, prefer not to answer, other.

c. Race/Ethnicity

To assess race/ethnicity, a single item was used.

“Which of the following best describes your race/ethnicity? (select all that apply)”

The response was categorized as non-Hispanic White, non-Hispanic Black, Hispanic or Latinx, American Indian or Alaska Native, Native Hawaiian or Pacific Islander, Asian, other (provided as free text).

d. Educational Level

The educational level of community paramedics was obtained with a single item.

“What is your highest educational level?”

The response was categorized as high school or GED, technical college certificate, associate degree, bachelor's degree, master's degree, other (provided as free text).

e. CP Work Hours

To obtain the number of hours per week allocated for community paramedicine role, a single item was used.

“How many hours per week is allocated to your role as a community paramedic?”

The response was provided as free text.

f. CP Work Experience

A single question was used to assess CP's work experience.

“How long have you worked as a community paramedic?”

The response was categorized as less than 1 year, 1 to 2 years, 3 to 4 years, greater than 4 years.

g. Previous Paramedic Experience

A single question was used to assess previous work experience (in years and months) as an EMT or paramedic.

“Prior to your present role as a community paramedic, how long did you work as an EMT or paramedic in emergency care?”

The response was provided as free text.

h. CP Roles

Fourteen items were used to assess how frequent CP roles,¹²⁹ including primary care (health assessment, medical procedures, disease management, medication management, medication administration, disease self-management), care coordination (patient coordination, patient navigation), public health & preventive roles (health education, health promotion, vaccine administration injury prevention/safety assessment, urgent care), and other (provided as free text) roles, were performed by community paramedics in a typical week.

“In your current role, in a typical week, how frequently do you do the following activities?”

The responses were categorized using a 5-point Likert scale from 1 (Less than once a week) to 5 (Everyday). A ‘not applicable (NA)’ option was included to indicate roles

not performed by a community paramedic in their respective programs. NA was coded as 0. A higher score indicated a higher extent of the CP role performed.

i. CP experiences during the Coronavirus (COVID-19) pandemic

Five questions assessed the CP roles performed during the COVID-19 pandemic, the impact of these roles on typical CP roles, access to personal protective equipment (PPE), and challenges and opportunities encountered.

Impact of COVID-19 on CP Roles

A single item was used to assess whether the COVID-19 pandemic had an impact on the typical CP roles.

“On a scale of 0 to 10, to what extent did the coronavirus (COVID-19) pandemic impact your roles/responsibilities?”

The response was recorded on a 10-point Likert scale ranging from 0 (Not at all) to 10 (To a great extent). A higher score indicated a higher level of impact.

Type of COVID-19 Roles

Five items assessed COVID-19 roles,¹³⁰ including whether or not CPs did the following: conduct in-home assessments, identify infected patients that require hospitalization, transport infected patients, support self-isolated patients, other (provided as free text).

“Please check yes or no to indicate whether or not you perform any of the COVID-19 roles listed below.”

The response was categorized as 1 (Yes), 0 (No).

Access to Personal Protective Equipment (PPE)

One item evaluated accessibility to PPE recommended by evidence-based guidelines.

“During the COVID-19 pandemic, how often have you had access to personal protective equipment (PPE) recommended by evidence-based guidance.”

The response was categorized as Never, Rarely, Sometimes, Very Often, Always.

COVID-19 Challenges

Challenges encountered during the COVID-19 pandemic were assessed with one open-ended question.

“What was the most significant challenge you encountered during the COVID-19 pandemic? (Please specify).”

The response was free text.

COVID-19 Opportunities

Opportunities encountered during the COVID-19 pandemic were assessed with an open-ended question.

“What was the most significant opportunity you encountered during the COVID-19 pandemic? (Please specify).”

The response was free text.

2. CP Training Characteristics

a. CP Training Completion

A single item assessed whether or not participants completed CP training.

“Have you completed additional training beyond on-the-job training to prepare you for your role as a community paramedic?”

The response was categorized as 1 (Yes), 0 (No).

For community paramedics that did not complete CP training, the survey skipped to item ‘g’ (previous professional license).

b. Type of CP Training

For community paramedics’ that completed CP training,¹⁴¹ two questions obtained information about the type of training. A question containing fourteen items assessed

the type of patient care training, including disease-specific health assessment, taking medical history, medical procedures, chronic disease management, administration/management of medications, provision of preventive care/education, social needs identification, community needs assessment, understanding community paramedics' roles, safety assessment/injury prevention, patient navigation, patient advocacy, assessment of personal wellness, and other (provided as free text).

“Please indicate yes or no regarding the type of patient care training you completed to prepare you for your role as a community paramedic.”

A question containing five items assessed interpersonal training, including therapeutic communication, identification of socioeconomic factors, patient health literacy, interprofessional collaboration, and other (provided as free text) training.

“Please indicate yes or no regarding the type of interpersonal training you completed to prepare you for your role as a community paramedic.”

Responses for both questions were categorized as 1 (Yes), 0 (No) for the list of items in patient care and interpersonal training.

c. Duration of CP Training

Two items assessed the duration of didactic/classroom and/or clinical CP training¹⁴¹ completed by community paramedics.

“How much didactic/classroom training did you receive as a community paramedic?”

The response was categorized as none, 1 day or less, 2 to 3 days, 4 to 6 days, 1 to 2 weeks, 3 to 4 weeks, 5 to 8 weeks, 9 weeks or more.

“How much clinical training did you receive as a community paramedic?”

The response was categorized as none, 1 day or less, 2 to 3 days, 4 to 6 days, 7 to 9 days, 10 days or more.

d. Training Mode

To assess the training delivery mode of community paramedics¹⁴¹ that participated in didactic/classroom and clinical training, two items were used.

“How was the didactic/classroom training delivered? (select all that apply)”

The response was categorized as in-person, online (e.g., distance learning, webinar), other (provided as free text).

“How was the clinical training delivered? (select all that apply)”

The response was categorized as a rotation at a practice site, direct practice/experiential rotation, shadowing a clinician, other (provided as free text).

e. CP Certification

A single item assessed whether or not community paramedics obtained CP certification after completing the CP training.

“Did you obtain a community paramedicine certification upon completion of the community paramedicine training program?”

The response was categorized as 1 (Yes), 0 (No).

f. Certification Issuing Agency

For community paramedics that completed CP training, a single item was used to assess the agency or organization that issued CP certification.

“What type of agency/organization issued the community paramedicine certification?”

The response was categorized as International Board of Specialty Certification, community college, local agency, other (provided as free text).

g. Previous Professional License

To determine if community paramedics have any previous non-EMS professional license, a single item was used.

“Have you obtained any other professional license(s)?

The response was categorized as 1 (Yes), 0 (No).

h. Type of License

For community paramedics that had a previous non-EMS license, a single item was used to assess the type of license.

“Which license(s) have you obtained?”

The response was categorized as Licensed Vocational or Practical Nurse (LVN, LPN), Registered Nurse (RN), Social Worker (LMSW, LCSW), other (provided as free text).

3. CP Program Characteristics

a. Practice Setting

To obtain the practice setting of community paramedics, a single item was used.

“In what setting do you practice as a community paramedic?”

Response was categorized³² as

- i. Non-metropolitan: small rural (less than 10,000 residents), large rural (10,000 to 49,999 residents).
- ii. Metropolitan: small metro (less than 250,000 residents), median metro (250,000 to 999,999 residents), large metro (1 million or more residents).

b. Geographical Region

A single item was used to obtain the geographical setting that community paramedics practice.

“In what geographical region do you practice as a community paramedic?”

The response was categorized as^{131,132}

- i. Northeast: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont, New Jersey, New York, Pennsylvania.

- ii. Midwest: Illinois, Indiana, Michigan, Ohio, Wisconsin, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota.
- iii. South: Delaware, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, District of Columbia, West Virginia, District of Columbia, West Virginia, Alabama, Kentucky, Mississippi, Tennessee, Arkansas, Louisiana, Oklahoma, Texas.
- iv. West: Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming, Alaska, California, Hawaii, Oregon, Washington.

c. CP Program Duration

To determine the duration of participants' CP program, a single item was used.

“How long has your community paramedic program been operational?”

Response was categorized as less than 1 year, 1 to 2 years, 3 to 4 years, 5 years, or more.

d. Delivery Model

A single item was used to assess the type of delivery model(s) utilized by CP programs.

“What type of delivery model is your community paramedicine program? (Select all that apply)”

Response was categorized as fire department, hospital-based, public - county, public - city, Public - regional, public - utility model (government contract), private (for-profit), private (nonprofit), law enforcement, military, industrial, other (provided as free text).

e. Patient Population

The type of patient population that community paramedics provide health services was determined using a single item.

“Which of the following best describes your patient population? (select all that apply)”

The response was categorized as individuals with chronic conditions, individuals with a disability, homeless individuals, individuals with mental health conditions, individuals with substance/alcohol abuse, uninsured individuals, high EMS users, high ED users, individuals in hospice care, older adults (≥ 65 years), children, other (provided as free text).

f. Funding

To determine how CP programs, obtain funding, a single item was used.

“How is your program funded? (select all that apply)”

The response was categorized as foundation/charitable grants, the federal government, state government, local government, insurance providers, EMS departments, health care agencies, other (provided as free text), don't know.

g. Data Sharing

Data sharing between community paramedics and other health professionals was determined using a single item.

“Please indicate how you share data with other health professionals. (select all that apply)”

Responses were categorized as electronic patient record systems, information exchange systems, encrypted email, faxing, telephone, manually (pen and paper), other (provided as free text).

h. Outcomes Documentation

A single item was used to determine the types of outcomes that are documented by CP programs.¹²⁹

“Please indicate what outcomes are documented in your community paramedicine program. (select all that apply)”

The response was categorized as health services utilization (e.g., hospital readmission/admissions, ED transport, ED visit, length of stay), cost savings, patient clinical outcomes (e.g., blood pressure and blood glucose control), patient-reported outcomes (e.g., patient satisfaction, health-related quality of life), process measures (e.g., referrals, immunizations), other (provided as free text), don't know.

i. MIH Practice

A single item was used to assess if community paramedics practice in mobile integrated health (MIH) programs.

“Do you practice as part of a mobile integrated health team?”

The response was categorized as 1 (Yes), 0 (No).

j. MIH Team Operation

For community paramedics that practice in a MIH team, a single item assessed how community paramedics operate within MIH teams.

“Please indicate the type of mobile integrated health (MIH) team that closely represents your usual MIH operations.”

The response was categorized as independent (I work by myself in collaboration with medical oversight), pre-hospital (I work with another paramedic or an EMT), integrated (I work with another health care professional e.g., physician, nurse, social worker), other (provided as free text).

4. CP Practice Perceptions

a. Role Clarity

Four items were used to assess community paramedics' role clarity.¹³³ Clarity on professional roles, work objectives, and role expectations by both health professionals and patients were assessed. Responses were recorded using a 5-point Likert scale

ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). A composite score ranging from 4 to 20 was calculated by adding responses to each item. A higher score indicated a stronger role clarity.

b. Role Readiness (RR)

To measure the level of preparedness for CP professional roles, a single item was used.

“From my first day as a community paramedic, I was adequately prepared to carry out my roles and responsibilities.”

The response was recorded on a 5-point Likert scale of 1 (Strongly Disagree) to 5 (Strongly Agree). A higher score signified a higher RR.

c. Professional Identity (PI)

A modified version of a questionnaire developed by Kanefuji et.al. (2017) to assess the PI of public health nurses (PIP_N)¹³⁴ was used to assess the PI of community paramedics. The PIP_N questionnaire is an 11-item, self-reported instrument that was developed from a 21-item scale using 309 public health nurses in Japan.¹³⁴ The PIP_N questionnaire consists of 3 domains: intention to develop professionally (4 items), confidence in own abilities (4 items), and occupational affinity (3 items). The subscales had Cronbach’s alphas of 0.80, 0.78, and 0.82, respectively, with an overall internal consistency of 0.87.¹³⁴ Each item is scored on a 5-point Likert scale as 1 (Strongly Disagree) to 5 (Strongly Agree) . A composite score ranging from 11 to 55 was calculated by adding responses to each item. A higher score signified a stronger PI.¹³⁴ As the concept of patient care could differ in Japan, some modifications were made to the questionnaire to tailor the questionnaire to community paramedics. For example, the word ‘clients’ was replaced with ‘patients’, and the word ‘junior’ was removed from ‘colleagues’ to be consistent with terminology in the U.S.

d. CP Role Satisfaction

A single item was used to measure the level of satisfaction with CP roles.

“Overall, how satisfied or dissatisfied are you with your role as a community paramedic?”

A 5-point Likert scale ranging from 1 (Very Dissatisfied) to 5 (Very Satisfied) was used.

A higher score indicated a higher CP role satisfaction.

e. Type of IPC

To assess the types of health care professionals that community paramedics collaborate with, a single item was used.

“What type of health professionals have you worked with as a community paramedic?” (select all that apply)

The response was categorized as physicians, nurse practitioners, physician assistants, pharmacists, registered nurses, licensed vocational or practical nurses, social workers, other (provided as free text).

f. Extent of IPC

The extent of IPC was measured with the Assessment of Interprofessional Team Collaboration Scale-II (AITCS-II).¹³⁵⁻¹³⁷ The AITCS-II is a 23-item, self-report instrument that has been utilized in measuring IPC among various students in health care (e.g., nurses, social workers, pharmacists, dieticians, paramedics) in the U.S. and Canada in hospitals and community health agencies.¹³⁵⁻¹³⁷ It was developed from the 47-item AITCS questionnaire.¹³⁵⁻¹³⁷ The AITCS-II comprises 3 subscales: partnership (8 items), cooperation (8 items), and coordination (7 items).¹³⁵ The AITCS-II retained the psychometric properties as its earlier versions (AITCS and AITCS-I).^{135,138} The subscales have Cronbach’s alphas of 0.90, 0.92, and 0.90, respectively, and the overall Cronbach’s alpha was 0.89. Each item was scored on a 5-point Likert scale as 1 (Never) to 5 (Always). For this study, nine items from partnership and cooperation domains

were used because they illustrate the pattern of community paramedics' collaboration with other health professionals. Two items in the partnership domain assessed communication and care coordination, while seven items from the cooperation domain assessed shared decision-making, respect/trust for other health professionals, openness/honesty, resolution of differences, role boundaries, knowledge/skills sharing, and building trust with other health professionals. A composite score ranging from 9 to 45 was calculated by adding responses to each item. A higher score indicated a stronger extent of IPC. The original scale included 14 items that assess collaboration at a team-level. These items were excluded from the study because community paramedics do not typically interact with health professionals in a team-based care model manner. Also, for most health professionals, team-based collaboration with community paramedics is not a customary approach in the provision of patient care services.

g. Importance of IPC

A single item was used to assess how community paramedics perceive the importance of collaboration with other health professionals.

“On a scale of 0 to 10, please indicate the importance of collaboration with other health care professionals in your role as a community paramedic.”

The response was recorded on a 10-point Likert scale ranging from 0 (Not at All Important) to 10 (Very Important). A higher score indicated a higher level of importance.

5. Future of Community Paramedicine

Finally, two items were used to assess community paramedics' views on the future of their CP programs and the CP care model.

“Where do you see your local community paramedicine program going in the next 3 - 5 years?”

“Where do you see the field of community paramedicine going in the next 10 - 20 years?”

The response to each question was provided as free text.

Table 2.1: Summary of Variables, Operational Definitions, and Variable Type

Variables	Operational Definition	Variable Type
CP Demographic/background Characteristics		
Age	Age (in years) was provided as free text.	Interval
Gender identity	Male, female, non-binary, transgender male, transgender female, prefer not to answer, other (provided as free text).	Categorical
Race/ethnicity	One item to select all that apply. Non-Hispanic White, non-Hispanic Black, Hispanic or Latinx, American Indian or Alaska Native, Native Hawaiian or Pacific Islander, Asian, other (provided as free text).	Categorical
Educational level	High school or GED, technical college certificate, associate degree, bachelor’s degree, master’s degree, other (provided as free text).	Ordinal
CP Work hours	Response (in hours per week) was provided as free text.	Interval
CP work experience	Less than 1 year, 1 year to 2 years, 3 years to 4 years, Greater than 4 years.	Categorical
Previous EMT/paramedic experience	Response (in years and months) was provided as free text.	Interval
CP roles	14 items on a 5-point Likert scale of 1 (periodically (Less than a typical week)), 2 (1 day), 3 (3-4 days), 4 (4 days), and 5 (Everyday) assessed CP roles (health assessment, medical procedures, disease management, medication management, medication administration, vaccine administration, disease self-management, health education, health promotion, care coordination, patient navigation, injury prevention/safety assessment, urgent care and other (provided as free text)). A higher score indicated a higher extent and type of CP roles performed.	Categorical

CP = community paramedicine

Table 2.1 Continued: Summary of Variables, Operational Definitions, and

Variable Type

Variables	Operational Definition	Variable Type
CP roles	A ‘not applicable (NA)’ option was included to indicate roles not performed by a community paramedic in their respective programs. NA was coded as 0.	Categorical
CPs Experiences during the Coronavirus (COVID-19) Pandemic		
Impact on CP Roles	A question with a 10-point Likert scale 0 = Not at All, 10 = To a Great Extent. A higher score indicated a higher impact on CP roles.	Interval
Type of COVID-19 Roles	5 items: Conduct in-home assessments, identify infected patients that require hospitalization, transport infected patients, support self-isolated patients, other (provided as free text). All items were categorized as 1 (Yes), 0 (No).	Categorical
Access to Personal Protective Equipment (PPE)	Never, Rarely, Sometimes, Very Often, Always	Categorical
COVID-19 challenges and opportunities	2 questions (view on COVID-19 challenges and opportunities in performing CP roles).	Free text
CP Training Characteristics		
CP training completion	1 (Yes), 0 (No)	Categorical
Types of CP training	19 items: Patient care (14 items): Disease-specific health assessment, taking medical history, medical procedures, chronic disease management, administration/management of medications, provision of preventive care/education, social needs identification, community needs assessment, understanding community paramedics’ roles, safety assessment/injury prevention, patient navigation, patient advocacy, assessment of personal wellness, other (provided as free text).	Categorical
Types of CP training	Interpersonal (5 items): Therapeutic communication, identification of socioeconomic factors, patient health literacy, interprofessional collaboration, other (provided as free text). All items were categorized as 1 (Yes), 0 (No).	Categorical

CP = community paramedicine; EMT = emergency medical technician

Table 2.1 Continued: Summary of Variables, Operational Definitions, and

Variable Type

Variables	Operational Definition	Variable Type
	Clinical: 1 day or less, 2 to 3 days, 4 to 6 days, 7 to 9 days, 10 days or more, none	
Training mode	Two items to select all that apply. Didactic/Classroom: In-person, online, other (provided as free text). Clinical: Rotation at a practice site, direct practice/experiential rotation, shadowing a clinician, other.	Categorical
CP certification	1 (Yes), 0 (No)	Categorical
Certification issuing agency	International Board of Specialty Certification, community college, local agency, other (provided as free text).	Categorical
Previous professional license	1 (Yes), 0 (No)	Categorical
Type of License	Licensed Vocational or Practical Nurse (LVN, LPN), Registered Nurse (RN), Social Worker (LMSW, LCSW), other (provided as free text).	Categorical
CP Program Characteristics		
Practice setting	Non-metropolitan: Small rural (less than 10,000 residents), Large rural (10,000 to 49,999 residents) Metropolitan: Small Metro (Less than 250,000 residents), Medium Metro (250, 000 to 999,999 residents), Large Metro (1 million or more residents)	Categorical
Geographical region	Northeast: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont, New Jersey, New York, Pennsylvania Midwest: Illinois, Indiana, Michigan, Ohio, Wisconsin, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota South: Delaware, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, District of Columbia, West Virginia, District of Columbia, West Virginia, Alabama, Kentucky, Mississippi, Tennessee, Arkansas, Louisiana, Oklahoma, Texas	Categorical

Table 2.1 Continued: Summary of Variables, Operational Definitions, and Variable Type

Variables	Operational Definition	Variable Type
Geographical region	West: Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming, Alaska, California, Hawaii, Oregon, Washington	Categorical
CP program duration	Less than 1 year, 1 to 2 years, 3 to 4 years, 5 years or more	Categorical
Delivery model	One item to select all that apply. Fire department, hospital-based, public - county, public - city, Public - regional, public utility model, private (for-profit), private (nonprofit), law enforcement, military, industrial, other (provided as free text).	Categorical
Patient population	One item to select all that apply. Individuals with chronic conditions, individuals with a disability, homeless individuals, individuals with mental health conditions, individuals with substance/alcohol abuse, uninsured individuals, high EMS users, high ED users, individuals in hospice care, older adults (≥ 65 years), children, other (provided as free text).	Categorical
Funding	One item to select all that apply. Foundation/charitable grants, federal government, state government, local government, insurance providers, EMS departments, health care agencies, other (provided as free text)., don't know.	Categorical
Data sharing	One item to select all that apply. Electronic patient record systems, health information exchange systems, encrypted email, faxing, telephone, manually (pen and paper), other (provided as free text).	Categorical
Outcomes documentation	One item to select all that apply. Health services utilization (e.g., hospital readmission/admissions, ED transport, ED visit, length of stays), cost savings, patient clinical outcomes (e.g., blood pressure and blood glucose control), patient-reported outcomes (e.g., patient satisfaction, health-related quality of life), process measures (e.g., referrals, immunizations), other (provided as free text), don't know.	Categorical

