

Assessing the Impact of EMS and Ambulance-Based Responses: A Review of Research

Academic Training to Inform Police Responses

Best Practice Guide



Prepared by the IACP / UC Center for Police Research and Policy

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Best Practice Guide on Responses to People with Behavioral Health Conditions or Developmental Disabilities:

A Review of Research on First Responder Models

The role of law enforcement in the United States has been characterized by a delicate balance between providing public safety, serving the community, and enforcing laws. Inherent in this work are public expectations for law enforcement officers to fill many roles, such as problem-solving, community relations, public health, and social work. Among their responsibilities, police officers have been increasingly tasked with responding to crisis situations, including those incidents involving people with behavioral health (BH) conditions and/or intellectual and developmental disabilities (IDD). These situations can present significant challenges for community members and officers, highlighting the need for clear policy direction and training in the law enforcement community to effectively serve these populations. The need for training and resources to facilitate effective responses also applies to routine activities and interactions between police officers and individuals with BH conditions and IDD.

Supported by the Bureau of Justice Assistance, researchers from the University of Cincinnati, in collaboration with Policy Research Associates, The Arc of the United States' National Center on Criminal Justice and Disability, and the International Association of Chiefs of Police, are working to address the need for additional training and resources to enhance police encounters with individuals with BH conditions and IDD. Specifically, the [Academic Training to Inform Police Responses](#), is being developed to raise awareness in the policing community about the nature and needs of people living with BH conditions and/or IDD and to facilitate the use of evidence-based and best practices in police responses to these individuals.

As part of this work, the research team is gathering the available evidence documenting the effectiveness of various police, behavioral health, disability, and community responses to incidents involving individuals experiencing behavioral health crises. Collectively, this work will be assembled into a larger "Best Practice Guide" for crisis response, presenting chapters on existing response models, such as crisis intervention teams, co-responder teams, law enforcement assisted diversion, mobile crisis teams, disability response, EMS-based services, and more. The writing following this introduction was prepared as a single chapter to be included within the larger comprehensive guide. This chapter provides a review of the available research examining the implementation and impact of EMS and Ambulance-Based Response Programs across communities. The review of this research is preceded by a list of key terms.

KEY TERMS

Behavioral health	A state of mental and emotional being and/or choices and actions that affect wellness.
Behavioral health condition	An umbrella term for substance use disorders and mental health conditions.
Developmental disability	Physical and/or mental impairments that begin before age 22, are likely to continue indefinitely, and result in substantial functional limitations in at least three of the following key areas: self-care (dressing, bathing, eating, and other daily tasks learning); walking/moving around; self-direction; independent living; economic self-sufficiency; and language.
Disability	A physical or mental impairment, a history of such impairment, or, regarded as such, an impairment that substantially limits a major life activity.
EMS and Ambulance-Based Responses	A community-based approach to crisis response that relies on paramedics to provide rapid response to behavioral health crises, to administer immediate medical attention, and to divert eligible individuals to behavioral health services.
Intellectual disability	A disability characterized by significant limitations in both intellectual functioning and in adaptive behavior, which covers many everyday social and practical skills. This disability originates before the age of 18.
Law Enforcement Assisted Diversion	Pre-booking diversion model allows officers to divert individuals charged with minor offenses away from prosecution and into community-based services in order to address addiction, mental health, and/or behavioral health conditions that may have contributed to the offense.
Mental health condition	A wide range of conditions that can affect mood, thinking, and/or behavior
Promising practice	A specific activity or process used that has an emerging or limited research base supporting its effectiveness. Promising practices are not considered “evidence-based” until additional evaluation research is completed to clarify short- and long-term outcomes and impact on groups going through the activity or process.
Public health system	Defined as “all public, private, and voluntary entities that contribute to the delivery of essential public health services within a jurisdiction,” including state and local public health agencies, public safety agencies, health care providers, human service and charity organizations, recreation and arts-related organizations, economic and philanthropic organizations, and education and youth development organizations.
Service provider	Any individual (practitioner) or entity (provider) engaged in the delivery of services or aid and who is legally authorized to do so by the state in which the individual or entity delivers the services.
Substance	A psychoactive compound with the potential to cause health and social problems, including substance use disorders (and their most severe manifestation, addiction).
Substance use disorders	A medical illness caused by repeated misuse of a substance or substances. Substance use disorders are characterized by clinically significant impairments in health, social function, and impaired control over substance use and are diagnosed by assessing cognitive, behavioral, and psychological symptoms.

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EXECUTIVE SUMMARY

Emergency medical service (EMS) and ambulance-based response programs are a community-based approach to behavioral health response intended to achieve multiple goals, including the provision of rapid response to behavioral health crises, the administration of immediate medical attention, and the diversion of eligible individuals to behavioral health services when appropriate. Although EMS and ambulance-based response program implementation varies considerably across communities, common goals include improving outcomes for individuals by increasing their connections to services and reducing reliance on EMS and emergency department resources. As an emerging model of practice there has been limited rigorous evaluation of the impact of EMS and ambulance-based responses. However, preliminary research suggests these programs may complement traditional crisis response strategies, producing benefits for service users, the healthcare system, and the criminal justice system.

This document provides a review of the available research on the implementation and impact of EMS and ambulance-based programs for crisis response. This review is organized into four major sections. First, the definition and implementation of EMS and ambulance-based responses is presented. Second, studies examining the impact of EMS and ambulance-based response programs on individuals' connection to services, the use of EMS and hospital resources, the use of criminal justice resources, and cost savings are reviewed. The third section addresses stakeholders' views of EMS and ambulance-based response programs from the perspectives of service providers and service users. The review concludes with a discussion of the findings, with particular attention to implications for practice and directions for future research.

Importantly, because EMS and ambulance-based programs have been developed to bolster communities' methods of behavioral health crisis response, the available research has focused on these programs' interactions with and impact on individuals living with mental health and/or substance use disorders. In consequence, individuals with intellectual and/or developmental disabilities (IDD) are often unconsidered as target populations for this type of response and remain unmentioned within the literature. As such, little is known about these programs' interactions with or impact on people with IDD. This lack of knowledge is exemplified throughout this document.

Definition and Implementation of EMS and Ambulance-Based Services Models

EMS and ambulance-based program models are community-based responses that rely on paramedics to provide services to individuals experiencing behavioral health-related issues. These programs often involve interagency collaborations to provide efficient response and appropriate service and/or treatment options. EMS and ambulance-based response programs are intended to provide better treatment for patients, to connect patients with behavioral health services that might not be available within emergency departments, to reduce the

unnecessary use of ambulance transports for minor incidents, to reduce overcrowding in emergency departments, and to lower healthcare system costs.

There is substantial variation in the organization and implementation of EMS and ambulance-based crisis response programs across communities. For example, EMS and ambulance-based responses may be implemented as standalone response programs or integrated into a broader network of crisis response and community resources. In some programs, community paramedics are provided considerable additional training to fit the needs of the program, while training in other programs is fairly limited.

There are three general types of EMS and ambulance-based response programs, including (1) frequent EMS user programs, (2) alternative destination programs, and (3) mobile response teams. *Frequent EMS user programs* are geared toward individuals who repeatedly call 911 to request assistance, often by providing case management services to address underlying patient needs. *Alternate destination programs* divert 911 callers from emergency departments to other treatment facilities, such as mental health crisis centers and sobering centers, to better address the needs of the caller. Finally, *mobile response teams* or mobile integrated healthcare models use mobile resources such as paramedics and nurses to provide patient care on-scene as opposed to in emergency departments.

The Impact of EMS and Ambulance-Based Responses

Evaluations of EMS and ambulance-based response programs have highlighted the impact of these programs across an array of outcomes, including increased connections to services, reduced pressure on EMS providers and hospitals, reduced pressure on the criminal justice system, and cost-effectiveness. The primary findings observed across these studies are detailed below.

Increased connections to services: Several studies have evaluated the impact of EMS and ambulance-based programs on service referrals for individuals with low-acuity medical problems and behavioral health conditions. The findings generally suggest that these programs can result in a substantial number of service referrals. However, the vast majority of these studies have been descriptive in nature, solely reporting the number of individuals who have been referred to services and the types of services provided, with limited attention to long-term patient outcomes.

Reduced pressure on EMS providers and hospitals: Several studies have found that EMS and ambulance-based programs can reduce the number of EMS transports, hospital admissions, and future 911 calls for service. Research has additionally found that most patients do not require additional medical attention after receiving services. However, these studies have relied heavily on descriptive analyses.

Reduced pressure on the criminal justice system: Little research has examined the impact of EMS and ambulance-based responses on the criminal justice system. Many EMS and

ambulance-based responses still require police involvement, although some studies suggest that these programs can reduce pressure on police officers and reliance on criminal justice resources.