EMS = emergency medical services; ED = emergency department; RR = role readiness;
CP = community paramedicine; MIH = mobile integrated health

Table 2.1 Continued: Summary of Variables, Operational Definitions, and

Variable Type

Variables	Operational Definition	Variable Type
MIH practice	1 (Yes), 0 (No).	Categorical
MIH team operations	Independent (I work by myself in collaboration with medical oversight), pre-hospital (I work with another paramedic or an EMT), integrated (I work with another health care professional e.g., physician, nurse, social worker), other (provided as free text).	Categorical
Community Paramedics' Practice Perceptions		
Role clarity	4 items on a 5-point Likert scale (Strongly Disagree (SD) = 1 to Strongly Agree (SA) = 5). A composite score ranging from 4 to 20 will be obtained. A higher score indicated a higher role clarity.	Interval
Role readiness (RR)	One item with a 5-point Likert scale (SD = 1 to SA = 5). A higher score indicated a higher RR.	Interval
Professional identity (PI)	11 items: 4 items: professional development 4 items: confidence in professional roles 3 items: professional pride Each item was scored on a 5-point Likert scale (SD = 1 to SA = 5). A composite score ranging from 11 to 55 was obtained. A higher score indicated a stronger PI.	Interval
CP Role satisfaction	One item with a 5-point Likert scale (1 =Very Dissatisfied, 5 = Very Satisfied). A higher score indicated a higher CP role satisfaction.	Interval
Types of IPC	One item to select all that apply. Physicians, nurse practitioners, physician assistants, pharmacists, registered nurses, licensed vocational nurses, social workers, other (provided as free text).	Categorical
Extent of IPC	9 items: Partnership (2 items): Communication and care coordination. Cooperation (7 items): shared decision-making, respect/trust for other health professionals, openness/honesty, resolution, role boundaries, knowledge /skills sharing, and building trust with other health professionals. Each item will be scored on a 5-point Likert scale (Never= 1, Always = 5).	Interval

Table 2.1 Continued: Summary of Variables, Operational Definitions, and

Variable Type

Variables	Operational Definition	Variable Type
Extent of IPC	A composite score ranging from 9 to 45 was obtained. A higher score indicated a higher extent of IPC.	Interval
Importance of IPC	A question with a 10-point Likert scale 0 = Not at All Important, 10 = Very Important. A higher score indicated a higher perception of IPC importance.	Interval
Future of CP		
Future of CP Local Programs	An item assessed the future of CP local programs	Free text
Future of CP Care Model	An item assessed the perception of the future of the CP care model	Free text

MIH = mobile integrated health; CP = community paramedicine; IPC = interprofessional collaboration; PI = professional identity

2.4 DATA COLLECTION

The survey questionnaire (Appendix 1) was administered using an online survey tool, Qualtrics (https://utexas.qualtrics.com/jfe/form/SV_6fp2hUhOacjxQR7). Two CP experts assessed the readability, interpretation, and content of the questionnaire. Based on feedback, minor modifications were made on the following items: CP delivery model and CP practice in a mobile integrated health (MIH) team. Also, additional items were added: two eligibility screening items, and questions to assess previous non-EMS license(s), type of non-EMS license, previous EMT/paramedic experience, future of local CP programs and CP care model, and CP experiences during the Coronavirus (COVID-19) pandemic. Prior to survey administration, the questionnaire was pilot tested by two community paramedics. Based on the suggestions and comments from the pilot test, minor modifications were made to the response options of the CP care delivery, data sharing, and MIH team operation survey questions. The survey took approximately 10 to 15 minutes to

complete. The survey was distributed over a 3-week period in July/August 2020. Using the NAEMT listserv of two digital email servers (relating to Mobile Integrated Healthcare (MIH) news and information, and EMS leadership respectively), an introduction letter (Appendix 2) containing the survey link was distributed by administrators of CP and MIH programs to their respective team members. To increase the response rate, two weekly follow-up reminder emails (Appendices 3 and 4) were also distributed by administrators of the programs. Upon completion of the survey, participants had the option to enter a drawing for the chance to win EMS medical gear.

2.5 STATISTICAL ANALYSES

All data analyses were conducted using SAS for Windows, version 9.4 (SAS Institute, Cary NC), and R package Version 3.6.1. The *a priori* alpha level for all inferential analyses was $p < 0.05$. For multiple comparisons of individual CP roles and IPC, significance was set at $p < 0.01$ to mitigate type 1 error inflation.

Descriptive analyses were used for Objectives 1, 2, and 3. Mean, standard deviation, and range were used to describe age, CP work hours, previous EMT/paramedic experience, role clarity, PI, RR, role satisfaction, the extent of IPC, and importance of IPC, while frequencies and percentages were used to describe the other variables. Objective 4 utilized Pearson's correlation. Objective 5 utilized independent samples t-test. Pearson's correlation, independent samples t-test, and one-way ANOVA were used for Objectives 6 and 7. To protect against type 1 error due to multiple comparisons in Objectives 6 and 7, the p-value was adjusted using the Bonferroni correction. Finally, multiple linear regression was used for Objective 8.

The regression model for Objective 8 examined the relationship between PI, CP training completion, CP work experience, CP roles (significant CP roles from Objective 7),^{139,140} and the extent of IPC while controlling for demographic/background characteristics. The dependent variable is the extent of IPC, while the independent variables are PI, CP training completion, CP work experience, CP roles, and demographic/background characteristics. Individual CP roles were assessed to determine the presence of significant bivariate relationships with the extent of IPC in Objective 7. Only significant CP roles were included in the regression model. Demographic/background characteristics (age, gender identity, race/ethnicity, educational level, CP work hours, and previous EMT/paramedic experience) are the covariates in the regression model.

$$Y1 = B0 + B1X1 + B2X2 + B3X3 + B4X4 + B5X5 + B6X6 + B7X7 + B8X8 + B9X9 + B10X10$$

Y1 = extent of IPC

X1 = PI

X2 = CP training completion

X3 = CP work experience

X4 = CP Roles

X5 = age

X6 = gender identity

X7 = race/ethnicity

X8 = educational level

X9 = CP work hours

X10 = Previous EMT/paramedic experience

The Bs are the regression coefficients for the corresponding independent variables.

Content Analysis

A qualitative content analysis was conducted to examine community paramedics' viewpoints on the future of their local CP programs and CP practice, and the challenges and opportunities encountered during the COVID-19 pandemic. Survey responses to open-ended questions were compiled and assessed for familiarization by reading the data repeatedly while actively searching for patterns.¹⁴¹ Textual codes were generated manually from the data by "cutting out and sorting." Contents were coded by first identifying texts and quotes that seemed important.^{141,142} Responses that were too broad or did not have enough context to code were excluded.^{141, 143,144} Relevant text and quotes were sorted into sub- and main categories based upon their meaning and concepts.^{141,142,145} Throughout the process, responses obtained were independently evaluated and coded by two researchers. Then two additional team members independently re-examined the codes to clarify any discrepancies. Finally, the team held a consensus meeting for final coding.

2.5.1 Statistical Assumptions

This section presents the statistical assumptions for the inferential analyses. All the assumptions were assessed prior to data analysis.

2.5.1.1 Pearson's Correlation

Pearson's correlation assumptions for normality, linearity, equality of variance (homoscedasticity), presence of paired observation between dependent and independent variables, and absence outliers^{139,140} were assessed prior to running any analysis. Examining the symmetry (skewness) and peak (kurtosis) using statistical tests (e.g., Shapiro- Wilk test) and graphical methods (histograms and residual scatter plots) were performed to assess the normality of the distribution.^{139,140} A significant statistical test, skewness > |2| and kurtosis > |7| typically indicate a violation.^{139,140} A visual inspection of

bivariate scatter plots was performed to assess the presence of a linear relationship between the dependent and independent variables. Finally, the presence of outliers was assessed by visual inspection and z score values $> |3.0|$ were reviewed for appropriateness.^{139,140}

2.5.1.2 Independent Samples t-test

The assumptions for independent samples t-test of normality, linearity, homoscedasticity, and independence of observations^{139,140} were assessed prior to statistical analyses. Normality was examined by assessing the skewness and kurtosis.^{137,138} Homoscedasticity was examined by visual inspection of scatter plots of residuals to assess if the variance of the two groups is equal.^{139,140} To satisfy the assumption of independence, reliability (e.g., internal consistency) of multi-item study instruments (role clarity, PI, and extent of IPC) was assessed using Cronbach's alpha with an acceptable value of $\alpha \geq 0.60$.^{146,147}

2.5.1.3 One-Way Analysis of Variance (ANOVA)

One-way ANOVA's assumptions of normality, linearity, homoscedasticity, and independence of observations^{139,140} were evaluated prior to statistical analyses. Homoscedasticity was examined by visual inspection of scatter plots of residuals to assess if the variance of error terms (the difference between the observed and predicted values) is equal across all levels of the independent variables.^{139,140}

2.5.1.4 Multiple Linear Regression

Assumptions of multiple linear regression for normality, linearity, homoscedasticity, and independence of observations were assessed prior to conducting statistical analyses as described above.^{139,140} For the assumption of multicollinearity, R^2 (proportion of shared variance between two independent variables) will be examined. A

tolerance $(1 - R^2)$ of < 0.10 or a variance inflation factor > 10 was used to detect multicollinearity.^{139,140}

Table 2.2 displays a summary of the study objectives, hypotheses, and planned statistical analyses.

Table 2.2: Summary of Objectives, Hypotheses, and Statistical Analyses

Hypothesis	Dependent variable	Independent variable	Statistical test
Objective 1: To describe community paramedics' demographic/background, CP training, and CP program characteristics.			
	Age, CP work hours, previous EMT/paramedic experience	NA	Mean, standard deviation, range
NA	Gender identity, race/ethnicity, educational level, CP work experience, CP roles, CP experiences during the Coronavirus (COVID-19) pandemic (impact on CP roles, types of CP roles, access to PPE), CP training completion, types of CP training, duration of CP training, training mode, CP certification, certification issuing agency, previous professional license, type of license, practice setting, geographical region, MIH practice, CP operational time, delivery model, patient population, funding, data sharing, and outcomes documentation.	NA	Frequencies

Table 2.2 Continued: Summary of Objectives, Hypotheses, and Statistical Analyses

Hypothesis	Dependent variable	Independent variable	Statistical test
Objective 2: To assess community paramedics' perceptions of role clarity, professional identity (PI), and role readiness (RR).			
NA	Role clarity	NA	Mean, standard deviation, range
	PI		
	RR		
Objective 3: To determine the type, extent, and importance of interprofessional collaboration (IPC).			
NA	IPC types	NA	Frequencies
	Extent of IPC		Mean, standard deviation, range
	Importance of IPC		
Objective 4: To determine if PI is related to community paramedics' role clarity.			
H_{1A}: There is a significant, positive association between PI and community paramedics' role clarity.	PI	Role clarity	Pearson's correlation
Objective 5: To determine if PI and community paramedics' role satisfaction differ by CP training completion.			
H_{2A}: PI will be significantly higher in community paramedics with CP training completion compared to those without CP training completion.	PI	CP training completion	Independent samples t-test
H_{2B}: Community paramedics' role satisfaction will be significantly higher in community paramedics with CP training completion compared to those without CP training completion.	Role satisfaction		
Objective 6: To determine if the extent of IPC is related to PI and if the extent of IPC differs by CP training completion and CP work experience.			
H_{3A}: There is a significant, positive association between PI and the extent of IPC.	Extent of IPC	PI	Pearson's correlation

Table 2.2 Continued: Summary of Objectives, Hypotheses, and Statistical Analyses

Hypothesis	Dependent variable	Independent variable	Statistical test
H_{3B} : The extent of IPC will be significantly higher in community paramedics with CP training completion compared to those without CP training completion.	Extent of IPC	CP training completion	Independent samples t-test
H_{3C} : The extent of IPC will be significantly, positively associated with CP work experience.	Extent of IPC	CP work experience	One-way ANOVA
Objective 7: To determine if the extent of IPC is related to CP roles.			
H_{4A} : The extent of IPC will not be significantly associated with performance of health assessment roles.	Extent of IPC	Health assessment	One-way ANOVA
H_{4B} : The extent of IPC will not be significantly associated with performance of medical procedure roles.	Extent of IPC	Medical procedure	One-way ANOVA
H_{4C} : The extent of IPC will not be significantly associated with performance of disease management roles.	Extent of IPC	Disease management	One-way ANOVA
H_{4D} : The extent of IPC will not be significantly associated with performance of medication management roles.	Extent of IPC	Medication management	One-way ANOVA
H_{4E} : The extent of IPC will not be significantly associated with performance of medication administration roles.	Extent of IPC	Medication administration	One-way ANOVA

Table 2.2 Continued: Summary of Objectives, Hypotheses, and Statistical Analyses

Hypothesis	Dependent variable	Independent variable	Statistical test
H_{4F} : The extent of IPC will not be significantly associated with performance of disease self-management roles.	Extent of IPC	Encouraging self-management of disease conditions	One-way ANOVA
H_{4G} : The extent of IPC will not be significantly associated with performance of care coordination roles.	Extent of IPC	Care coordination	One-way ANOVA
H_{4H} : The extent of IPC will not be significantly associated with performance of patient navigation roles.	Extent of IPC	Patient navigation	One-way ANOVA
H_{4I} : The extent of IPC will not be significantly associated with performance of vaccine administration roles.	Extent of IPC	Vaccine administration	One-way ANOVA
H_{4J} : The extent of IPC will not be significantly associated with provision of health education roles.	Extent of IPC	Health education	One-way ANOVA
H_{4K} : The extent of IPC will not be significantly associated with provision of health promotion roles.	Extent of IPC	Health promotion	One-way ANOVA
H_{4L} : The extent of IPC will not be significantly associated with performance of injury prevention/safety assessment.	Extent of IPC	Injury prevention/safety assessment.	One-way ANOVA
H_{4M} : The extent of IPC will not be significantly associated with performance of urgent care.	Extent of IPC	Urgent care	One-way ANOVA

Table 2.2 Continued: Summary of Objectives, Hypotheses, and Statistical Analyses

Hypothesis	Dependent variable	Independent variable	Statistical test
Objective 8: To examine the relationship between PI, CP training completion, CP work experience, CP roles, and the extent of IPC while controlling for demographic/background characteristics.			
H_{5A}: PI will be a significant positive predictor of the extent of IPC while controlling for CP training completion, CP work experience, and demographic/background characteristics.	Extent of IPC	PI	Multiple linear regression
H_{5B}: CP training completion will be a significant positive predictor of the extent of IPC while controlling for PI, CP work experience, and demographic/background characteristics.	Extent of IPC	CP training completion	Multiple linear regression
H_{5C}: CP work experience will be a significant positive predictor of the extent of IPC while controlling for PI, CP training completion, and demographic/background characteristics.		CP work experience	
H_{5D}: CP roles will be a significant positive predictor of the extent of IPC while controlling for PI, CP training completion, and demographic/background characteristics.	Extent of IPC	CP Roles	Multiple linear regression
Reliability			
Internal consistencies of multi-item study instruments (role clarity, PI, the extent of IPC) will be assessed using Cronbach's alpha with an acceptable value of $\alpha \geq 0.60$.			

CP = community paramedicine; IPC = interprofessional collaboration; PI = professional identity; RR= role readiness

2.6 SAMPLE SIZE DETERMINATION

Using the G*Power 3.1.9.4 software with an alpha level of 0.05 and power of 0.80, the minimum required sample size for the inferential analyses based on medium effect sizes is displayed in Table 2.3. Overall, the minimum sample size that will be required for this study is 200.

Table 2.3: Minimum Sample Size for Inferential Analyses

Statistical test	Medium effect size	Minimum required sample size
Pearson's correlation	$\rho = 0.3$	84
Independent samples t-test	$d = 0.5$	64 per group = 128
One-way ANOVA (5 groups)	$f = 0.25$	200
Multiple linear regression (9 IVs)	$f^2 = 0.15$	114

d = Cohen's d , ρ = correlation rho, f = Cohen's f , f^2 = Cohen's f -square

2.7 IRB PROCEDURES

The University of Texas Institutional Review Board (IRB) of the University of Texas at Austin approved the study protocol [IRB Protocol Approval Number **2019-08-0052**].

2.8 STUDY TIMELINE

Data collection occurred over a 3-week period in July/August 2020. In the first week, an invitation letter with the survey link was forwarded to community paramedics by administrators of their respective CP programs. Then, two weekly follow-up reminder emails were sent to encourage non-participants to complete the survey. Data analysis and interpretation of results were conducted in the Fall 2020. Table 2.4 contains the details of the study timeline.

Table 2.4: Study Timeline

Activity	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb
Project duration								
Study invitation email								
Two weekly follow-up email reminders								
Organize study data								
Data analysis/interpretation								
Writing/final report								

Chapter 3: Results

This chapter describes the study findings. First, data preparation and cleaning, including visual inspection of data are described. Statistical assumptions (normality, linearity, homoscedasticity, independence of observations, outliers, and missing data) are also discussed. Then community paramedics' demographic/background, CP training, CP practice perceptions, and CP program characteristics are described, followed by the results from the inferential analyses that were conducted to test the study hypotheses.

3.1 RESPONSE RATE, DATA PREPARATION, AND CLEANING

The web-based survey was conducted over a 3-week period in July/August 2020. The survey was distributed to 372 members of the NAEMT listserv. A total of 111 participants responded to the survey. However, 29 participants did not meet the eligibility criteria because they were not EMTs or paramedics and actively practicing as community paramedics. Thus, those participants were excluded, and the total number of potentially eligible respondents was 343. Out of 343 potential eligible respondents, 82 participants responded and met the study criteria. Of those 25 participants were excluded for the following reasons: nine had complete missingness (i.e., no response at all), and sixteen had incomplete responses (i.e., did not respond to a sufficient number of questions (non-random missing data of $\geq 80\%$) on the survey items)). Therefore, the number of eligible responses after accounting for missingness was 57 with a response rate of 16.7% (57/343). Figure 3.1 shows a flowchart of responses to the study invitation. Upon completion of data collection, data was exported from Qualtrics into an Excel spreadsheet for data analysis.

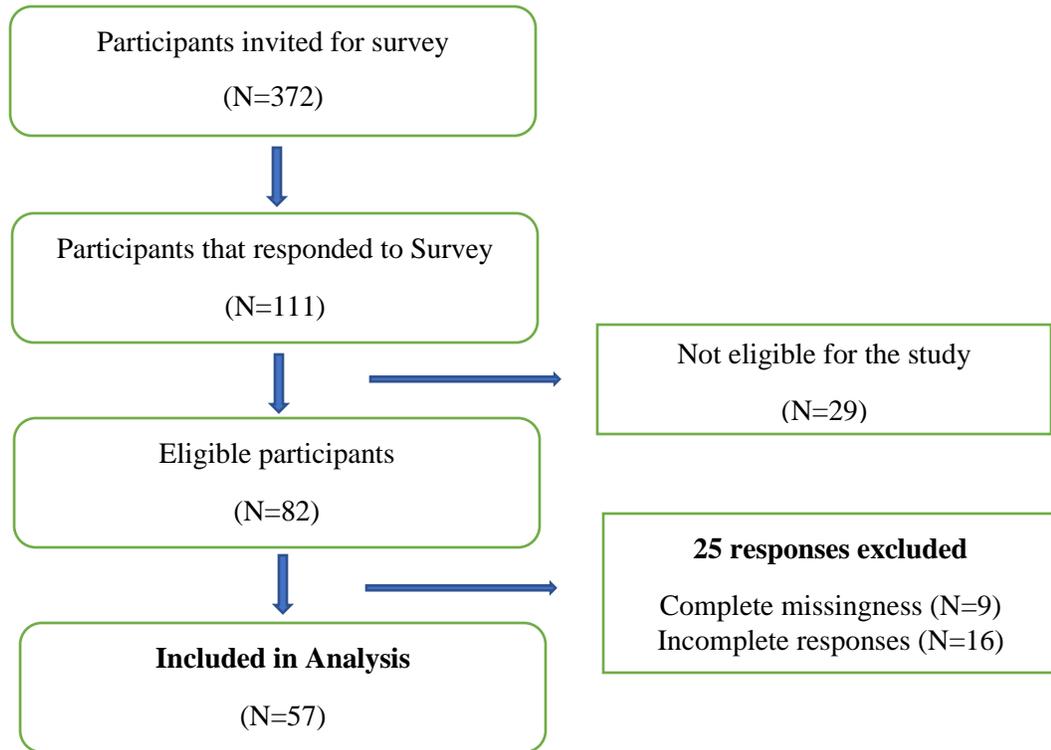


Figure 3.1: Flow Chart of Participants

3.2 ASSESSMENT OF STATISTICAL ASSUMPTIONS

Prior to data analysis, an examination of outliers, linearity, normality, and independence of observations was conducted using SAS version 9.4. To screen for outliers that could potentially affect study results, a visual inspection of data was conducted and Z score values were evaluated. Twenty-one potential outliers based on Z score values $> |3.0|$ were identified in the dataset: 1 outlier from role satisfaction, 3 outliers from role clarity, 10 outliers from PI, and 7 outliers from the extent of IPC. Upon visual inspection of the data, varying work experience and exposure accounted for these potential outliers as all of the outliers were within the response ranges of the survey items. Therefore, the outliers were not excluded from the analysis.

To determine linearity between the dependent and independent variables of interval variables, scatter plots were examined. However, the plots were clustered together and showed horizontal patterns. Therefore, the assumption of linearity was not met across the variables. Normality was assessed by examining skewness and kurtosis. Normality is defined as distributions with skewness of $\leq |2|$ and kurtosis of $\leq |7|$.^{139,140} Table 3.1 displays the skewness and kurtosis for the interval variables. Though the distribution of all the interval variables did not exceed the thresholds for skewness and kurtosis, the examination of the histograms and QQ-plots showed that the overall distribution was not normally distributed (except age and previous EMT/paramedic experience) and was likely impacted by the small sample size. Also, similar findings were observed using the Shapiro-Wilk test for normality. Therefore, the interval variables were not normally distributed, which resulted in a non-parametric distribution.

Table 3.1: Skewness and Kurtosis Values of Interval Variables

Variable	Skewness	Kurtosis
Age	- 0.06	- 0.58
CP Work Hours	- 0.53	- 1.51
Previous EMT/paramedic experience	0.54	- 0.37
Impact on CP Roles	- 1.30	0.29
Role Clarity	- 1.24	1.14
Role Readiness (RR)	- 0.65	- 1.03
Professional Identity (PI)	- 1.00	0.83
<i>Professional Development</i>	- 0.89	0.61
<i>Confidence in Professional Roles</i>	- 1.22	2.99
<i>Professional Pride</i>	- 1.67	2.96
CP Role Satisfaction	- 1.92	4.72
Extent of IPC	- 1.04	1.87
<i>Partnership</i>	- 0.39	- 0.91
<i>Cooperation</i>	- 1.69	4.72
Importance of IPC	- 1.86	2.18

CP = community paramedicine; IPC = interprofessional collaboration; PI = professional identity; RR= role readiness

Table 3.2: Test for Normality (Shapiro -Wilk Test)

Variable	Statistic (W)	P-Value
Age	0.98	0.7243
CP Work Hours	0.78	<0.0001
Previous EMT/paramedic experience	0.95	0.0327
Impact on CP Roles	0.73	<0.0001
Role Clarity	0.87	<0.0001
Role Readiness (RR)	0.75	<0.0001
Professional Identity (PI)	0.92	0.0015
<i>Professional Development</i>	0.93	0.0032
<i>Confidence in Professional Roles</i>	0.91	0.0005
<i>Professional Pride</i>	0.72	<0.0001
CP Role Satisfaction	0.69	<0.0001
Extent of IPC	0.91	0.0005
<i>Partnership</i>	0.89	0.0001
<i>Cooperation</i>	0.85	<0.0001
Importance of IPC	0.56	<0.0001

CP = community paramedicine; EMT = emergency medical technicians; IPC = interprofessional collaboration; PI = professional identity; RR= role readiness

Using Cronbach’s alpha, reliability estimates of the multi-item scales (role clarity, PI, the extent of IPC, CP role categories) were evaluated. The acceptable value of internal consistency was $\alpha \geq 0.60$.^{139,140} Domains with 2 items were assessed using Pearson’s correlation with an acceptable value of ≥ 0.5 .^{139,140} Multi-item scales exhibited acceptable reliability. However, the correlation of the partnership domain of the extent of IPC scale was 0.28 which was below the acceptable value. This low correlation could be due to the utilization of only 2 items instead of the entire 8 items in the partnership domain of the original Assessment of Interprofessional Team Collaboration Scale-II. Finally, since the survey questionnaires were distributed individually to participants and responses were recorded independently by participants, the assumption of the independence of observation was met. Table 3.3 displays the reliability values of the multi-item scales.

Table 3.3: Reliability of Multi-item Scales

Scale	Number of Items	Standardized Cronbach's Alpha
Role clarity	4	0.90
Professional identity	11	0.88
<i>Professional Development</i>	4	0.77
<i>Confidence in Professional Roles</i>	4	0.74
<i>Professional Pride</i>	3	0.83
Extent of IPC	9	0.83
<i>Partnership^a</i>	2	0.28
<i>Cooperation</i>	7	0.80

Bolded numbers are within the acceptable Cronbach's alpha values ($\alpha \geq 0.60$)

^a Estimated by Pearson Correlation ($P = 0.0422$)

The overall summary of the results of the tests for assumptions of linearity, normality, and independence of observations are displayed in Table 3.4.

Table 3.4: Summary of Statistical Assumptions of Interval Variables

	Result	Decision
Linearity (scatter plots)	Clusters with consistent horizontal patterns	Assumption not met
Normality (visual inspection (QQ-plots, histograms, skewness, kurtosis))	All skewed (except age, previous paramedic/EMT experience)	Assumption not met
Normality (Shapiro-Wilk Test)	All significant (except age)	Assumption not met
Independence of observation (Cronbach's $\alpha \geq 0.60$)	Within the acceptable value	Assumption met

3.3 DESCRIPTION OF STUDY VARIABLES

This section presents the descriptive statistics of the study variables of Objectives 1 to 3 (See Tables 3.5 to 3.11 and Figures 3.2 to 3.5).

3.3.1 Community Paramedic Demographic & Background Characteristics

Tables 3.5 to 3.7 summarize the respondent demographic and background characteristics (Objective 1) which include age, gender identity, race/ethnicity, educational level, CP work hours, CP work experience, previous EMT/paramedic experience, CP roles, and CP experiences during the COVID-19 pandemic.

A total of 52/57 participants (91.2%) responded to the demographic and CP background survey items. The mean age of the participants (n=51) was 44.3±10.0 years, with a range of 24.0 to 65.0 years. The gender identity of the participants comprised primarily of males (n=41, 80.4%). The predominant race of the participants (n=51) was Non-Hispanic White (n=45, 88.2%). The most frequent education level (n=52) reported was a bachelor’s degree (n=14, 26.9%), followed by an associate degree (n=12, 23.1%), and a master’s degree (n=10, 19.2%). The mean CP work hours (n=47) of the participants were 29.0±15.8 hours, with a range of 3 to 48 hours per week. The most frequent CP work experience (n=52) reported was 4 years or more (n=16, 30.8%), 3 years to 4 years (n=15, 28.8%), and less than a year (n=13, 25.0%). The mean previous EMT/paramedic experience of the participants (n=50) was 18.0±9.9 years, with a range of 3.0 to 41.0 years. See Table 3.5 for a description of demographic and background characteristics.

Table 3.5: Demographic & Background Characteristics

	Mean ± SD [Range] or n (%)
Age (years) (n=51)	44.3 ± 10.0 [24.0 - 65.0]
Gender Identity (n=51)	
Male	41 (80.4)
Female	10 (19.6)
Race/ethnicity (n=51) ^a	
Non-Hispanic White	45 (88.2)
Hispanic or Latinx	4 (7.8)
American Indian or Alaska Native	1 (2.0)
Other ^b	2 (3.9)

SD = standard deviation

^a Participants selected more than one response; ^b Other include human (n=1), multi-cultural (n=1)

Table 3.5 Continued: Demographic & Background Characteristics

	Mean ± SD [Range] or n (%)
Educational Level (n=52)	
High school or GED	5 (9.6)
Technical college certificate	7 (13.5)
Associate degree	12 (23.1)
Bachelor's degree	14 (26.9)
Master's degree	10 (19.2)
Other ^c	4 (7.7)
CP Work Hours (hours per week) (n=47)	29.0 ± 15.8 [3.0 - 48.0]
CP Work Experience (years) (n=52)	
Less than 1 year	13 (25.0)
1 year to 2 years	8 (15.4)
3 years to 4 years	15 (28.8)
Greater than 4 years	16 (30.8)
Previous EMT/Paramedic Experience (years) (n=50)	18.0 ± 9.9 [3.0 - 41.0]

SD = standard deviation; GED = general educational diploma

^a Participants selected more than one response

The CP roles of the participants are described in Table 3.6 and Figures 3.2 and 3.3.

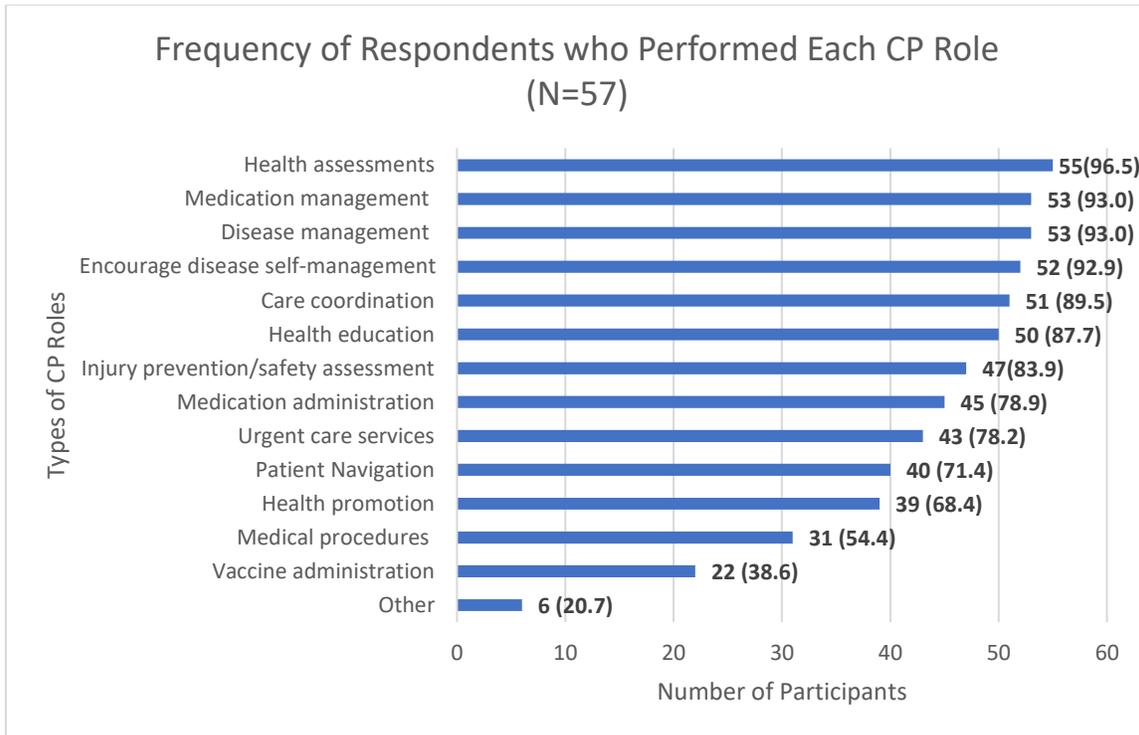
All the participants (n=57, 100.0%) performed at least one of the CP roles. The most predominant CP role was performing health assessments (n=55, 96.5%), followed by providing disease management (n=53, 93.0%), performing medication management (n=53, 93.0%) and encouraging self-management of health conditions (n=52, 92.9%). The least common CP role performed was vaccine administration (n=22, 38.6%). Overall, 7 of the 13 CP roles were conducted most commonly every day by respondents: performing health assessments (n=32, 56.1%), encouraging disease self-management (n=28, 50.0%), performing disease management (n=26, 45.6%), performing medication management (n=22, 38.6%), performing care coordination (n=22, 38.6%), providing health education (n=21, 36.8%), and performing injury prevention/safety assessment (n=15, 26.8%). Medication administration was mostly conducted 2 to 3 days per week (n=13, 22.8%), while urgent care services (n=16, 29.1%) were mostly conducted periodically (less than a typical week). However, the CP roles that were never performed or were not assigned

responsibilities of participants were administering vaccines (n=35, 61.4%), performing medical procedures (n=26, 45.6%), providing health promotion (n=18, 31.6%), and performing patient navigation (n=16, 28.6%).

Table 3.6: Percentage of Participants who Performed Each CP Roles and How Often Each CP Role was Performed (N = 57)

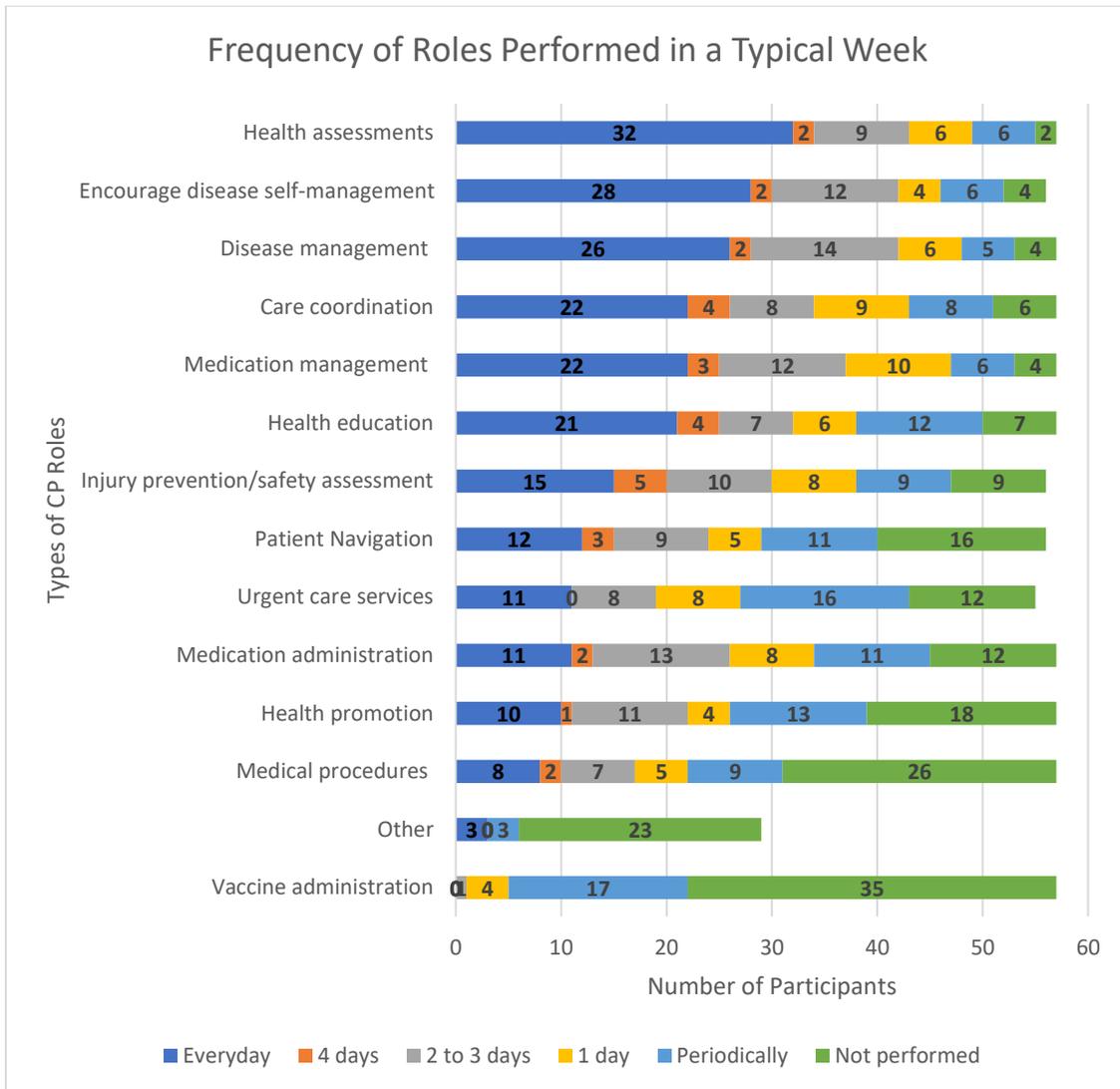
	Total N (%)	Every day (n, %)	4 day (n, %)	2 to 3 days (n, %)	1 day (n, %)	Periodically (Less than a typical week) (n, %)	NA (Role not performed)
a. Perform health assessment	57 (100.0)	32 (56.1)	2 (3.5)	9 (15.8)	6 (10.5)	6 (10.5)	2 (3.5)
b. Perform medical procedures	57 (100.0)	8 (14.0)	2 (3.5)	7 (12.3)	5 (8.8)	9 (15.8)	26 (45.6)
c. Provide disease management	57 (100.0)	26 (45.6)	2 (3.5)	14 (24.6)	6 (10.5)	5 (8.8)	4 (7.0)
d. Perform medication management	57 (100.0)	22 (38.6)	3 (5.3)	12 (21.0)	10 (17.5)	6 (10.5)	4 (7.0)
e. Administer medications	57 (100.0)	11 (19.3)	2 (3.5)	13 (22.8)	8 (14.0)	11 (19.3)	12 (21.1)
f. Administer vaccines	57 (100.0)	0 (0.0)	0 (0.0)	1 (1.8)	4 (7.0)	17 (29.8)	35 (61.4)
g. Encourage patient to self-manage their conditions	56 (98.2)	28 (50.0)	2 (3.6)	12 (21.4)	4 (7.1)	6 (10.7)	4 (7.1)
h. Provide health education	57 (100.0)	21 (36.8)	4 (7.0)	7 (12.3)	6 (10.5)	12 (21.1)	7 (12.3)
i. Provide health promotion	57 (100.0)	10 (17.5)	1 (1.8)	11 (19.3)	4 (7.0)	13 (22.8)	18 (31.6)
j. Coordinate care	57 (100.0)	22 (38.6)	4 (7.0)	8 (14.0)	9 (15.8)	8 (14.0)	6 (10.5)
k. Navigate patients through the health care system	56 (98.2)	12 (21.4)	3 (5.4)	9 (16.1)	5 (8.9)	11 (19.6)	16 (28.6)
l. Perform injury prevention/safety assessment	56 (98.2)	15 (26.8)	5 (8.9)	10 (17.9)	8 (14.3)	9 (16.1)	9 (16.1)
m. Provide urgent care services	55 (100.0)	11 (20)	0 (0.0)	8 (14.6)	8 (14.6)	16 (29.1)	12 (21.8)
n. Other ^a	29 (50.9)	3 (10.3)	0 (0.0)	0 (0.0)	0 (0.0)	3 (10.3)	23 (79.3)

^a Other included COVID-19 education (every day, n=1). NA = not applicable (never performed or not an assigned responsibility). Bolded numbers indicate the highest frequency of individual roles conducted in a typical week. The reverse is observed in the NA (role not performed) column.



Other included COVID-19 education (n=1)

Figure 3.2: Bar Chart Showing Frequency of Participants (n, %) who Performed Each CP Role (N = 57)



Other included COVID-19 education (every day, n=1); periodically = less than a typical week

Figure 3.3: Bar Chart Showing Proportion of Participants who Performed Each CP Roles in a Typical Week (N = 57)

The COVID-19 experience (impact on CP role, types of COVID-19 roles, and access to PPE) is described in Table 3.7. A total of 55/57 participants (96.5%) reported COVID-19 experience. Of those that reported COVID-19 experience, 55 participants (100.0%) rated that the COVID-19 pandemic had an impact on their CP roles by a mean

value of 7.6 ± 3.4 (scores ranging from 0 to 10), with a higher value signifying a higher extent of COVID-19 impact on CP roles. A total of 54/55 participants (98.2%) performed COVID-19 roles. Of those that reported COVID-19 roles, ‘conducting in-home assessments’ (n=35, 64.8%) was the most common COVID-19-related role, followed by ‘identifying infected patients that required hospitalization’ (n=32, 59.3%), and ‘providing support to COVID-infected patients that were self-isolated’ (31, 57.4%). The least common role was ‘transporting COVID-19 infected patient’ (n=20, 37.0%). Some additional roles reported were ‘personal protective equipment (PPE) training’, ‘support to homebound patient family and care staff’, ‘setting-up hospice services for terminally ill-COVID-19 patients,’ and ‘mental health evaluations’. Overall, 55 (96.5%) participants reported that they had access to PPE, of which most participants (n=42, 76.4%) reported that they ‘always’ had access to PPE. A minority of participants reported that they ‘sometimes’ (n=2, 3.6%) or ‘rarely’ (n=2, 3.6%) had access to PPE.

Table 3.7: Descriptive Statistics of COVID-19 Experience (N = 55)

	Mean \pm SD [Range] or n (%)
The extent of Impact on CP Roles (n=55)	7.6 \pm 3.4 [0.0 - 10.0]
Types of COVID-19 Roles (n=54) ^a	
Conduct in-home assessments	35 (64.8)
Identify infected patients that require hospitalization	32 (59.3)
Transport infected patients	20 (37.0)
Support self-isolated patients	31 (57.4)
Other ^b	11 (20.4)
Access to PPE (n=55)	
Never	3 (5.5)
Rarely	2 (3.6)
Sometimes	2 (3.6)
Very Often	6 (10.9)
Always	42 (76.4)

^a Participants selected more than one response

^b Other included testing (testing/swabbing (n=5), blanket testing in long-term care facility (n=1), community surveillance testing (n=1)) (n=7); PPE training and support to homebound patient family and care staff (n=1); setting-up hospice services for terminally ill-COVID-19 patients (n=1); mental health evaluations (n=1); roles were suspended (n=1)

3.3.2 CP Training Characteristics

This section described the CP training characteristics (CP training completion, types of CP training, duration of CP training, training mode, CP certification, certification issuing agency, previous professional license, and type of license). Tables 3.8 and 3.9, and Figures 3.4 and 3.5 display the CP training characteristics.