Cost-effectiveness: Several studies have identified cost savings associated with these programs, although measuring the true impact of these programs on costs is challenging given the multiple agencies involved in these models.

Stakeholders' Perceptions of EMS and Ambulance-Based Responses

In addition to the outcomes above, the available research has examined stakeholders' perceptions of EMS and ambulance-based responses. EMS and ambulance-based service program providers have reported mixed perceptions of community paramedicine and alternative destination programs. Although some EMS personnel have identified benefits of these programs, many paramedics have reported frustration with responding to non-medical incidents involving behavioral health-related issues. Only a handful of studies have examined service users' perceptions of EMS and ambulance-based response programs. These studies have found that participants have positive experiences with these programs, report improved treatment compared to prior contacts with EMS/emergency department providers, and experience limited EMS needs following their interactions with these programs.

Discussion

EMS and ambulance-based response models use paramedics and EMS providers to respond to individuals experiencing behavioral health crises with the intention of providing more appropriate patient care through on-scene treatment, alternative destination transportation, and/or case management services and referrals to community-based services. Prior evaluations of EMS and ambulance-based models have found that these programs can successfully increase patient connections to services, reduce pressure on the healthcare system, and achieve financial savings. Although paramedics and EMS providers have raised some concerns about the implementation of these programs and the use of EMS to respond to behavioral health-related incidents, patients have largely reported favorable perceptions of these programs.

Prior research examining EMS and ambulance-based response programs provides numerous practical implications for communities interested in implementing these models. For instance, most paramedics receive limited training surrounding behavioral health or intellectual and developmental disabilities, despite the frequency with which they interact with individuals impacted by behavioral health related crises. Incorporating specialized service provider training could maximize the success of these programs. These programs additionally depend on collaborations between multiple agencies. However, establishing these relationships can be challenging due to different policies and cultures within participating organizations. To address these concerns, clear policies and workflows should be delineated for participating agencies.

Despite the continuing implementation of EMS and ambulance-based response programs in various communities, these programs have been subject to relatively few evaluations. Although many of the studies reviewed in this report have been peer-reviewed publications, the analyses were predominately descriptive. Additional research using more rigorous methodologies could better clarify the impact of these programs on patient outcomes, healthcare system efficiency, the criminal justice system, and cost-savings.

Key Takeaways

- EMS and ambulance-based response programs represent an emerging practice to enhance community responses to individuals experiencing behavioral health crises. These programs are intended to improve patient access to behavioral health services and to provide more efficient and appropriate care, while reducing pressure on EMS and hospitals to address low acuity medical problems.
- There are three general types of EMS and ambulance-based response programs: frequent EMS user programs, alternative destination programs, and mobile response teams. Frequent EMS user programs connect frequent 911 callers to case managers to address underlying needs contributing to frequent EMS requests. Alternative destination programs enable EMS providers to directly transport patients with behavioral health conditions to mental health facilities or sobering centers for services. Mobile response teams provide on-scene treatment to reduce the use of EMS transportation and emergency departments for minor medical concerns.
- Research has found that EMS and ambulance-based programs can increase individuals' connections to services. These programs have additionally resulted in a large proportion of eligible patients being diverted from emergency departments. However, limited research has examined the impact of EMS and ambulance-based programs on the criminal justice system. Several studies have found that these programs can achieve substantial cost savings, with most of these savings benefiting Medicare programs.
- Service providers have reported some hesitation surrounding these programs. Providers have reported frustration with the expectation to respond to behavioral health-related crises as opposed to medical emergencies. Service providers have also raised concerns about unclear expectations for engaging in these programs. Service users, however, have reported positive experiences with EMS and ambulance-based response programs.
- Studies suggest that paramedics who engage in EMS and ambulance-based response programs should receive additional training to effectively respond to individuals with behavioral health conditions. Future implementations of EMS and ambulance-based response models should also be guided by well-defined collaborative agreements among participating agencies.
- Most of the research examining EMS and ambulance-based responses are descriptive. More rigorous evaluations of these programs are needed to better assess the long-term impact of these programs, with particular attention to the suitability of these programs for individuals experiencing intellectual and/or developmental disabilities.

I. Introduction

In the United States, it is common for communities to rely on law enforcement or behavioral health-based responses to calls for service involving individuals experiencing behavioral health crises. More recently, however, several communities have begun to leverage their existing systems for emergency medical response to optimize responses to behavioral health incidents in the community (Watson et al., 2019). These emergency medical service (EMS) and ambulance-based response programs are designed to provide rapid response to behavioral health crises, to administer immediate medical attention to individuals in crisis, and to facilitate diversion to behavioral health treatment and/or services, when appropriate.