Forty-six of the 57 participants (80.7%) reported that they completed CP training. Of the participants that reported completing CP training, 45 participants (97.8%) and 46 participants (100.0%) reported training via didactic/room and clinical modes, respectively. Didactic training was majorly carried out using in-person mode (n=35, 77.8%), while clinical training was majorly conducted by shadowing a clinician (n=29, 74.4%), followed by direct practice/experiential rotation (n=27, 69.2%). The duration of didactic training varied among participants, with the most common reporting being 9 weeks or more (n=10, 21.7%) and 2 to 3 days (n=10, 21.7%), while clinical training most commonly spanned across 10 days or more (n=23, 50%).

Upon completion of CP training, 20/46 participants (43.5%) obtained CP certification. CP certification was most commonly obtained from community colleges (n=7, 35%) and local agencies (n=7, 35%), with the least common certification obtained from the International Board of Specialty Certification (n=1, 5%). Sixteen (28.1%) participants had professional licensure of some type before being a community paramedic. Participants reported a variety of prior professional licensures (e.g., registered nurse, athletic training, board-certified critical care paramedic, naturopathic doctor, community health worker, spiritual mentor).

Table 3.8: Frequency Distribution of CP Training Characteristics (N = 57)

	Mean ± SD [Range] or n (%)
CP Training Completion (n=57)	
Yes	46 (80.7)
No	11 (19.3)
Didactic/classroom Training (n=46)	
9 weeks or more	10 (21.7)
5 to 8 weeks	7 (15.2)
3 to 4 weeks	4 (8.7)
1 to 2 weeks	6 (13.0)
2 to 3 days	10 (21.7)
4 to 6 days	7 (15.2)
1 day or less	1 (2.2)
None	1 (2.2)
Didactic Training Mode (n=45)^a	
In-Person	35 (77.8)
Online (e.g., distance learning, webinar)	19 (42.2)
Other ^b	2 (4.4)
Clinical Training (n=46)	
10 days or more	23 (50.0)
7 to 9 days	2 (4.4)
4 to 6 days	1 (2.2)
2 to 3 days	7 (15.2)
1 day or less	6 (13.0)
None	7 (15.2)
Clinical Training Mode (n=39)^a	
Rotation at a practice site	15 (38.5)
Direct practice/ experiential rotation	27 (69.2)
Shadowing a clinician	29 (74.4)
Other ^c	1 (2.6)
CP Certification (n=46)	
Yes	20 (43.5)
No	26 (56.5)
CP Issuing Agency (n=20)	
International Board of Specialty Certification	1 (5.0)
Community College	7 (35.0)
Local Agency ^d	7 (35.0)
Other ^e	5 (25)
Previous Professional License (n=57)	
Yes	16 (28.1)
No	41 (71.9)
Type of License (n=16)^a	
Registered Nurse (RN)	3 (18.8)
Other ^f	14 (87.5)

^a Participants selected more than one response

^b Other included the University of Arkansas for Medical Sciences (n=1); hospital job training (n=1)

^c Other included in-class (n=1)

^d Local agency included health agencies (United Health Care (n=2), Center of Emergency Medicine of Western Pennsylvania (n=1), Denver Health (n=1), health system (n=1)); state endorsement (n=1)

^e Other included EMS section of the Arkansas Department of Health (n=1), Northwell Health System (n=1), International Board of Specialty Certification (n=1), state CP program (n=1), university (n=1)

^f Other included paramedic (Board Certified Critical Care Paramedic (n=1), Critical Care Emergency Medical Transport (n=1), emergency medical technician (n=2), Flight Paramedic Certification (n=1), CP Certificate (n=1)); Naturopathic Doctor (n=1); community health worker (n=1); athletic training (n=1); spiritual mentor (n=1)

The three most common types of patient care training received by participants were ‘identifying social needs affecting patient care’ (n=45, 97.8%), followed by both ‘taking patient medical history’ (n=44, 95.7%) and ‘understanding community paramedic’s roles’ (n=44, 95.7%). The least reported patient care training was ‘performing medical procedures’ (n=32, 69.6%) and ‘providing patient navigation’ (n=31, 67.4%). For the interpersonal training, ‘identifying socioeconomic factors’ (n=41, 89.1%) was the most prevalent, followed by ‘therapeutic communication’ (n=39, 84.8%) and ‘interprofessional collaboration’ (n=39, 84.8%). The least reported interpersonal training was ‘patient health literacy’ (n=36, 80.0%).

Table 3.9: Frequency Distribution of Types of CP Training (N = 46)

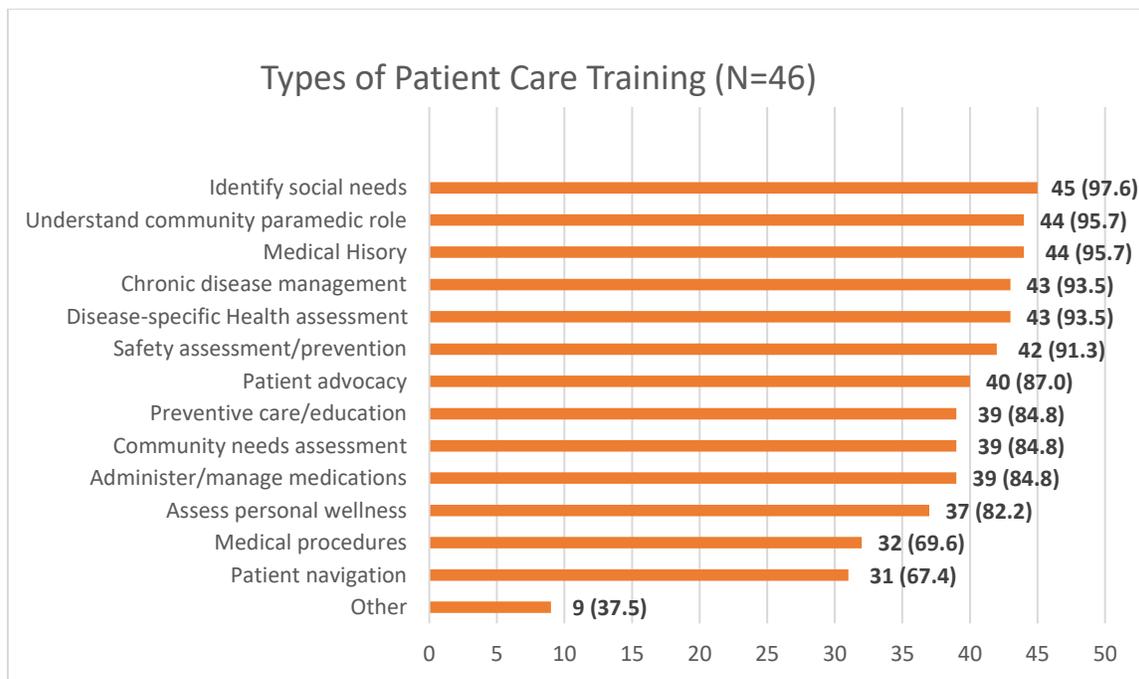
	N	Yes (n, %)	No (n, %)
Patient Care			
a. Perform disease-specific health assessment	46	43 (93.5)	3 (6.5)
b. Take patient’s medical history	46	44 (95.7)	2 (4.3)
c. Perform medical procedures	46	32 (69.6)	14 (30.4)
d. Provide chronic disease management	46	43 (93.5)	3 (6.5)
e. Administer/manage medications	45	39 (86.7)	6 (13.3)
f. Provide preventive care/education	46	39 (84.8)	7 (15.2)
g. Identify social needs affecting patient care (e.g., social characteristics, transportation)	46	45 (97.8)	1 (2.2)
h. Participate in community needs assessment/allocation of resources	46	39 (84.8)	7 (15.2)
i. Understand community paramedic’s roles	46	44 (95.7)	2 (4.3)
j. Perform safety assessment/injury prevention	46	42 (91.3)	4 (8.7)

Table 3.9 Continued: Frequency Distribution of Types of CP Training (N = 46)

	N	Yes (n, %)	No (n, %)
Patient Care			
k. Provide patient navigation	46	31 (67.4)	15 (32.6)
l. Serve as a patient advocate in the management of their health	46	40 (87.0)	6 (13.0)
m. Assess personal wellness	45	37 (82.2)	8 (17.8)
n. Other ^a	24	9 (37.5)	15 (62.5)
Interpersonal			
a. Therapeutic communication	46	39 (84.8)	7 (15.2)
b. Identification of socioeconomic factors	46	41 (89.1)	5 (10.9)
c. Patient health literacy	45	36 (80.0)	9 (20.0)
d. Interprofessional collaboration	46	39 (84.8)	7 (15.2)
e. Other ^b	27	9 (33.3)	18 (66.7)

^a Other included social determinants of health (n=2), readmission avoidance processes and hospital readmissions (n=2), addiction and substance abuse (n=1), hospice care (n=1), out-patient detox, COVID testing and management (n=1), all additional training provided by medical director (n=1), self-trained – not included in curriculum (n=1)

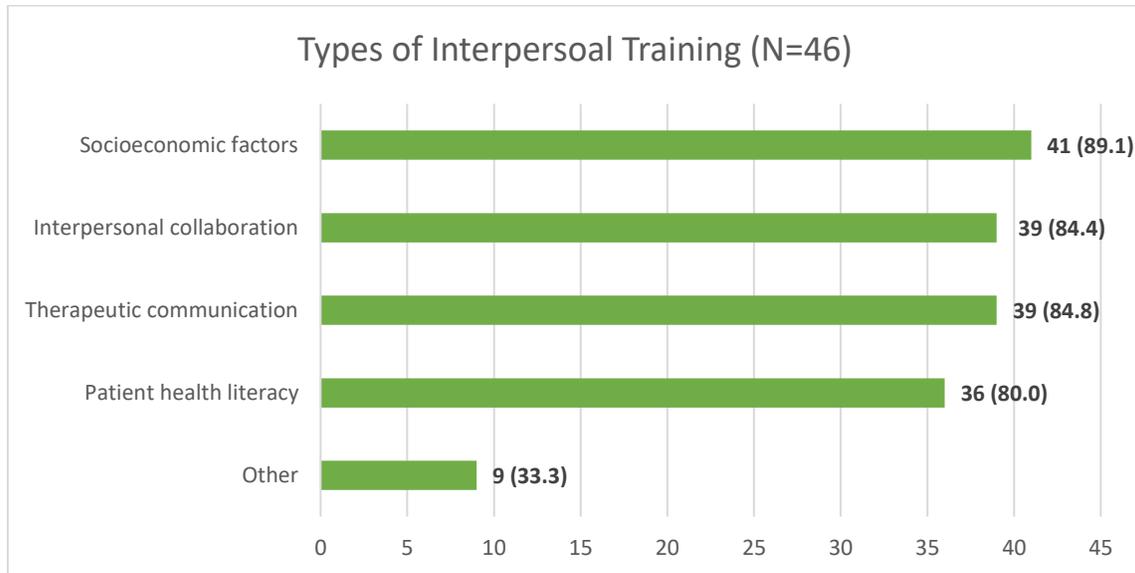
^b Other included care coordination (n=3); navigation (n=1); incorporating family in visits and decision-making (n=1); collaboration with external organizations, social services (foodbank) (n=1); readmission (n=1); on-the-job training – not included in curriculum (n=1); self-trained - not included in curriculum (n=1)



Other included social determinants of health (n=2), readmission avoidance processes and hospital readmissions (n=2), addiction and substance abuse (n=1), referrals (n=1), community outreach (n=1), hospice

care (n=1), wellness coaching (n=1), fall prevention (n=1), out-patient detox, COVID testing and management (n=1), all additional training provided by medical director (n=1), self-trained – not included in curriculum (n=1)

Figure 3.4: Bar Chart Showing Frequency of Participants (n, %) who Reported Each Type of Patient Care CP Training (N=46)



Other included care coordination (n=3); navigation (n=1); incorporating family in visits and decision-making (n=1); collaboration with external organizations, social services (foodbank) (n=1); readmission (n=1); on-the-job training – not included in curriculum (n=1); self-trained - not included in curriculum (n=1)

Figure 3.5: Bar Chart Showing Percentage of Participants (n, %) who Reported Each Type of Interpersonal CP Training (N=46)

3.3.3 CP Program Characteristics

This section describes the characteristics of the CP programs (practice setting, geographical region, CP program duration, delivery model, patient population, funding, data sharing, outcomes documentation, and MIH practice) as shown in see Table 3.10.

Fifty-three participants (93.0%) responded to the section on CP practice setting. The CP practice setting was primarily located in metropolitan areas (n=41, 77.4%), of which large metropolitan (n=16, 30.2%) was the most common setting, followed by small

metropolitan areas (n=14, 26.4%). The least common practice setting was small rural (n=2, 3.8%). The geographical location of respondents CP programs was predominantly in the Northeast (n=22, 41.5%), followed by West (n=16, 30.2%). About half of participants reported that their CP programs were operational for 5 years or more (n=28, 52.8%), with only 5 (9.4%) participants reporting their CP programs were operational for 1 to 2 years. The most common CP delivery model reported by the participants was hospital-based (n=26, 49.1%), and the least reported CP delivery model was public-city (n=1, 1.9%). The patient population that the participants provided care to most commonly was individuals with chronic conditions (n=53, 100.0%), followed by high EMS users (n=41, 77.4%). The least common patient population served were children (n=4, 7.5%). CP funding was majorly provided by health care agencies (n=23, 43.4%), followed by foundation/charitable grants (n=12, 22.6%), and EMS departments (n=10, 18.9%). The least common funding agency was the federal government (n=3, 5.7%). The most common methods of sharing data with collaborators were telephone (n=37, 69.8%), electronic patient record systems (n=36, 67.9%), and encrypted email (n=27, 50.9%), with the least common method of data sharing conducted manually (n=1, 1.9%). The types of outcomes documented most included health services utilization (n=38, 71.7%), patient-reported outcomes (n=33, 62.2%), and clinical outcomes (n=30, 56.6%). One-fifth (20.8%) of participants reported that they did not know what outcomes were being documented. Sixty percent of respondents (32/53) were practicing in MIH programs.

Table 3.10: CP Program Characteristics (N = 53)

	Mean ± SD [Range] or n (%)
Practice Setting (n=53)	
<i>Non-metropolitan Setting</i>	12 (22.6)
Small rural (less than 10,000 residents)	2 (3.8)
Large rural (10,000 to 49,999 residents)	10 (18.9)
<i>Metropolitan Setting</i>	41 (77.4)
Small Metro (Less than 250,000 residents)	14 (26.4)
Medium Metro (250, 000 to 999,999 residents)	11 (20.8)
Large Metro (1 million or more residents)	16 (30.2)
Geographical Region (n=53)	
Northeast (Connecticut, Maine, Massachusetts, New Hampshire, Rhodes Island, Vermont, New Jersey, New York, Pennsylvania)	22 (41.5)
Midwest (Illinois, Indiana, Michigan, Ohio, Wisconsin, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota)	7 (13.2)
South (Delaware, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, District of Columbia, West Virginia, District of Columbia, West Virginia, Alabama, Kentucky, Mississippi, Tennessee, Arkansas, Louisiana, Oklahoma, Texas)	8 (15.1)
West (Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming, Alaska, California, Hawaii, Oregon, Washington)	16 (30.2)
CP Program Duration (n=53)	
Less than 1 year	10 (18.9)
1 to 2 years	5 (9.4)
3 to 4 years	10 (18.9)
5 years or more	28 (52.8)
CP Delivery Model (n=53) ^a	
Fire department	10 (18.9)
Hospital-based	26 (49.1)
Public – county	8 (15.1)
Public – city	1 (1.9)
Public – regional	2 (3.8)
Public utility model	3 (5.7)
Private (for-profit)	10 (18.9)
Private (nonprofit)	8 (15.1)
Law enforcement	1 (1.9)
Other ^b	2 (3.8)
Patient Population (n=53) ^a	
Individuals with chronic conditions	53 (100.0)
Individuals with a disability	35 (66.0)

Table 3.10 Continued: CP Program Characteristics (N = 53)

	Mean ± SD [Range] or n (%)
Patient Population (n=53) ^a	
Homeless individuals	22 (41.5)
Individuals with mental health conditions	33 (62.3)
Individuals with substance/alcohol abuse	31 (58.5)
Uninsured individuals	24 (45.3)
High EMS users	41 (77.4)
High ED users	37 (69.8)
Individuals in hospice care	18 (34.0)
Older adults (≥ 65 years)	36 (67.9)
Children	4 (7.5)
Other ^c	5 (9.4)
Funding (n=53) ^a	
Foundation/charitable grants	12 (22.6)
Federal government	3 (5.7)
State government	6 (11.3)
Local government	7 (13.2)
Insurance providers	10 (18.9)
EMS departments	10 (18.9)
Health care agencies	23 (43.4)
Don't know.	5 (9.4)
Other ^d	5 (9.4)
Data Sharing (n=53) ^a	
Electronic patient record systems	36 (67.9)
Health information exchange systems	13 (24.5)
Encrypted email	27 (50.9)
Faxing	13 (24.5)
Telephone	37 (69.8)
Manually (pen and paper)	1 (1.9)
Other ^e	6 (11.3)
Outcomes Documentation (n=53) ^a	
Health services utilization (e.g., hospital readmission/ admissions)	38 (71.7)
Cost savings	21 (39.6)
Patient clinical outcomes (e.g., blood pressure and blood glucose control)	30 (56.6)
Patient-reported outcomes (e.g., patient satisfaction, health-related quality of life)	33 (62.2)
Process measures (e.g., referrals, immunizations)	22 (41.5)
Other ^f	1 (1.9)
Don't know	11 (20.8)
MIH Practice (n=53)	
Yes	32 (60.4)
No	31 (39.6)

Table 3.10 Continued: CP Program Characteristics (N = 53)

	Mean ± SD [Range] or n (%)
MIH Team Operations (n=31)	
Independent (I work by myself in collaboration with medical oversight)	12 (38.7)
Pre-hospital (I work with another paramedic or an EMT)	9 (29.0)
Integrated (I work with another health care professional e.g., physician, nurse, social worker)	9 (29.0)
Other ^g	1 (3.2)

ED=emergency department; EMS=emergency medical services; EMT=emergency medical technician

^a Participants selected more than one response

^b Other included insurance agency (n=1); accountable care organizations (n=1); independent local government (n=1)

^c Other included acute/sub-acute patients enrolled in home care (n=1); post-discharged patients (n=1); patients with high stakes surgery (n=1); veterans (n=1); patients across all age groups (n=1)

^d Other included CP program budget (n=2); tax (n=1); variety of revenue streams (n=1); not funded (n=1)

^e Other included telehealth (n=4); in-person (n=1)

^f Other included insurance program score cards (n=1)

^g Other included fire service (n=1)

3.3.4 Community Paramedics' Practice Perceptions

This section described community paramedics' responses for Objectives 2 and 3 (role clarity, PI, RR, role satisfaction, the type of IPC, extent of IPC, and perceived importance of IPC). Table 3.11 summarizes these variables.

The mean role clarity score of the participants was 15.5±4.3, of which scores range from 4 to 20 with higher scores indicating higher role clarity. The mean RR score of the participants was 3.3±0.8, with a range of 2.0 to 4.0, with higher scores indicating higher readiness to conduct CP roles. The mean PI score of the participants was 46.8±6.1, with a range of 30.0 to 55.0, with higher scores signifying higher PI. The mean CP role satisfaction score of the participants was 4.4±0.9, with a range of 1.0 to 5.0, with higher scores representing higher satisfaction of CP roles. Participants primarily collaborated with physicians (n=50, 94.3%), followed by registered nurses (n=47, 88.7%) and social workers (n=44, 83.0%). The least common professional collaboration was with licensed vocational

nurses (n=17, 32.1%). The mean IPC score of the participants was 40.1±4.2, with a range of 25.0 to 45.0, with higher scores signifying a higher extent of IPC. The mean importance of IPC score was 9.5±0.9, with a range of 7 to 10, with higher scores signifying higher perception of the importance of IPC to CP practice.

Table 3.11: Community Paramedics’ Perceptions on Role Clarity, Readiness, Satisfaction, Types of IPC, Extent of IPC, and the Importance of IPC (N = 54)

	Mean ± SD [Range] or n (%)
Role Clarity (n=54)	15.5 ± 4.3 [4.0 - 20.0]
Role Readiness (RR) (n=43)	3.3 ± 0.8 [2.0 - 4.0]
Professional Identity (PI) (n=53)	46.8 ± 6.1 [30.0 - 55.0]
Professional development	16.0 ± 2.9 [8.0 - 20.0]
Confidence in roles	17.0 ± 2.3 [8.0 - 20.0]
Professional pride	13.8 ± 1.8 [7.0 - 15.0]
CP Role Satisfaction (n=53)	4.4 ± 0.9 [1.0 - 5.0]
Types of IPC (N=53)	
Physicians	50 (94.3)
Nurse practitioners	40 (75.5)
Physician assistants	35 (66.0)
Pharmacists	29 (54.7)
Registered nurses	47 (88.7)
Licensed vocational nurses	17 (32.1)
Social workers	44 (83.0)
Other ^a	16 (30.2)
The extent of IPC (N=53)	40.1 ± 4.2 [25.0 - 45.0]
Partnership	8.2 ± 1.6 [5.0 - 10.0]
Cooperation	31.9 ± 3.1 [19.0 - 35.0]
Importance of IPC (N=53)	9.5 ± 0.9 [7.0 - 10.0]

^a Other included health agencies/providers (health care navigators, health system administrators, caseworkers/managers, patient care aides, nutritionist, radiology technicians, occupational therapist, physiotherapist, dentistry, optometry, mental health professionals, wound clinics, town/city health departments, department of human services) (n=13); social service agencies (Food/Nutrition assistance program, food pantries, housing assistance services, transportation services, area churches, free clinics, housing police) (n=2); home agencies (group home staff, nursing homes, home health agencies) (n=2); other community paramedics and allied health providers (n=2); crisis intervention team (n=1); American Automobile Association (n=1); law enforcement (n=1); county workers (n=1)

3.4 BIVARIATE ANALYSES

This section describes bivariate analyses of Objectives 4 to 7.

Responses from 53 participants (93.0%) were utilized for bivariate analyses. Due to the non-parametric nature of the data, analyses were conducted using non-parametric methods. Therefore, Pearson's correlation, Independent Samples t-test, and One-Way ANOVA were replaced with Spearman's correlation, Wilcoxon Mann-Whitney U, and Kruskal-Wallis tests, respectively. Multiple regression was not conducted due to the small sample size of the study. This section displays the results from the bivariate analyses.

3.4.1 Spearman's Correlation

Results of the bivariate analyses conducted with Spearman's correlation are displayed below (Tables 3.12 and 3.13).

Objective 4: To determine if PI is related to community paramedic's role clarity.

There was a statistically significant, positive relationship between PI and role clarity (Spearman's rho = 0.4, p = 0.0013).

Table 3.12: Correlation of PI and Role Clarity (N = 53)

	PI	Role Clarity	P-value
PI	1.0		
Role Clarity	0.4	1.0	0.0013*

*Significant at p < 0.05

Objective 6: To determine if the extent of IPC is related to PI.

There was a statistically significant, positive relationship between PI and the extent of IPC (Spearman's rho = 0.4, p = 0.0015).

Table 3.13: Correlation of PI and Extent of IPC (N = 53)

	PI	Extent of IPC	P-value
PI	1.0		
Extent of IPC	0.4	1.0	0.0015*

*Significant at $p < 0.05$

3.4.2 Wilcoxon Mann-Whitney U test

Results of the bivariate analyses conducted with Wilcoxon Mann-Whitney U are displayed below (Tables 3.14 to 3.16).

Objective 5: To determine if PI and community paramedic's role satisfaction differ by CP training completion.

There was no statistically significant difference in PI (mean scores = 28.9 vs. 18.7, $p = 0.0657$) for participants with and without CP training completion.

Table 3.14: Wilcoxon Test for PI and CP Training Completion (N = 53)

CP Training Completion	PI		Statistic	P-value
	Mean Score	SD		
Yes (n = 43)	28.9	43.9	187.0	0.0657
No (n = 10)	18.7	43.9		

There was a statistically significant difference in CP role satisfaction (mean scores = 29.4 vs. 16.7, $p = 0.0114$) for participants with and without CP training completion.

Table 3.15: Wilcoxon Test for CP Role Satisfaction and CP Training Completion (N = 53)

CP Training Completion	Role Satisfaction		Statistic	P-value
	Mean Score	SD		
Yes (n = 43)	29.4	39.3	166.5	0.0114*
No (n = 10)	16.7	39.3		

*Significant at $p < 0.05$

Objective 6: To determine if the extent of IPC differs by CP training completion.

There was no statistically significant difference in the extent of IPC (mean scores = 27.8 vs. 23.5, $p = 0.4326$) for participants with and without CP training completion.

Table 3.16: Wilcoxon Test for Extent of IPC and CP Training Completion (N = 53)

CP Training Completion	Extent of IPC		Statistic	P-value
	Mean Score	SD		
Yes (n = 43)	27.8	43.6	235.0	0.4326
No (n = 10)	23.5	43.6		

3.4.3 Kruskal-Wallis Tests

Results of inferential statistics conducted with Kruskal-Wallis tests are displayed below (Tables 3.17 to 3.20).

Objective 6: To determine if the extent of IPC differs by CP work experience.

There was a statistically significant difference in the mean rank scores of the extent of IPC ($X^2 = 8.5$, $p = 0.0374$) in at least one CP work experience group. Therefore, H_{3C} is supported (Table 3.17). However, after conducting multiple pairwise comparisons of CP work experience groups, there was no significant difference in the mean rank scores of the extent of IPC across the paired groups (see Tables 3.18 and 3.19).

Table 3.17: Kruskal-Wallis Test for Extent of IPC and CP Work Experience (N = 52)

	DF	Mean Square	Chi-Square	P-value
Among	3	38.7	8.5	0.0374*
Within	48	16.6		
Total				

*Significant at $p < 0.05$

Table 3.18: Wilcoxon Rank Scores for Extent of IPC by CP Work Experience (N = 52)

CP Work Experience	N	Sum of Scores	SD	Mean Scores
Greater than 4 years	16	388.5	50.0	24.3
3 years to 4 years	15	535.5	49.1	35.7
1 year to 2 years	8	155.5	39.1	19.4
Less than 1 year	13	298.5	46.9	23.0

Table 3.19: Pairwise Two-Sided Multiple Comparisons for Extent of IPC and CP Work Experience (N = 52)

CP Work Experience	Wilcoxon Z	P-value
Greater than 4 years vs. Less than 1 year	0.2	1.0000
Greater than 4 years vs. 1 year to 2 years	0.7	1.0000
Greater than 4 years vs. 3 years to 4 years	- 2.1	0.2067
3 years to 4 years vs. Less than 1 year	2.2	0.1515
3 years to 4 years vs. 1 year to 2 years	2.5	0.0805
1 year to 2 years vs. Less than 1 year	- 0.5	1.0000

Dunn Test with Bonferroni adjustment

Objective 7: To determine if the extent of IPC is related to CP roles.

Due to the sample size, response options for how often CP roles were performed were collapsed into the following categories: a) At least 1 day per week (Every day, 4 days, 2 to 3 days, and 1 day), b) Less than once a week (Less than a typical week), and c) Role not performed (NA). Table 3.20 displayed the frequency of the combined responses. Only CP roles with a cell size of 5 and above across the response options were assessed to avoid unreliable p-value estimates. To account for multiple comparisons and to minimize Type 1 error, the p-value was set at < 0.01. The result of the analyses is displayed in Table 3.21.

Table 3.20: Percentage of Participants who Performed Each CP Roles and How Often Each CP Role was Performed (N = 53)

	Total N (%)	At least 1 day per week (n, %)	Less than once a week (n, %)	Role not performed
a. Perform health assessment	53 (100.0)	45 (84.9)	6 (11.3)	2 (3.8)
b. Perform medical procedures	53 (100.0)	20 (37.7)	9 (17.0)	24 (45.3)
c. Provide disease management	53 (100.0)	44 (83.0)	5 (9.4)	4 (7.6)
d. Perform medication management	53 (100.0)	44 (83.0)	5 (9.4)	4 (7.6)
e. Administer medications	53 (100.0)	30 (56.6)	11 (20.8)	12 (22.6)

Table 3.20 Continued: Percentage of Participants who Performed Each CP Roles and How Often Each CP Role was Performed (N = 53)

	Total N (%)	At least 1 day per week (n, %)	Less than once a week (n, %)	Role not performed
a. Perform health assessment	53 (100.0)	45 (84.9)	6 (11.3)	2 (3.8)
b. Perform medical procedures	53 (100.0)	20 (37.7)	9 (17.0)	24 (45.3)
c. Provide disease management	53 (100.0)	44 (83.0)	5 (9.4)	4 (7.6)
d. Perform medication management	53 (100.0)	44 (83.0)	5 (9.4)	4 (7.6)
e. Administer medications	53 (100.0)	30 (56.6)	11 (20.8)	12 (22.6)
f. Administer vaccines	53 (100.0)	5 (9.4)	16 (30.2)	32 (60.4)
g. Encourage patient to self-manage their conditions	52 (98.2)	43 (82.7)	5 (9.6)	4 (7.7)
h. Provide health education	53 (100.0)	38 (71.7)	9 (17.0)	6 (11.3)
i. Provide health promotion	53 (100.0)	26 (49.1)	11 (20.8)	16 (30.2)
j. Coordinate care	53 (100.0)	40 (75.5)	8 (15.1)	5 (9.4)
k. Navigate patients through the health care system	53 (98.2)	29 (54.7)	10 (18.9)	14 (26.4)
l. Perform injury prevention/safety assessment	53 (98.2)	36 (67.9)	9 (17.0)	8 (15.1)
m. Provide urgent care services	53 (100.0)	25 (47.2)	16 (30.2)	12 (22.6)
n. Other ^a	29 (50.9)	3 (10.3)	3 (10.3)	23 (79.3)

NA = not applicable (never performed or not an assigned responsibility)

^a Other included COVID-19 education (every day, n=1)

Results of the association between the extent of IPC and individual CP roles are displayed below.

The Extent of IPC and Performing Health Assessment

The analysis was not conducted due to cell size less than 5 in the Role Not Performed category.

The Extent of IPC and Performing Medical Procedure

There was no statistically significant difference in the mean rank scores of the extent of IPC ($X^2 = 3.0$, $df = 2$, $p = 0.2224$) and how often medical procedures were performed.

The Extent of IPC and Performing Disease Management

The analysis was not conducted due to cell size less than 5 in the Role Not Performed category.

The Extent of IPC and Performing Medication Management

The analysis was not conducted due to cell size less than 5 in the Role Not Performed category.

The Extent of IPC and Performing Medication Administration

There was no statistically significant difference in the mean rank scores of the extent of IPC ($X^2 = 1.5$, $df = 2$, $p = 0.4825$) and how often medication administration was performed.

The Extent of IPC and Encouraging Disease Self-Management

The analysis was not conducted due to cell size less than 5 in the Role Not Performed category.

The Extent of IPC and Performing Care Coordination

There was no statistically significant difference in the mean rank scores of the extent of IPC ($X^2 = 5.3$, $df = 2$, $p = 0.0702$) and how often care coordination was performed.

The Extent of IPC and Performing Care Navigation

There was no statistically significant difference in the mean rank scores of the extent of IPC ($X^2 = 12.1$, $df = 2$, $p = 0.0023$) and how often care navigation was performed.

The Extent of IPC and Performing Vaccine Administration

There was no statistically significant difference in the mean rank scores of the extent of IPC ($X^2 = 4.5$, $df = 2$, $p = 0.1080$) and how often vaccines were administered.

The Extent of IPC and Provision of Health Education

There was no statistically significant difference in the mean rank scores of the extent of IPC ($X^2 = 7.8$, $df = 2$, $p = 0.0204$) and how often health education was provided.

The Extent of IPC and Provision of Health Promotion

There was a statistically significant difference in the mean rank scores of the extent of IPC ($X^2 = 11.2$, $df = 2$, $p = 0.0037$) and how often health promotion activities were provided.

The extent of IPC and Performance of Injury Prevention/Safety Assessments

There was a statistically significant difference in the mean rank scores of the extent of IPC ($X^2 = 18.6$, $df = 2$, $p < 0.0001$) and how often injury prevention/safety assessments were performed.

The Extent of IPC and Performance of Urgent Care Roles

There was no statistically significant difference in the mean rank scores of the extent of IPC ($X^2 = 2.1$, $df = 2$, $p = 0.3522$) and how often urgent care was delivered.

Table 3.21: Summary of Kruskal-Wallis Tests for Extent of IPC and CP Roles (N = 53)

CP Roles	N	DF	Chi-Square	P-Value
Primary Care Roles				
Perform medical procedures	53	2	3.0	0.2224
Administer medications	53	2	1.5	0.4825
Care Coordination Roles				
Coordinate care	53	2	5.3	0.0702
Navigate patients through the health care system	53	2	12.1	0.0023*
Public Health & Preventive Services				
Administer vaccines	53	2	4.5	0.1080
Provide health education	53	2	7.8	0.0204
Provide health promotion	53	2	11.2	0.0037*
Perform injury prevention/safety assessment	53	2	18.6	<0.0001*
Provide urgent care services	53	2	2.1	0.3522

*Significant at $p < 0.01$

To further understand the difference in the extent of IPC and how often roles were performed for significant variables (providing health promotion, performing injury prevention/safety assessments, and performing patient navigation), pairwise multiple comparisons were conducted and are displayed in Table 3.23. Table 3.22 shows the rank sum of the extent of IPC across the frequencies of significant variables.

Table 3.22: Wilcoxon Rank Scores for Extent of IPC for Frequency of Performance of Patient Navigation, Health Promotion & Injury prevention/Safety Assessments (N = 53)

	N	Sum of Scores	SD	Mean Scores
Patient Navigation	53			
At least 1 day per week	29	976.0	55.5	33.7
Less than once a week	10	196.0	43.6	19.6
Role not performed	14	259.0	49.2	18.5
	N	Sum of Scores	SD	Mean Scores
Health Promotion	53			
At least 1 day per week	26	887.5	55.7	34.1
Less than once a week	11	234.5	45.2	21.3
Role not performed	16	309.0	51.2	19.3
	N	Sum of Scores	SD	Mean Scores
Injury Prevention/ Safety Assessments	53			
At least 1 day per week	36	1180.5	52.0	32.8
Less than once a week	9	243.0	41.9	20.3
Role not performed	8	68.0	39.9	8.5

Table 3.23: Pairwise Two-Sided Multiple Comparisons for Extent of IPC and Frequency of Performance of Patient Navigation, Health Promotion & Injury prevention/Safety Assessments (N = 53)

	Wilcoxon Z	P-value
Patient Navigation		
At least 1 day per week vs. Role not performed	3.0	0.0071*
At least 1 day per week vs. Less than once a week	2.5	0.0370
Less than once a week vs. Role not performed	0.1	1.0000
Health Promotion		
At least 1 day per week vs. Role not performed	3.0	0.0070*
At least 1 day per week vs. Less than once a week	2.3	0.0599
Less than once a week vs. Role not performed	0.3	1.0000
Injury Prevention/ Safety Assessments		
At least 1 day per week vs. Role not performed	4.1	0.0001*
At least 1 day per week vs. Less than once a week	2.2	0.0850
Less than once a week vs. Role not performed	1.6	0.3404

*Significant at $p < 0.01$

After pair-wise comparisons, there were statistically significant differences in the mean rank scores of the extent of IPC in the groups that performed roles for ‘At least 1 day

per week' compared to the 'Role Not Performed' group for patient navigation, health promotion, and injury prevention/safety assessments roles. The mean rank scores of the extent of IPC were higher for participants that performed patient navigation (mean scores 33.7 vs 18.5, $p = 0.0071$), provided health promotion (mean scores 34.1 vs 21.3, $p = 0.0070$), and performed injury prevention/safety assessments (mean scores 32.8 vs 8.5, $p = 0.0001$) for 'At least 1 day per week' in a typical week compared to participants in the 'Role Not Performed' group.

3.5 TESTS OF HYPOTHESES

This section discusses the results of the hypotheses test (see Table 3.24).

Objective 4: To determine if PI is related to community paramedic's role clarity.

H_{1A}: There is a significant, positive association between PI and community paramedics' role clarity.

Spearman's correlation was used to assess the relationship between PI and role clarity. This resulted in a statistically significant positive relationship (Spearman's rho = 0.4, $p = 0.0013$). Therefore, H_{1A} is supported (Table 3.12).

Objective 5: To determine if PI and community paramedic's role satisfaction differ by CP training completion.

H_{2A}: PI will be significantly higher in community paramedics with CP training completion compared to those without CP training completion.

Wilcoxon Mann-Whitney U test showed that there was no statistically significant difference in PI (mean scores = 28.9 vs. 18.7, $p = 0.0657$) for participants with and without CP training completion. Therefore, H_{2A} is not supported (Table 3.14)

H_{2B}: Community paramedics' role satisfaction will be significantly higher in community paramedics with CP training completion compared to those without CP training completion.

A statistically significant difference in role satisfaction (mean scores = 29.4 vs. 16.7, $p = 0.0114$) for participants with and without CP training completion was observed using Wilcoxon Mann-Whitney U Test. Therefore, H_{2B} is supported (Table 3.15).

Objective 6: To determine if the extent of IPC is related to PI and if the extent of IPC differs by CP training completion and CP work experience.

H_{3A}: There is a significant, positive relationship between PI and the extent of IPC.

Spearman's correlation showed a statistically significant positive bivariate relationship between PI and the extent of IPC (Spearman's $\rho = 0.4$, $p = 0.0015$). Therefore, H_{3A} is supported (Table 3.13).

H_{3B}: The extent of IPC will be significantly higher in community paramedics with CP training completion compared to those without CP training completion

Wilcoxon Mann-Whitney U test showed no significant difference in the extent of IPC (mean scores = 27.8 vs. 23.5, $p = 0.4326$) for participants with and without CP training completion. Therefore, H_{3B} is not supported (Table 3.16).

H_{3C}: The extent of IPC will be significantly, positively associated with CP work experience.

Kruskal-Wallis test showed a statistically significant difference in the mean rank scores of the extent of IPC ($X^2 = 8.5$, $p = 0.0374$) in at least one CP work experience group.

Therefore, H_{3C} is supported (Table 3.17). However, after conducting multiple pairwise comparisons of CP work experience groups, there was no significant difference in the mean rank scores of the extent of IPC across the paired groups (Table 3.19).

Objective 7: To determine if the extent of IPC is related to CP roles.

Table 3.20 displays the result of the association of the extent of IPC and individual CP roles using Kruskal-Wallis tests. To mitigate the potential for Type I error from multiple comparisons of the extent of IPC and individual CP roles, the significance level was set at p-value < 0.01.

Primary Care Roles

H_{4A}: The extent of IPC will be significantly associated with performance of health assessment roles.

The relationship was not assessed because the combined responses were less than 5 in at least one cell.

H_{4B}: The extent of IPC will be significantly associated with performance of medical procedure roles.

There was no statistically significant difference in the mean rank scores of the extent of IPC ($X^2 = 3.0$, $df = 2$, $p = 0.2224$) in the frequency of performance of medical procedure roles. Therefore, H_{4B} is not supported.

H_{4C}: The extent of IPC will be significantly associated with performance of disease management roles.

The relationship was not assessed because the combined responses were less than 5 in at least one cell.

H_{4D}: The extent of IPC will be significantly associated with performance of medication management roles.

The relationship was not assessed because the combined responses were less than 5 in at least one cell.

H_{4E}: The extent of IPC will be significantly associated with performance of medication administration.

There was no statistically significant difference in the mean rank scores of the extent of IPC ($X^2 = 1.5$, $df = 2$, $p = 0.4825$) in the frequency of performance of medication management roles. Therefore, H_{4E} is not supported.

H_{4F}: The extent of IPC will be significantly associated with self-management of disease conditions role.

The relationship was not assessed because the combined responses were less than 5 in at least one cell.

Care Coordination Roles

H_{4G}: The extent of IPC will be significantly associated with performance of care coordination roles.

There was no statistically significant difference in the mean rank scores of the extent of IPC ($X^2 = 5.3$, $df = 2$, $p = 0.0702$) in the frequency of performance of care coordination roles. Therefore, H_{4G} is not supported.

H_{4H}: The extent of IPC will be significantly associated with performance of care navigation roles.

There was a statistically significant difference in the mean rank scores of the extent of IPC ($X^2 = 12.1$, $df = 2$, $p = 0.0023$) in the frequency of performance of care navigation roles. Therefore, H_{4H} is supported.

Public Health & Preventive Services

H_{4I}: The extent of IPC will be significantly associated with performance of vaccine administration role.

There was no statistically significant difference in the mean rank scores of the extent of IPC ($X^2 = 4.5$, $df = 2$, $p = 0.1080$) in the frequency of performance of vaccine administration roles. Therefore, H_{4I} is not supported.

H_{4J}: The extent of IPC will be significantly associated with provision of health education roles.

There was no statistically significant difference in the mean rank scores of the extent of IPC ($X^2 = 7.8$, $df = 2$, $p = 0.0204$) in the frequency of provision of health education roles. Therefore, H_{4J} is not supported.

H_{4K}: The extent of IPC will be significantly associated with provision of health promotion roles.

There was a statistically significant difference in the mean rank scores of the extent of IPC ($X^2 = 11.2$, $df = 2$, $p = 0.0037$) in the frequency of provision of health promotion roles. Therefore, H_{4K} is supported.

H_{4L}: The extent of IPC will be significantly associated with performance of injury prevention/safety assessment roles.

There was a statistically significant difference in the mean rank scores of the extent of IPC ($X^2 = 18.6$, $df = 2$, $p < 0.0001$) in the frequency of performance of injury prevention/safety assessment roles. Therefore, H_{4L} is supported.

H_{4M}: The extent of IPC will be significantly associated with performance of urgent care roles.

There was no statistically significant difference in the mean rank scores of the extent of IPC ($X^2 = 2.1$, $df = 2$, $p = 0.3522$) in the frequency of performance of urgent care roles. Therefore, H_{4M} is not supported.

Table 3.24: Summary of Tests of Hypotheses

Hypothesis	Statistical Test	Result
Objective 4: To determine if PI is related to community paramedics' role clarity.		
H_{1A}: There is a significant, positive association between PI and community paramedics' role clarity.	Spearman's Correlation	H _{1A} is supported
Objective 5: To determine if PI and community paramedics' role satisfaction differs by CP training completion.		
H_{2A}: PI will be significantly higher in community paramedics with CP training completion compared to those without CP training completion.	Wilcoxon Mann-Whitney U Test	H _{2A} is not supported
H_{2B}: Community paramedics' role satisfaction will be significantly higher in community paramedics with CP training completion compared to those without CP training completion.	Wilcoxon Mann-Whitney U Test	H _{2B} is supported
Objective 6: To determine if the extent of IPC is related to PI and if the extent of IPC differs by CP training completion and CP work experience.		
H_{3A}: There is a significant, positive association between PI and the extent of IPC.	Spearman's Correlation	H _{3A} is supported

Table 3.24 Continued: Summary of Tests of Hypotheses

Hypothesis	Statistical Test	Result
Objective 6: To determine if the extent of IPC is related to PI and if the extent of IPC differs by CP training completion and CP work experience.		
H_{3B}: The extent of IPC will be significantly higher in community paramedics with CP training completion compared to those without CP training completion.	Wilcoxon Mann-Whitney U Test	H _{3B} is not supported
H_{3C}: The extent of IPC will be significantly, positively associated with CP work experience.	Kruskal-Wallis Test	H _{3C} is supported
Objective 7: To determine if the extent of IPC is related to CP roles		
H_{4A}: The extent of IPC will be significantly associated with the performance of health assessment roles.	Not conducted due to low cell response at the 'Role not performed' group (cell response less than 5)	
H_{4B}: The extent of IPC will be significantly associated with the performance of medical procedure roles.	Kruskal-Wallis Test	H _{4B} is not supported
H_{4C}: The extent of IPC will be significantly associated with the performance of disease management roles.	Not conducted due to low cell response at the 'Role not performed' group (cell response less than 5)	
H_{4D}: The extent of IPC will be significantly associated with the performance of medication management roles.	Not conducted due to low cell response at the 'Role not performed' group (cell response less than 5)	
H_{4E}: The extent of IPC will be significantly associated with the performance of medication administration roles.	Kruskal-Wallis Test	H _{4E} is not supported
H_{4F}: The extent of IPC will be significantly associated with the performance of disease self-management roles.	Not conducted due to low cell response at the 'Role not performed' group (cell response less than 5)	
H_{4G}: The extent of IPC will be significantly associated with the performance of care coordination roles.	Kruskal-Wallis Test	H _{4G} is not supported
H_{4H}: The extent of IPC will be significantly associated with the performance of patient navigation roles.	Kruskal-Wallis Test	H _{4H} is supported
H_{4I}: The extent of IPC will be significantly associated with the performance of vaccine administration roles.	Kruskal-Wallis Test	H _{4I} is not supported
H_{4J}: The extent of IPC will be significantly associated with the provision of health education roles.	Kruskal-Wallis Test	H _{4J} is not supported
H_{4K}: The extent of IPC will be significantly associated with the provision of health promotion roles	Kruskal-Wallis Test	H _{4K} is supported

Table 3.24 Continued: Summary of Tests of Hypotheses

Hypothesis	Statistical Test	Result
H_{4L} : The extent of IPC will be significantly associated with the performance of injury prevention/safety assessment.	Kruskal-Wallis Test	H _{4L} is supported
H_{4M} : The extent of IPC will be significantly associated with the performance of urgent care.	Kruskal-Wallis Test	H _{4M} is not supported
Objective 8: To examine the relationship between PI, CP training completion, CP work experience, and the extent of IPC while controlling for demographic/background characteristics		

CP = community paramedicine; IPC = interprofessional collaboration; PI = professional identity; RR= role readiness; Ho = null hypothesis

3.6 CONTENT ANALYSIS

This section presents the results from the content analysis of the four open-ended questions addressing: COVID-19 challenges, COVID-19 opportunities, future of local CP programs, and the future of the CP care model.

3.6.1 COVID-19 Challenges

This section summarizes the response to the survey item ‘What has been the most significant challenge you have encountered during the COVID-19 pandemic?’ Table 3.5 describes a summary of the findings. Forty-six (80.7%) participants responded to this item. The primary challenges were related to COVID policies/procedures, service delivery, patient care delivery, patients’ help-seeking behaviors, and community paramedics’ well-being.

One participant expressed challenges in creating COVID-19 policies and tailoring their visits/services to the Centers for Diseases Control & Prevention (CDC) guidelines.

Several participants indicated that they found it difficult to implement personal protective equipment (PPE) use guidelines/recommendations due to the evolving nature of the PPE guidelines, decrease in PPE availability/supplies, and inconvenience of PPE donning due to movement restrictions.

Maintaining service delivery was a challenge in performing roles as some CP programs were shut down or suspended services due to the COVID-19 pandemic.

A decline in patient volume with limited in-person visits and a decline in patient referrals from partner agencies was also reported. One participant indicated that the decrease in referrals led to temporary staff furloughs. Another described how the unwillingness of some CP team members to interact with COVID-19 positive patients increased the workload of CPs that were willing to provide care to COVID-19 positive patients. Some participants felt that CPs were being underutilized in the provision of COVID-19 related services and engaging in the transport of patients for non-urgent needs and that some health agencies were reluctant in turning to CPs for help with COVID-related care. Lack of funding for COVID-19 testing also presented a challenge in meeting needs related to COVID-19.

Challenges in patient care delivery were also reported. Participants encountered challenges in conducting health assessments (e.g., medical testing and tracking), and patient navigation (e.g., helping patients obtain assessment tools to self-monitor their health conditions). Other challenges were related to the fact that there was a lack of effective prehospital treatment for COVID-19 and taking the necessary precautions to conduct in-home treatments of COVID-19 positive patients. Another challenge that respondents described was the impact of the pandemic on patient engagement. For instance, patients' non-transparency in reporting COVID-19-related symptoms due to fear of COVID-19 or being refused care at home, connecting with patients on a personal level,

and engaging isolated mental health patients were barriers in delivering patient care. Furthermore, participants perceived that patients were hesitant to seek medical treatment due to fear of emergency rooms and the possibility of dying alone.

Concerns about CP's well-being, both emotional (e.g., increased stress, anger, discouragement, and difficulty in maintaining a positive attitude) and occupational were also described. One participant shared that the COVID-19 pandemic had a mental and emotional impact on the entire CP staff in their program. The pandemic also presented occupational hazards as participants reported their fear of getting infected with COVID-19 and concern for the safety of their families. A participant also reported being infected with COVID-19 which led to them not being able to work for a month. Other challenges reported were difficulties in collaboration and communication, lack of administrative/medical leadership, and lack of time to complete education programs.

Table 3.25: Content Analysis of COVID-19 Challenges

COVID-19 Challenges (N=46)		
Categories	Sub-categories	Examples of Representative Quotes
Policy & Procedures	COVID-19	“Creating policy around COVID-19 and MIH visits in line with CDC guidelines”
	PPE	“Decrease in PPE availability” “Working in full PPE is difficult and absolutely necessary”
Service Delivery	A decline in service availability	“Our CP activities focus on homeless healthcare access. COVID required the shelters we were working with to close”
	Patient volume	“The Hospital is short-staffed because of COVID-19. Case management who would normally identify our MIH patients are so busy working as floor nurses they do not have time to identify MIH patients”
	Work conditions	“Staff Furloughed on a temporary basis due to significant decline in patient referrals and visits” ” Work overload - not enough providers willing to home visit COVID positive patients” “They have forced us to work telephonically 99% of the time and it just does not work”
	CPs under-utilization	“The reluctance of County Health Department to utilize CP providers to assist with various COVID related tasks”

CDC = Centers for Diseases Control & Prevention; CPs = community paramedics; MIH = mobile integrated health

Table 3.25 Continued: Content Analysis of COVID-19 Challenges

COVID-19 Challenges (N=46)		
Categories	Sub-categories	Examples of Representative Quotes
Service Delivery	Funding	“I could do COVID-19 testing but there is no funding in place to perform these tests. We are not a funded program. We operate on an in-house budget which is targeted at preventing readmission. If we were funded, then the opportunity would be limitless” “There is no lack of agencies who could give us referrals and have a need, but their ability to pay for a visit is obviously an issue.”
Patient Care Delivery	Keeping up with the emerging standard of care	“Lack of effective prehospital treatment”
	Health assessments	“Testing, tracking”
	Patient navigation	“Getting assessment equipment that we were looking to send home with patients for daily monitoring so we could watch them self-monitor instead of entering home”
	Patient engagement	“Mental health of my patients. Getting patients to seek further medical treatment” “The inability to have that personal connection with patients”
	In-home care	“Treating COVID-19 positive patients at home”
Perceptions of Patients’ Help-seeking Behaviors	Patients’ fear	“Convincing patients that require hospitalization to go to the ED versus staying home. They were afraid to die alone in the hospital”
	Non-transparency of symptoms	“Pt not honest with symptoms out of fear of COVID-19 or being refused care at home”
CPs Well-being	Emotional/mental	“I am disengaged and angry” “Stress” “Maintaining a positive attitude” “The mental and emotional impact of this entire situation on every staff member in my agency”
	Occupational	“Getting COVID-19 and being out for a month” “Making sure I don't infect my family” “Family safety”
Other	Collaboration and communication	“Collaboration and communication”
	Leadership	“Lack of any solid direction from our Medical leadership” “Unclear guidance from administration”
	Education	“Getting my training completed”

ED = emergency departments

3.6.2 COVID-19 Opportunities

This section summarizes the responses to the survey item ‘What has been the most significant opportunity you have encountered during the COVID-19 pandemic?’ Table 3.6 describes a summary of the findings. Thirty-eight (66.7%) participants responded to this

item. The opportunities described were related to service delivery, patient care delivery, professional improvement, growth, and expansion, improving CPs value/potential, and opportunities to highlight CPs roles.

COVID-19 led to opportunities to enhance service delivery by increasing flexibility of work conditions and telehealth delivery, reducing health service utilization, and increasing funding. Work conditions were flexible as participants could work from home, and a participant described the work isolation precautions as ‘refreshing’. An increase in telehealth services increased opportunities to communicate regularly with the patient to meet needs in a timely manner and be more efficient in time spent conducting in-home visits. A reduction in health services utilization was observed as over-crowding of emergency departments for minor to moderate symptoms declined and patients avoided emergency transport to hospitals for non-urgent reasons. Calls for proposals in response to COVID-19 grants increased opportunities for CPs to be compensated for services during the pandemic.

Although, as previously stated, there were some challenges with patient engagement, some participants reported that patient care activities were also enhanced by the pandemic. Participants indicated that COVID-19 led to stronger relationships with patients by engaging in health assessments (e.g., general in-home testing including COVID-19 testing), providing health education/promotion (e.g., education on preventable risk factors, reaching out to marginalized communities), and performing patient navigation by connecting patients to resources in a safe way. One participant reported increasing participation in public health services and providing support for public health activities at the state-level.

CP program growth and expansion was reported with new programs initiated to address rising patient care needs and expansion via collaboration with private payer

insurance agencies. Participants had the opportunity to educate individuals and organizations about EMS services and the roles of CP. There was the perception that various agencies and health professionals increased recognition of CP roles. Participants reported the opportunity to highlight CP roles by showcasing the skills and flexibility of CPs in reaching patients, providing care at convenient locations (e.g., in-home care), identifying patients that require hospitalization on time, acting as a physician extender for in-home care, engaging in treatment and referral activities, and alleviating patient fears during the COVID-19 pandemic.

Table 3.26: Content Analysis of COVID-19 Opportunities

COVID-19 Opportunities (N=38)		
Categories	Sub-categories	Examples of Representative Quotes
Service Delivery	Delivery mode - telehealth	“We have been able to engage known or suspected COVID-19 positive patients telephonically prior to entering their homes and conduct much of the visit via telehealth, reducing time spent in the home and workforce exposure” “Increased use of telemedicine systems as a means of patient contact.”
	Health services utilization	“The ability to reach patients and get them the help they need. Also, keep our ED from becoming overwhelmed.” “Keeping patients home rather than clogging EDs for minor to moderate symptoms”
	Work conditions	“Working from home” “Refreshing isolation precautions”
	Funding	“COVID grant funding means I can use it, where it was financially unavailable before.”
Patient Care Delivery	Health assessments	“In-home COVID-19 testing” “In-home testing”
	Health education/ promotion	“Discussion of risks associated with preventable risk factors” “Community education” “Community outreach” “The opportunity to reach out to marginalized communities”

ED = emergency department

Table 3.26 Continued: Content Analysis of COVID-19 Opportunities

COVID-19 Opportunities (N=38)		
Categories	Sub-categories	Examples of Representative Quotes
Patient Care Delivery	Patient navigation	“Connecting patients in a safe way with resources.”
	Patient engagement	“Engage with patients who often require additional services beyond COVID-19 related” “Phone communication establishing stronger relationships with established and new contacts”
Opportunity for Professional Improvement	Public health	“Thrown into the public health environment, supporting state: county/city public health activities that were unavailable to us pre-COVID-19 and telehealth”
Growth and Expansion	Initiation of new CP program	“Developing a new program to conduct 1-time visits, mostly to collect lab samples prior to telehealth visits.”
	Program growth	“Overall program growth”
	Collaboration	“Contracting with Private Payer Insurance in State to manage clients”
Program Value/Potential	Program promotion	“Being able to tell our story to individuals/organizations that never really had an idea about what EMS does.” “Promotion of MIH in general”
	CP program potential	“It pushed hospitals and MD groups to see our potential.”
Opportunities to Highlight Roles	Skills and flexibility of CPs	“Treat and Refer instead of transporting patients emergently to the hospital” “Earlier recognition of a patient needing hospitalization” “The ability to reach patients and get them the help they need” “To bring calm to terrified people.”
	Provider extender	“The ability to really be provider extender to homes”
Other	Research	“I have been permitted to conduct my own data collection project for research purposes. I have had ample time to work on this.”

CPs = community paramedics, EMS = emergency medical services, MIH = mobile integrated health

3.6.3 Future of Local CP Programs

This section summarizes the responses to the survey item ‘Where do you see your local community paramedicine program going in the next 3 - 5 years?’ Table 3.27 describes a summary of the findings. Thirty-nine (68.4%) participants responded to this item. Primary categories included payment model, service delivery, CP reach, and the future of EMS.

Participants envisioned incorporating service payment models such as fee-for-service models and MIH-coded services for billing payers and the introduction of the ET3 (Emergency, Triage, Treat, and Transport) model with the possibility of oversight and operation of the ET3 model in multiple 9-1-1 systems. ET3 is a 5-year payment developed by the Center for Medicare and Medicaid Services (CMS) for Medicare beneficiaries after a 9-1-1 call to ensure adequate and timely emergency treatments.¹⁴⁸

Participants indicated that their local program would have more evidence for favorable outcomes related to CP services such as cost savings, health outcomes, reduction in patients' ED utilization, and an increase in revenue generation and sustainable revenue streams. They also expect to see an increase in patient and provider volume and an increase in patients in insurance-based CP programs and payment from payers such as Medicaid. Workflow improvements related to referrals, data collection, and more education and training for CPs were also envisioned. It was expected that CP referral criteria would evolve to become more stringent.

The participants anticipated that their local CP programs would continue to grow and expand to include a) more health assessments (e.g., home diagnostic testing, point-of-care testing, and customized patient testing), b) disease-specific services (e.g., mental health), c) population-specific services (e.g., children, victims of domestic violence/human trafficking), d) geographical expansion (e.g., communities, in-state, counties), and e) service expansion (e.g., more referrals, treat-in-place, remote monitoring systems, a transition to 24/7 coverage, more clinical and mid-level provider roles). An expected increase in the CP workforce was also reported. Participants also anticipate expanded collaboration with health care providers and agencies for referrals, follow-ups, and hospital readmission reduction services. Finally, participants envisioned that their local CP

programs will be recognized by health agencies for their value and as a standard of care for EMS.

Sustained funding for service delivery presented the greatest challenge in the advancement of respondents’ local CP programs. The need for more funding to align with the growing need for CP services was greatly emphasized as lack of consistent revenue streams, lack of grant opportunities for expanded roles, and no reimbursement for visits were all reported as reasons for funding challenges.

Table 3.27: Content Analysis of the Future of Local CP Programs

Future of Local CP Program (N=39)		
Categories	Sub-categories	Examples of Representative Quotes
Payment Model	Emergency Treat and Triage (ET3) model	“We are meeting with payors and through our ET3 pilot to create a MIH-coded service.” “Operation of the ET3 program in our multiple 9-1-1 systems.”
	Fee-for-service model	“Our program is working with many different organizations with a fee for service model. With or without a coded service we have partners lined up to build programs in a fee-for-service model across the state.”
Service Delivery	Outcomes	“Our goal is to someday work with clients that have been referred by hospitals & physicians for follow-up & hospital readmission reduction. We are also keeping an open eye for ways where revenue can be made as a whole.” “I see great opportunities for growth with decreased ED usage and improved patient outcomes.” “Increasing our Patient base with regards to our current insurance-based programs with increased revenue production.”
	Workflow improvement	“Improve on the mode of receiving referrals.” “Changing cultural use of the emergency room” “Better data collection.” “Stricter criteria for referral acceptance”
	Increased funding	“Hopefully growing immensely and being fully funded by Medicaid and or Health System as they recognize the importance of these programs.” “I would hope that we will obtain a continuous funding source to train, support, and provide community paramedicine.” “Hopefully fully funded by insurance, we will integrate with MDs, NPs, and PAs to have a sustainable revenue stream”

CP = community paramedicine; ET3 = emergency triage, treat, and triage, ED=emergency department; EMS = emergency medical services, MIH = mobile-integrated health

Table 3.27 Continued: Content Analysis of the Future of Local CP Programs

Future of Local CP Program (N=39)		
Categories	Sub-categories	Examples of Representative Quotes
CP Reach	General	“Growing to meet the needs of the community addressing the gaps in healthcare not covered by other outreach services.”
	Health assessments	“More point of care testing. More specific tests for patient care population such as lactate levels etc.” “Expanding throughout health system coverage area, home diagnostic testing.” “Our program continues to expand; our in-home risk assessments have expanded to include fire safety as well.”
	Disease-specific	“I see our program being more involved in remote monitoring programs. Providing more care around dementia-related patients.” “Hopefully, a mobile integrated healthcare team that is able to help fill the gaps in our chronic illness, mental health, and wellness programs.”
	Population-specific	“Hope it continues to expand and continues to provide a benefit to our vulnerable population”. “I think we'll probably continue what we are doing: responding to specific patient populations for urgent evaluations when there is a change in their condition.”
	Geographical	“I see our geographical area expanding and the number of referrals to increase, hopefully needing to add more MIH medics.” “Hoping for this program to grow and reach out to surrounding counties.” “Expanding into other parts of the state.”
	Expanded collaboration	“Increased needs within the community and increased networking with Payers will enable the program to expand within our community.”
	Service	“The introduction of ET3, payers contracting directly with EMS agencies to perform services in the home, and the explosion of telemedicine due to COVID will transition our current delivery model into a more home-care model.” “Move to 24/7 coverage.” “Hopefully growing to be more of a provider extender in patients’ homes.” “Expanded formulary and more point of care procedures”
	Workforce	“Increase in CP workforce”
Future of EMS	Program recognition	“The Hope from EMS is to get Hospital recognition in money saved and hence more operation budget for EMS.”
	Standard of care	“The Future of EMS”

CP = community paramedicine; ET3 = emergency triage, treat, and triage, EMS = emergency medical services, MIH = mobile-integrated health.

3.6.4 Future of CP Care Model

This section summarizes the responses to the survey item ‘Where do you see the field of community paramedicine going in the next 10 - 20 years?’ Table 3.28 describes a summary of the findings. Thirty-four (59.6%) participants responded to this item. Primary categories included payment model, service delivery, patient care delivery, the reach of CP programs, education, and the future of EMS. In some cases, categories (payment model, service delivery, CP reach, and the future of EMS) were an extension of the vision for local CP programs.

Participants envisioned that the CP care model will be fully integrated with payment models where MIH-coded billing mechanisms will be routine, and payers would adequately compensate CPs for their services. Participants also postulated that the CP care model would have a sustained impact on outcomes such as a reduction in readmissions, lower ED visits, and cost savings. Expanded collaboration/integration with primary care offices, hospitals for managing transitions of care, and the public health sector were also described. Funding was a great hurdle to CP programs. To improve funding, the reallocation of funds from other sources was proposed. Participants anticipated improved patient care delivery via an increase in telehealth delivery and more formal system integration to deliver more care coordination and patient navigation services.

Participants expected that the CP care model will continue to extend its reach through geographical expansion, expanded practice, expanded collaboration, and increased adoption of CP services. Expanded practice included a) role expansion (e.g., provider extender, midlevel providers) and b) service expansion (e.g., diagnostic testing, preventive care, in-home care, priority dispatching, out-of-hospital patient management, onsite treat and refer). Increased adoption of the CP care model by various stakeholders (e.g., fire-based EMS, EMS, and the public health sector) was also predicted.

Participants also described how CP education and training would be included in the normal paramedic/EMT curriculum, include extra certifications (e.g., master’s degree), and have specialties such as behavioral health and pediatricians. Finally, some respondents indicated that the CP care model will evolve to be ‘the future of EMS’ with a focus on place-based care rather than transport-based care and recognized by healthcare stakeholders, hospital systems, and payers for its impact on health outcomes. Although the evolution of the CP care model was met with an overall positive outlook, a participant emphasized that the lack of CP recognition at the national level was responsible for the non-advancement of CP at this time.

Table 3.28: Content Analysis of the CP Care Model

Future of CP Care Model (N=34)		
Categories	Sub-categories	Examples of Representative Quotes
Payment Model	Coded billing	“With coded billing for MIH services, I can see it becoming an integral part of healthcare as a companion to telehealth”
	Billing rate	“Insurance companies will have a fair rate”
Service Delivery	Outcomes	“In the direction that saves the hospitals money and makes them more profitable.”
	Funding	“In the climate of redirecting funds for police we could respond instead.” “CP tends to be so community-specific or specific to grant funding, I have no idea where it will head.”
Patient Care Delivery	Delivery mode – telehealth	“I see us partnering with local PCP to engage in more telehealth services.”
	Care coordination	“I see us assisting more with the transition of care from hospitals and other health care facilities.”
	Patient navigation	“Increase patient navigation.”
CP Reach	General	“It will grow into an integrated system, so it is not EMS based but full coordination between public health, hospital, insurance companies, and local community partners.”
	Geographical	“I am optimistic that every community in the US will have some form of Community Health EMS providers out in their communities.”
	Expanded roles	“Expanded role as EMS gains a better position as a health care provider versus simply an ambulance transport system. managing patients outside of the hospital setting to lessen healthcare costs will continue to expand this role.”

CP = community paramedicine; MIH=mobile-integrated health; EMS = emergency medical services; PCP = primary care practitioners

Table 3.28 Continued: Content Analysis of the CP Care Model

Future of CP Care Model (N=34)		
Categories	Sub-categories	Examples of Representative Quotes
CP Reach	Expanded collaboration	<p>“Potentially be a larger part of a hospital system, integrated to clinic systems, and potentially CP having specialties such as behavioral, pediatricians.”</p> <p>“I see us being more a part of the public health sector. I see us assisting more with the transition of care from hospitals and other health care facilities. I see us partnering with local PCP to engage in more telehealth services.”</p>
	CP adoption	<p>“I hope that it will eventually involve most (if not all) paramedics in our service. Ultimately the system is moving in that direction anyway, in my opinion, and all paramedics should be prepared to evaluate and treat patients without necessary transport.”</p> <p>“I envision there being more Community Paramedics than 911 medics”</p>
Education	Curriculum	<p>“I am optimistic that every community in the US will have some form of Community Health EMS providers out in their communities or that it will be part of the normal Paramedic/EMT curriculum. This will change the landscape of EMS and create recognition.”</p>
	Certification	<p>“I see CP work becoming an advanced practice in line with NP and PA. I think there will be an associated master’s degree education.”</p> <p>“Mid-level providers. A master’s degree pre-requisite either focusing on Community Paramedicine or Critical Care Paramedicine... perhaps both?”</p>
	Specialization	<p>“Hope that it continues to mature and improve and is seen as a specialty with certification in the EMS profession. I also hope that hospital systems and insurers are able to see the true value to the healthcare system.”</p>
The Future of EMS	Value recognition	<p>“I believe as more health care professionals recognize our abilities and how flexible we are the more our roles will evolve. I also believe that utilizing experienced paramedics is essential for this role to move forward. I believe we can heavily impact.”</p>
	Standard of care	<p>“I feel Community Paramedicine will become the new normal for the EMS industry. Not only will CP programs become standard in the industry, but even front-line EMS personnel will begin to practice some form of what traditionally was only.”</p> <p>“It is the real future of healthcare and EMS!”</p>
Other	Leadership	<p>“Leaders in Community Paramedicine like Wake County, etc. will continue to lead.”</p> <p>“I hope that it expands, and less administrative hurdles exist that restrict visit types.”</p>

CP = community paramedicine; EMS = emergency medical services; EMT=emergency medical technicians; PCP = primary care practitioners

Chapter 4: Discussion & Conclusion

This chapter discusses study findings and implications. The first section of this chapter contains an in-depth discussion of the key study findings. The second section highlights the implications of the study findings and suggestions for future research. The last two sections contain the study limitations and conclusions drawn for the study.

4.1 STUDY FINDINGS

This section highlights key findings and discusses CP demographic/background characteristics, CP training, roles, practice perceptions (role clarity, PI, RR, role satisfaction, the type of IPC, extent of IPC, and perceived importance of IPC). Key findings from the content analysis (COVID-19 challenges/opportunities, and the future of local CP programs and CP care model) are also discussed.

4.1.1 CP Demographics and Background Characteristics

The demographic and background characteristics of participants varied, particularly in age, race/ethnicity, CP work hours per week, and previous EMT/paramedic work experience. The variation in age (24.0 - 65.0 years) and previous EMT/paramedic experience (3.0 - 41.0 years) could demonstrate the attractiveness of CP to early entry and experienced-level providers. More than one-fourth of the participants had some form of professional license or certification prior to transitioning to CP, showing diverse areas of expertise and skillsets. Higher educational levels (e.g., masters (19.2%) and doctorate (3.9%)) coupled with the diverse previous professional backgrounds show that CPs have varying levels of training and experience prior to performing expanded roles. The CP work hours per week also varied (3.0 - 48.0 hours per week). This could depend on the program needs, the time allotted to CP roles, and the availability of resources. Qualitative findings

from this study showed that the COVID-19 crisis resulted in some CP programs shutting down or being suspended, which could further explain the variation in CP work hours.

4.1.2 CP Program Characteristics

Programs were commonly located in metropolitan settings (77.4%). This corresponds to a 2017 national survey across 33 states showing 57% of CP programs in the US were in metropolitan areas.¹⁹ Also, evidence from systematic and scoping reviews of CP programs showed more CP programs located in metropolitan settings.^{129,149} This indicates that although CP was initiated to address community health care gaps in non-metropolitan settings, there is increasing utilization of CP in metropolitan settings.^{15,16,18,19,40} Most programs in this study were operational for 5 or more years (52.8%), had a hospital-based focus (49.1%), and catered to patients with chronic disease conditions (100%) and high EMS users (77.4%). This aligns with previous studies where health agencies utilize CPs to meet specific health needs and other organizational goals such as readmissions reduction.^{2,40,96,129,149} Data sharing between CPs and health providers was majorly conducted using the telephone (69.8%) and electronic health records (EHRs) (67.9%). Qualitative findings from this study showed increased utilization of telehealth systems during the COVID-19 crisis with participants anticipating the increased utilization of telehealth systems as an opportunity for enhanced partnership with health agencies (hospitals, medical groups, etc.).

The most common outcomes documented by respondents included health services utilization (71.7%) and patient-reported outcomes (62.2%). This aligns with general goals of CP programs which often include decreasing readmissions and use of the emergency department for non-urgent reasons.⁹⁸ Previous reports have also highlighted CPs focus on incorporating the patient's perspective to make health care decisions.^{16,20,71,93-94} However, 20.8% of participants had no knowledge of the type of outcomes documented in their

programs. This corresponds with studies that reported limited reporting and highlighting the need for more detailed reporting of program outcomes.^{129,149} Therefore, CPs should be more updated on the program outcomes to continue to provide value and meet health needs. With the shift to value-based care, the need to document these outcomes will continue to be important, and it also corresponds with the EMS Agenda 2050 vision to provide safe and effective patient-centered care and favorable outcomes.¹⁵⁰

Funding sources varied, with funding majorly provided by healthcare agencies (43.4%), and the least from the federal government (5.7%). This presents an opportunity for the federal government to increase funding opportunities for CP programs. Funding by local health agencies suggests an increased value of CP programs to meet rising health care needs and health outcomes.^{19,98} Qualitative findings indicated that respondents perceived that funding was inadequate and inconsistent, emphasizing the need for more sustainable funding. This is supported by previous findings.^{2,3,19,96,97}

4.1.3 CP Training

Most participants (80.7%) completed CP training beyond on-the-job training, but less than half (43.5%) obtained CP certification. This aligns with the fact that CP training is often conducted in an informal or non-accredited format (i.e., in-house training), with no certificates issued upon completion.²⁰ Didactic/classroom training was majorly conducted in-person (77.8%) and required longer training time (i.e., days to weeks) compared to clinical training which was mainly conducted by shadowing an expert (74.4%) in shorter time periods (i.e., days). The training mode and duration could have widely varied due to the CPs professional backgrounds, previous work experience, and the availability of resources.^{13,19,34,38,61–64} Also, training topics, mode, and duration likely differ based upon each CP program's goals.¹²⁹ As CP programs are responsive to local community health needs, it is not surprising that programs tailor their CP training curriculum to meet program

needs and resource availability.^{11,129} Given that about 40% of respondents reported the receipt of a CP certificate by various agencies at local and state levels, this is an indication that CP certification is growing, which could be important to CP recognition and sustainability of CP services. Qualitative findings from this study showed suggestions for the expansion of CP certifications to include more advanced practice (e.g., mid-level providers) and specialty training (e.g., critical care CPs). This aligns with the EMS 2050 vision for the integration of educational programs to continually meet evolving health needs.¹⁵⁰

Nearly all respondents reported that patient care (97.6%) and interpersonal training (89.1%) covered topics on socioeconomic factors affecting patients' health. This is consistent with the EMS Agenda 2050 call for greater integration of social determinants of health in CP training and education programs.¹⁵⁰ Patient care training covered topics that align with CP patient care roles across primary care, care coordination, and public health/preventive services roles. Interpersonal training had a primary focus on IPC, therapeutic communication, and patient advocacy, emphasizing the need for CPs to work with other health professionals to meet patient needs. To meet health care needs and better prepare for their roles, some participants indicated that they took proactive steps in learning additional patient-care skills (observing experts, self-learning) not covered by their training curriculum. Despite training of some kind, participants, on average, were neutral about their role readiness (M=3.3/5). This demonstrates the need for a more standardized curriculum to adequately prepare CPs for their roles.

A systematic review by Chan et.al (2019) highlighted the importance of CP programs to document training components to enhance the development of a standardized training curriculum.¹⁴⁹ Also, training could be standardized by using common training components as core competencies in the development of a CP education framework.¹⁴⁹

This could ensure that appropriate training and education standards are defined to better prepare CPs for expanded roles. Though the standardization of CP training in common core competencies may be necessary, allowing programs flexibility to tailor training competencies to meet program needs could ensure that CPs obtain sufficient training to meet specific local health care needs. This could enhance role readiness to perform CP roles.

4.1.4 CP Roles

Though participants performed a variety of CP roles,^{17,18} primary care roles (e.g., health assessments (96.5%), disease (93.0%), and medication management (93.0%)) were the most common and most consistently performed role. Public health and preventive roles such as vaccine administration were performed less (38.6%). This could be due to variation in community needs for these services. Most participants were situated in metropolitan areas (77.4%) where vaccine administration may be conducted by other health professionals. With various studies showing CPs participating in mass immunization programs especially in rural settings,^{18,40,51,88,89} vaccine administration is an area where CPs could be utilized when needed, especially in non-metropolitan settings and emergency public health situations. As expected, urgent services were not frequently conducted, emphasizing that CPs are less focused on traditional EMS-type services and more on expanded non-urgent care roles. COVID-19-related roles were majorly primary care roles and care coordination was the least performed role. This demonstrates that CPs performed their roles despite the COVID-19 pandemic.

Qualitative findings from this study showed that the COVID-19 pandemic had an impact on CP roles. Service delivery and patient care delivery were affected by varying degrees across programs. Challenges with COVID-19 policies and procedures highlight the need to keep up with emerging public health policies/procedures, such as COVID-19,

to be equipped to render an effective and proactive public health response in the future. Despite the challenges and adverse effects of COVID-19 on CPs' wellbeing, participants continually showed flexibility to meet the community's needs.^{1,10-12} CPs engaged with patients and effectively connected them to health providers. This an example of how CPs focus on meeting specific health needs of individual patients.

4.1.5 CP Practice perceptions

IPC with a variety of health care providers was observed (e.g., physicians (94.3%), registered nurses (88.7%), and social workers (83.0%)) and corresponds to previous studies.^{2,18,44,61,79,129,149} Participants rated IPC as very important (M=9.5, SD=0.9) in the provision of patient care. This is not surprising as IPC skills are vital to ensure that CPs interact with health providers to meet needs of their patients.^{2,18,44,61,79,106-108}

Respondents had variations in perceptions of role clarity (4.0-20.0), PI (30.0-55), and satisfaction in performing their roles (1.0-5.0). The diverse characteristics of the participants in terms of CP work hours, CP work experience, and previous EMT/paramedic experience could account for these variations. Evidence shows that PI develops over time and could be a factor of education, and professional training.^{105,106,110,118,120,122} Therefore, more experienced CPs could have higher role clarity, higher role satisfaction, and more established PI. While this relationship was not examined in this study, future research should focus on understanding factors that impact PI.

Positive relationships between PI and role clarity and PI and IPC were observed and support evidence that a higher role clarity increases PI, while a higher PI improves IPC between CPs and health providers.¹²¹ Martin & O'Meara highlighted that PI entailed building meaningful trusting relationships with patients, while comfortably operating within diverse interprofessional teams.¹⁵¹ Findings from this study demonstrates CPs building their PI by working with diverse teams to render health services.

Participants that completed CP training showed significantly higher satisfaction of CP roles, which highlights the importance of standardizing CP education and training curriculum to enhance CP role satisfaction. However, the extent of IPC and PI were unaffected by training completion status. Other factors, unrelated to training completion such as previous professional background and work experience, could account for this. For instance, CPs with previous backgrounds in patient care and experience with IPC, are likely to establish PI, irrespective of whether or not CP training was completed. Therefore, CPs have to communicate with other providers to meet health needs. CP roles with higher interaction with health providers (e.g., navigation, health promotion, and injury prevention/safety assessment roles) could demonstrate higher IPC.¹⁵¹ More interaction with health care providers was observed with roles that were performed at least one day per week. Therefore, CP roles with higher interactions could enhance IPC. A study by Martin & O'Meara highlighted that experienced CPs (≥ 5 years of clinical experience) had increased patient contacts, integrated health care delivery, and a better understanding of social determinants of health,¹⁵¹ and these could contribute to higher IPC. Since IPC could impact the implementation of CP roles,^{118,124} CP training curricula could be structured as an interprofessional setting where CPs could learn IPC skills with other health providers.

4.1.6 The Future of CP Care Model

Qualitative findings from this study show that sustainable payment models, a shift to CP models as the standard of care for EMS, education, expansion in service delivery, patient care delivery, value recognition, and geographic reach are important to the future of the CP care model. Expanded CP reach was the most prominent vision for local CP programs and the CP care model, with opportunities for expanded partnerships with agencies (e.g., hospital systems, medical groups) and health providers (e.g., primary care

practitioners), increased telehealth utilization, and development of sustainable payment models. These findings align with the EMS Agenda 2050.¹⁵⁰ The EMS Agenda 2050 propose that EMS systems will continually be reliable in showing flexibility to rising and unpredictable health needs, provide safe and effective socially equitable care, report relevant outcomes measures, incorporate IPC, and care coordination, and provide value to the community.¹⁵⁰ Study findings align with the EMS Agenda 2050 with the CP care model gradually evolving to meet these goals while continually providing health services tailored to community needs, even during the COVID-19 pandemic. However, there are opportunities for improvement in employing adaptable and innovative technological systems and more standardized training programs, while providing sustainable payment frameworks to enhance the expansion of local CP programs and the sustainability of the CP care model.

4.2 STUDY IMPLICATIONS AND FUTURE RESEARCH

The study findings have implications for practice, policy, and research. CPs continually meet the health needs of communities, with a focus on tailoring services to patient-specific needs, even in an unpredictable public health crisis as seen in the COVID-19 pandemic. Given that many programs already align with the EMS Agenda 2050 vision (i.e., flexibility to meet health needs, safe and equitable care, reporting relevant outcomes measures, and incorporating IPC and care coordination),¹⁴⁹ there is a larger call for CP programs to achieve seamless collaboration by incorporating integrated systems to allow for greater data sharing and care coordination among health providers. A standardized training curriculum will ensure that training programs are structured to include core competencies and tailored training to meet local health care needs. As Martin & O'Meara

and O’Meara et al. highlighted, standardization of training curriculum could promote consistency of training programs.^{151,152} Also, evidence shows that advancement in education and training increases IPC and PI.¹⁵³ Education on role clarity to enhance PI will benefit CPs especially in interprofessional settings where they interact with health providers and during public health emergency responses. IPC training curriculum should be structured to promote interaction with other health providers and be integrated with continual professional development activities post-training. From a policy perspective, the standardization of training curriculum of core competencies could promote the recognition and sustainability of CP care model.

Although CPs quickly responded to health care needs during the COVID-19 pandemic, some respondents indicated that their wellbeing was affected. This could be due to limited preparedness for public health emergencies. Training tailored towards public health emergency response should be incorporated in the training curriculum. CP work conditions could also be made more favorable by incorporating less restrictive practice policies, favorable reimbursement policies, proactive CP leadership, and more resources for public health emergencies. Additional information on self-care and wellness resources to mitigate burnout may be required.

The increased utilization of telehealth systems could lead to a shift toward telemedicine in service care delivery. Telehealth utilization as a long-term strategy could enhance the delivery of patient care services. Therefore, policies could be incorporated to improve telehealth utilization, ease of use, and affordability, especially during public health emergencies. Given that funding was a primary concern of respondents, as the evidence for the value of the CP care model builds, payment models (e.g., MIH-coded billing, fee-for-service, and ET3 payment models) should be developed to ensure the sustainability of the CP care model.

Future studies should focus on understanding CP roles and practice perceptions in non-metropolitan settings to help inform CP models in those areas. More studies should focus on understanding factors that impact CP role clarity and how role clarity, role readiness, role satisfaction, PI, and IPC could be improved. The relationship between PI, IPC, and training CP completion should be studied further to assess the impact of CP training on PI and IPC. Assessing these relationships could better explain the role of CP training in PI and IPC. To capture changes in CPs' role perceptions over time, longitudinal studies of CPs' perceptions of their roles and a more rigorous qualitative methodology to assess role clarity, readiness, PI, and IPC should also be carried out. Incorporating this information into future studies will further aid in understanding CPs' perceptions of their roles and enhance the advancement of the CP care model.

4.3 STUDY LIMITATIONS

This study has several limitations. First, a cross-sectional design was employed, therefore responses were only measured at a single point in time. Secondly, administrators of CP and MIH programs were responsible for distributing the survey and follow-up reminder emails rather than direct invitations from the researchers to participants, which may have impacted the response rate. To improve the response rate, the research team collaborated with an administrator actively involved in NAEMT (National Association of Emergency Medical Technicians). Also, the survey distribution was sent at a date later than planned to increase participation by respondents during the COVID-19 pandemic. However, the pandemic may still have had an impact on responses.

Thirdly, the study was prone to biases. For instance, given the voluntary nature of the survey invitation, only interested community paramedics may have participated in the

study leading to selection bias. However, the survey was distributed nationwide, and the responses obtained were from a variety of geographical and practice settings. Recall bias could also be present as some items require community paramedics to remember past details or events. However, this was mitigated by incorporating comprehensive and thorough descriptions of answer choices for each question.

Finally, the qualitative data findings were from web-based, open-ended survey questions and explored individual CP perceptions which could result in bias and may not be representative of the overall population. However, a large proportion of participants (80.7%) responded to the open-ended questions, which presented diverse views of CPs across diverse geographical settings and locations.

4.4 CONCLUSIONS

This study assessed community paramedics' perceptions of CP training, roles, role clarity, role readiness, PI, role satisfaction, and IPC. This study demonstrates that CPs comprise health providers from diverse professional backgrounds and work experience with varying CP work hours. CPs serve a diverse patient population, majorly the chronically ill and high ED utilizers, and majorly perform primary care roles. Though training was diverse, it commonly covered topics on patient care activities, IPC, therapeutic communication, and patient advocacy. CPs continue to show value to health agencies and flexibility to meet health needs, even in a public health emergency such as the COVID-19 pandemic.

There were variations in perceptions of role clarity, PI, and satisfaction in performing CP roles. Participants viewed IPC as very important. However, role clarity, readiness, and PI could be improved, which aligns with the emerging nature of the CP care

model. CP training was essential for CPs job satisfaction, and role clarity was necessary for establishing PI. Training improved role satisfaction. With the rising health care needs and the need for IPC, more training on role clarity, readiness, PI, and IPC may be required. Clearer definitions of CP roles are required to improve role clarity to ensure effective implementation of roles and the advancement of the CP care model. Periodic updates and a more structured CP training curriculum that allows flexibility in tailoring training to local health care needs could help improve role clarity, readiness, satisfaction, PI, IPC, and adequately prepare CPs to meet evolving roles.

Sustainable payment models, a shift to CP models as the standard of care for EMS, and expansion in service delivery and geographic reach are important to the future of community paramedicine. The study highlights that opportunities for enhanced partnerships and CP reach, more utilization of telehealth systems, more standardized training curriculum, development of payment models, and improved public health preparedness exist and should be considered as the CP model evolves.

Appendices

Appendix 1: Web-Based Survey Script

Welcome! Your participation is appreciated.

This survey consists of 10 sections about your community paramedicine training, roles, role clarity, readiness for roles, professional identity, role satisfaction, and interprofessional collaboration. We will also assess your opinion on the future of community paramedicine.

SCREENING QUESTIONS

1. Are you an emergency medical technician (EMT) or a paramedic?

Yes

No

2. Are you actively working as a community paramedic or as a paramedic on a mobile integrated health (MIH) team?

Yes

No

(For “No” responses in either question 1 or 2, the survey will automatically be set to end as participants are not eligible for the study).

SECTION 1: COMMUNITY PARAMEDIC TRAINING

This set of questions will help us understand the type and extent of your training in community paramedicine.

Instruction: Please select the option that best aligns with your community paramedic training.

1. Have you completed additional training beyond on-the-job training to prepare you for your role as a community paramedic?

Yes

No

(For “No” response in question 1, the survey will automatically be skipped to question 10).

2. Please indicate yes or no for each type of patient care training you completed to prepare you for your role as a community paramedic.

a. Perform disease-specific health assessment (e.g., physical, and mental health assessment, quality of life, health risk assessment)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
b. Take patient's medical history (e.g., perform comprehensive patient history and documentation)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
c. Perform medical procedures (e.g., wound care and sepsis management, in-home infusion, airway maintenance, urinary catheterization and maintenance, peripheral intravenous access maintenance)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
d. Provide chronic disease management (e.g., patient education, in-home care, preventive care, care plans interpretation, point-of-care testing such as blood pressure monitoring, complete blood count, blood/fluid chemistry profile, metabolic profile)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
e. Administer/manage medications (e.g., medication monitoring, reconciliation, adherence, management of adverse drug reactions)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
f. Provide preventive care/education (e.g., screen for chronic diseases, provide education for chronic diseases and community resources, oral health education and screening)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
g. Identify social needs affecting patient care (e.g., social characteristics, transportation)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
h. Participate in community needs assessment/allocation of resources (e.g., social services, housing, mental care)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
i. Understand community paramedic's roles (e.g., roles in primary care, public health, and the health care systems)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
j. Perform safety assessment/injury prevention (e.g., fall/injury prevention and safety protocol)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
k. Provide patient navigation (e.g., guiding patients through and around barriers in the complex health care system)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
k. Provide patient navigation (e.g., guiding patients through and around barriers in the complex health care system)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
l. Serve as a patient advocate in management of their health (e.g., provide patient support in decision making, protect patient privacy and confidentiality)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
m. Assess personal wellness (e.g., warning signs of stress, stress management, stages of grief)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
n. Other (please specify) _____	Yes <input type="checkbox"/>	No <input type="checkbox"/>

3. Please indicate yes or no for each type of interpersonal training you completed to prepare you for your role as a community paramedic.

a. Engage patients in therapeutic communication (e.g., counseling, and motivational interviewing such as reflective listening skills, give affirmations)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
b. Identify cultural factors affecting patient care (e.g., manage cultural differences such as language, religion, race, sexual orientation)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
c. Improve patient health literacy (e.g., empower patients with health information to make more informed decisions)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
d. Participate in interprofessional collaboration	Yes <input type="checkbox"/>	No <input type="checkbox"/>
e. Other (please specify) _____	Yes <input type="checkbox"/>	No <input type="checkbox"/>

4. How much didactic/classroom training did you receive for your role as a community paramedic?

- None
- 1 day or less
- 2 to 3 days
- 4 to 6 days
- 1 to 2 weeks
- 3 to 4 weeks
- 5 to 8 weeks
- 9 weeks or more

(For “None” response in question 4, the survey will automatically skip to question 6)

5. How was the didactic/classroom training delivered? (select all that apply)

- In-person
- Online (e.g., distance learning, webinar)
- Other (please specify) _____

6. How much clinical training did you receive for your role as a community paramedic?

- None
- 1 day or less
- 2 to 3 days
- 4 to 6 days
- 7 to 9 days
- 10 days or more

(For “None” response in question 6, the survey will automatically skip to question 8).

7. How was the clinical training delivered? (select all that apply)

- Rotation at a practice site
- Direct practice/experiential rotation
- Shadowing a clinician
- Other (please specify) _____

8. **Did you obtain a community paramedicine certification upon completion of the community paramedicine training program?**

- Yes
- No

(For “No” response in question 8, the survey will automatically skip to question 10).

9. **What type of agency/organization issued the community paramedicine certificate?**

- International Board of Specialty Certification
- Community college
- Local program (please specify) _____
- Other (please specify) _____

10. **Have you obtained any other professional license(s)?**

- Yes
- No

(For “No” response in question 10, the survey will automatically skip to Section 2).

11. **Which license(s) have you obtained?**

- Licensed Vocational or Practical Nurse (LVN, LPN)
- Registered Nurse (RN)
- Social Worker (LMSW, LCSW)
- Other (please specify) _____

SECTION 2: COMMUNITY PARAMEDIC ROLES

The table below lists the most common community paramedic roles identified in the primary literature.

Instructions: *Please consider your current roles/responsibilities as a community paramedic and select the option which is most relevant.*

1. In your current role, in a typical week, how frequently do you do the following activities?

If you never perform the task or the task is not a role/responsibility, please check the ‘not applicable (NA)’ option.

	Every day	4 days	2 to 3 days	1 day	Periodically (Less than a typical week)	NA
a. Perform health assessment (e.g., medical history, physical and mental health assessment, health risk assessment, health screening, quality of life assessment)	<input type="checkbox"/>	<input type="checkbox"/>				
b. Perform medical procedures (e.g., transfusions, urinary catheterization, suturing, feeding tube insertion)	<input type="checkbox"/>	<input type="checkbox"/>				
c. Provide disease management (e.g., identify and treat disease-related symptoms, disease-specific education, in-home care, post-discharge care, point-of-care testing such as blood glucose test)	<input type="checkbox"/>	<input type="checkbox"/>				
d. Perform medication management (e.g., educate patients on medications, medication reconciliation, adherence, and adherence verification)	<input type="checkbox"/>	<input type="checkbox"/>				
e. Administer medications	<input type="checkbox"/>	<input type="checkbox"/>				
f. Administer vaccines (e.g., pneumococcal and flu vaccines)	<input type="checkbox"/>	<input type="checkbox"/>				
g. Encourage patient to self-manage their conditions (e.g., self-monitoring of health parameters (blood pressure, blood glucose), development of individualized health plans, patient education, lifestyle modification instruction, wound-care instructions)	<input type="checkbox"/>	<input type="checkbox"/>				
h. Provide health education (e.g., nutrition education, family safety, and poison control information)	<input type="checkbox"/>	<input type="checkbox"/>				
i. Provide health promotion (e.g., first aid training, public education programs on healthy lifestyles, death and illness prevention)	<input type="checkbox"/>	<input type="checkbox"/>				

	Every day	4 days	2 to 3 days	1 day	Periodically (Less than a typical week)	NA
j. Coordinate care (e.g., coordination of care with other health care team members, referral to community resources and health providers, electronic medical record charting)	<input type="checkbox"/>	<input type="checkbox"/>				
k. Navigate patients through the health care system (e.g., transportation, assistance with finances (advising, disability payments, health insurance), obtaining medications and medical devices)	<input type="checkbox"/>	<input type="checkbox"/>				
l. Perform injury prevention/safety assessment (e.g., Home safety assessment, fall risk assessment, injury prevention education)	<input type="checkbox"/>	<input type="checkbox"/>				
m. Provide urgent care services (e.g., transportation to the emergency department determined by evaluation, acute patient assessment)	<input type="checkbox"/>	<input type="checkbox"/>				
n. Other (please specify) _____	<input type="checkbox"/>	<input type="checkbox"/>				

2. On a scale of 0 to 10, to what extent did the coronavirus (COVID-19) pandemic impact your roles/responsibilities as a community paramedic?

1 2 3 4 5 6 7 8 9 10

Not at all (0)

To a great extent (10)

3. Please check yes or no to indicate whether or not you perform any of the COVID-19 roles listed below.

	Yes	No
a. Conduct in-home assessments for patients with suspected or confirmed COVID-19	<input type="checkbox"/>	<input type="checkbox"/>
b. Identify infected patients that require hospitalization	<input type="checkbox"/>	<input type="checkbox"/>
c. Transport infected patients to emergency departments	<input type="checkbox"/>	<input type="checkbox"/>
d. Support self-isolated patients	<input type="checkbox"/>	<input type="checkbox"/>
e. Other (please specify) _____		

4. During the COVID-19 pandemic, how often have you had access to personal protective equipment (PPE) recommended by evidence-based guidelines?

- Never
- Rarely
- Sometimes
- Very Often
- Always

5. What has been the most significant challenge you have encountered during the COVID-19 pandemic? (Please specify)

6. What has been the most significant opportunity you have encountered during the COVID-19 pandemic? (Please specify)

SECTION 3: ROLE CLARITY

The following questions will assess the clarity of your professional role as a community paramedic.

1. Please select the option that best corresponds to your level of agreement for each question.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
a. I am clear about my professional roles/responsibilities.	<input type="checkbox"/>				
b. My work objectives are well defined.	<input type="checkbox"/>				
c. I am clear about what other health professionals expect of me.	<input type="checkbox"/>				
d. I am clear about what patients expect of me.	<input type="checkbox"/>				

SECTION 4: ROLE READINESS

*This section will assess your readiness for professional roles.
Please select the option that best corresponds to your level of agreement.*

1. From my first day as a community paramedic, I was adequately prepared to carry out my roles and responsibilities.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

SECTION 5: PROFESSIONAL IDENTITY

The following questions are about your perceptions of your professional identity as a community paramedic.

1. Please select the option that best corresponds to your level of agreement for each question.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
a. I have goals for developing as a community paramedic.	<input type="checkbox"/>				
b. I want to develop further as a community paramedic.	<input type="checkbox"/>				
c. I make self-driven efforts to develop as a community paramedic.	<input type="checkbox"/>				
d. I have a role model who is a community paramedic.	<input type="checkbox"/>				
e. I have confidence in my abilities as a community paramedic.	<input type="checkbox"/>				
f. My experience is useful to my colleagues.	<input type="checkbox"/>				
g. I can incorporate the needs of patients and organizations to achieve administrative goals.	<input type="checkbox"/>				
h. I am depended on by my patients.	<input type="checkbox"/>				
i. I feel pride in working as a community paramedic.	<input type="checkbox"/>				
j. I think that a community paramedic's work is interesting.	<input type="checkbox"/>				

k. I feel that community paramedics have unique abilities.	<input type="checkbox"/>				
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SECTION 6: ROLE SATISFACTION

This question will assess your satisfaction with your professional role as a community paramedic. Please select the option that best corresponds to your level of satisfaction.

1. Overall, how satisfied or dissatisfied are you with your role as a community paramedic?

- Very Dissatisfied
- Dissatisfied
- Neutral
- Satisfied
- Very Satisfied

SECTION 7: INTERPROFESSIONAL COLLABORATION

The section contains questions about your collaboration with other health professionals as a community paramedic.

1. What type of health professionals have you worked with as a community paramedic? (select all that apply)

- | | |
|---|---|
| <input type="checkbox"/> Physicians | <input type="checkbox"/> Registered Nurses |
| <input type="checkbox"/> Nurse Practitioners | <input type="checkbox"/> Licensed Vocational Nurses |
| <input type="checkbox"/> Physician Assistants | <input type="checkbox"/> Social Workers |
| <input type="checkbox"/> Pharmacists | <input type="checkbox"/> Other (please specify) _____ |

2. On a scale of 1 to 10, please indicate the importance of collaboration with other health care professionals in your role as a community paramedic.

1	2	3	4	5	6	7	8	9	10
Not at all					Very				
important (0)					important (10)				

3. When working with other health professionals, I:

	Never	Rarely	Occasionally	Most of the time	Always
a. Use consistent communication to discuss patient care.	<input type="checkbox"/>				
b. Coordinate health and social services (e.g., financial, occupational, housing) based upon patient care needs.	<input type="checkbox"/>				
c. Exercise shared decision-making capacity (e.g., responsibilities, decisions) with other health professionals.	<input type="checkbox"/>				
d. Respect and trust other health professionals.	<input type="checkbox"/>				
e. Am open and honest with other health professionals.	<input type="checkbox"/>				
f. Strive to achieve mutually satisfying resolution for differences of opinions.	<input type="checkbox"/>				
g. Understand the role boundaries of other health professionals.	<input type="checkbox"/>				
h. Understand that there are shared knowledge and skills between health professionals.	<input type="checkbox"/>				
i. Establish a sense of trust with other health professionals.	<input type="checkbox"/>				

SECTION 8: COMMUNITY PARAMEDICINE PROGRAM CHARACTERISTICS

This section will ask questions about your community paramedicine program.

Instruction: *Please select the option that best corresponds with your program characteristics.*

1. In what setting do you practice as a community paramedic?

Non-metropolitan	<input type="checkbox"/> Small Rural (Less than 10,000 residents) <input type="checkbox"/> Large Rural (10,000 to 49,999 residents)
Metropolitan	<input type="checkbox"/> Small Metro (Less than 250,000 residents) <input type="checkbox"/> Medium Metro (250,000 to 999,999 residents) <input type="checkbox"/> Large Metro (1 million or more residents)

6. How is your program funded? (select all that apply)

- Foundation/charitable grants
- Federal government
- State government
- Local government
- Insurance providers
- EMS departments
- Health care agencies (e.g., hospitals)
- Other (please specify) _____
- Don't know

7. Please indicate how you share data with other health professionals. (select all that apply)

- Electronic health record systems (e.g., hospital or primary care provider systems)
- Health information exchange systems
- Encrypted email
- Faxing
- Telephone
- Manually (pen and paper)
- Other (please specify) _____

8. Please indicate what outcomes are documented in your community paramedicine program (select all that apply).

- Health services utilization
(e.g., hospital readmission/admissions, ED transport, ED visit, length of stays)
- Cost savings
- Patient clinical outcomes (e.g., blood pressure and blood glucose control)
- Patient-reported outcomes (e.g., patient satisfaction, health-related quality of life)
- Process measures (e.g., referrals, immunization)
- Other (please specify) _____
- Don't know

9. Do you practice as part of a mobile integrated health team?

- Yes No

10. Please indicate the type of mobile integrated health team (MIH) team that most closely represents your usual MIH operation.

- Independent (I work by myself in collaboration with medical oversight)
- Pre-hospital (I work with another paramedic or EMT)
- Integrated (I work with another health care professional e.g., physician, nurse, social worker)
- Other (please specify) _____

SECTION 9: DEMOGRAPHIC & BACKGROUND CHARACTERISTICS

This section is comprised of questions about your background. Please fill in your response or select the option that best corresponds to your answer for each of the following questions.

1. **What is your age?** _____ years

2. **With which gender identity do you most identify?**
 - Male
 - Female
 - Non-binary
 - Transgender Male
 - Transgender Female
 - Prefer Not to Answer
 - Other (please specify) _____

3. **Which of the following best describes your race/ethnicity? (select all that apply).**
 - Non-Hispanic White
 - Non-Hispanic Black
 - Hispanic or Latinx
 - American Indian or Alaska Native
 - Native Hawaiian or Pacific Islander
 - Asian
 - Other (please specify) _____

4. **What is your highest educational level?**
 - High school or GED
 - Technical college certificate
 - Associate degree
 - Bachelor's degree
 - Master's degree
 - Other (please specify): ____

5. **How many hours per week is allocated to your role as a community paramedic?**
_____ hours per week

6. **How long have you worked as a community paramedic?**
 - Less than 1 year
 - 1 year to 2 years
 - 3 years to 4 years
 - Greater than 4 years

7. **Prior to your present role as a community paramedic, how long did you work as an EMT or paramedic in emergency care?**

_____ years

SECTION 10: FUTURE OF COMMUNITY PARAMEDICINE

Finally, we wish to obtain your viewpoint about the future of community paramedicine programs.

1. **Where do you see your local community paramedicine program going in the next 3 – 5 years?**

2. **Where do you see the field of community paramedicine going in the next 10 – 20 years?**

Your participation in this survey is appreciated.

If you would like to enter a drawing for the chance to win EMS medical gear, please enter your name and email address below.

Name:

Email:

If you do not wish to participate, simply click on the 'Next' option to end the survey.

This is the end of the survey. Thank you for participating!!

Appendix 2: Invitation Email Script

Dear community paramedic,

You are invited to participate in a research study, titled “**Community Paramedics Perceptions of Their Roles in Community Paramedicine Programs.**” The study is being conducted by Chinyere Okoh, B.Pharm., a graduate student at The University of Texas at Austin.

As community paramedics are increasingly utilized to address a variety of community health needs, your help is needed to understand how community paramedics perceive their expanded roles. We are particularly interested in community paramedic training, professional roles, role clarity, role readiness, role satisfaction, professional identity, and extent of collaboration with health professionals.

This is one of the first studies being conducted to examine community paramedics’ views about their roles. You will also be provided with the opportunity to give response on your role during the Coronavirus (COVID-19) pandemic. Your opinion is particularly important as this study could help advance community paramedics’ practice.

To participate in the study, you must be actively providing care as a community paramedic, be 18 years or older, and be willing to participate in the study. It will take approximately 10 - 15 minutes of your time to complete the survey. Clicking on the survey link below indicates your approval to participate in this study.

To complete the survey, please click on this URL:

https://utexas.qualtrics.com/jfe/form/SV_6fp2hUhOacjxQR7

Risks/Benefits/Confidentiality of Data

The risk of participating in this study is minimal. There will be no direct benefits for participating. Your privacy and confidentiality will be protected by ensuring limited access to your data during data collection and deidentifying all responses that could be linked back to you.

Participation or Withdrawal

Your participation in this study is voluntary. You may decline to answer any question and you have the right to withdraw from participation at any time by stopping the survey and closing the browser window. Withdrawal will not affect your relationship with The University of Texas in any way.

Compensation

There is no compensation for your participation. However, upon completion of the survey, you will have the opportunity to participate in a drawing for EMS medical gear.

Contact Information

If you have any questions, comments or encounter any problems, please call or send an email to the study investigators, Chinyere Okoh (512-800-4675, chinyereokoh@utexas.edu) or Dr. Leticia Moczygamba (512-232-6880, lmoczygamba@austin.utexas.edu).

Questions About Rights or Dissatisfaction

If you have questions about your rights or are dissatisfied at any time with any part of this study, you can contact, anonymously if you wish, the Institutional Review Board by phone at 512-471-8871 or email at orsc@uts.cc.utexas.edu.

We really appreciate your help with this survey.

Thank you!!

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Appendix 3: First Follow-up Email Script

Dear community paramedic,

About a week ago, you were invited to participate in a research study, titled “**Community Paramedics Perceptions of Their Roles in Community Paramedicine Programs.**” This is the first study that is being conducted to examine perceptions about community paramedic roles. You will also be provided with the opportunity to give response on your role during the coronavirus (COVID-19) pandemic. Your opinion is particularly important as this study could help advance community paramedicine.

If you have already completed the survey, please accept our sincere appreciation. If you have not yet completed the questionnaire, please kindly complete the survey.

To make it convenient to complete the survey, we have provided a link to the survey website. To complete the survey, simply click on this link:

https://utexas.qualtrics.com/jfe/form/SV_6fp2hUhOacjxQR7

Your participation in this study is voluntary.

There is no compensation for your participation. However, upon completion of the survey, you will have the opportunity to participate in a drawing for EMS medical gear.

If you have any questions, comments or encounter any problems, please contact the study investigators by calling or sending an email to Chinyere Okoh (512-800-4675, chinyereokoh@utexas.edu) or Dr. Leticia Moczygemba (512-232-6880, lmoczygemba@austin.utexas.edu).

Thank you!!

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Appendix 4: Second Follow-up Email Script

Dear community paramedic,

Recently, we sent you an email inviting you to participate in a research study, titled “**Community Paramedics Perception of Their Roles in Community Paramedicine Programs.**” If you have already completed the survey, we would like to thank you. We truly appreciate your help. If you have not yet completed the survey, we urge you to do so. It will take approximately 10 – 15 minutes of your time to complete the survey. Simply click on the link below:

https://utexas.qualtrics.com/jfe/form/SV_6fp2hUhOacjxQR7

This study is important. As community paramedics are increasingly utilized in a variety of community health needs, getting truly representative opinions of your roles is necessary to help advance community paramedicine.

Your participation in this study is voluntary.

There is no compensation for your participation. However, upon completion of the survey, you will have the opportunity to participate in a drawing for EMS medical gear.

If you have questions or concerns, please contact the study investigators by calling or sending an email to Chinyere Okoh (512-800-4675, chinyereokoh@utexas.edu) or Dr. Leticia Moczygemba (512-232-6880, irmoczygemba@austin.utexas.edu).

Thank you for your help!!

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