Although the implementation of EMS and ambulance-based response programs vary considerably across communities, they share many common goals, including enhancing outcomes for individuals by increasing their connections to services and reducing reliance on EMS and emergency department resources in the long-term (Chan et al., 2019). As an emerging model of practice there has been limited rigorous evaluation of the impact of EMS and ambulance-based responses in communities. However, preliminary research suggests these responses may complement traditional crisis response strategies, producing benefits for service users, the healthcare system, and the criminal justice system.

This document provides a review of the available research on the implementation and impact of EMS and ambulance-based programs for crisis response. This review is organized into the following sections: Section II presents the definition and implementation of EMS and ambulance-based responses, discussing the goals of these programs, key components, and variation in program implementation across communities. Section III examines the impact of EMS and ambulance-based response programs across several outcomes, including individuals' connection to services, the use of EMS and hospital resources, the use of criminal justice resources, and the cost effectiveness of this approach. Section IV details stakeholders' views of EMS and ambulance-based response programs from the perspectives of service providers and patients. Finally, Section V discusses the research findings, paying particular attention to implications for practice and directions for future research.

Importantly, because EMS and ambulance-based programs have been developed to bolster communities' methods of behavioral health crisis response, the available research has focused on these programs' interactions with and impact on individuals living with mental health and/or substance use disorders. In consequence, individuals with intellectual and/or developmental disabilities (IDD) are often unconsidered as target populations for this type of response and remain unmentioned within the literature. As such, little is known about these programs' interactions with or impact on people with IDD. This represents a significant gap in knowledge exemplified throughout this document.

II. Definition and Implementation of the EMS and Ambulance-Based Response Model

EMS and ambulance-based responses are a newer approach in crisis response that relies on paramedics to provide services to individuals experiencing behavioral health-related crises and low-acuity medical problems (Coffman & Blash, 2021). Emergency medical service providers are argued to be well-positioned—both organizationally and geographically—to deliver timely response and effective patient care in crisis situations. These programs often involve interagency collaborations to provide efficient response and appropriate service and/or treatment options (Chan et al., 2019; Coffman & Blash, 2021). Collaborations have included partnerships with emergency departments, physicians, nurses, social workers, case managers, community-based mental health facilities, substance use treatment programs, and law enforcement agencies (Bouveng et al., 2017; Gregg et al., 2019; Mechem et al., 2020; Sanko & Eckstein, 2021).

As shown in Table 1, EMS and ambulance-based response programs are typically developed to meet several different objectives. Specifically, the available literature suggests these response programs aim to provide better treatment for patients, to connect patients with specialized behavioral health services that might not be offered within emergency departments, to reduce the unnecessary use of ambulance transports for minor incidents, to reduce overcrowding in emergency departments, and to lower healthcare costs (Coffman & Blash, 2021; Gregg et al., 2021; Sanko et al., 2020).

Table 1. Goals of EMS and Ambulance-Based Programs

Impacted individuals

- Provide faster access to appropriate mental health and substance use treatment
- Reduce time spent waiting for medical clearance for non-medical cases
- Increase connection to services to reduce future EMS and emergency department visits

Healthcare system

- Free EMS providers to respond to medical emergencies
- Improve coordination between EMS and other service providers
- Reduce unnecessary ambulance transports
- Reduce overcrowding in emergency departments
- Reduce repeat hospital admissions
- Increase healthcare efficiency
- Reduce costs across the healthcare system

Criminal justice system

- Improve responses to individuals experiencing mental/behavioral health issues
-

A. Variation in EMS & Ambulance-Based Response Programs

There is substantial variation in the organization and implementation of EMS and ambulance-based crisis response programs—with differences reflecting efforts to tailor these responses to the specific needs of the community they function within (Mechem et al., 2020). The wide range of program designs has been highlighted in a recent systematic review of community-based paramedic services, which identified 64 studies covering 58 unique models (see Chan et al., 2019). The specific elements of variation in EMS and ambulance-based service programs across communities are shown in Table 2 and discussed in greater detail below.

Table 2. EMS and Ambulance-Based Response Program Variation

Characteristic	Description
1. Model Implementation	EMS and ambulance-based programs can be implemented as stand-alone programs to better respond to individuals with behavioral health-related conditions, or as one of many resources within a community.
2. Target Populations	Some programs include individuals experiencing mental health, substance use, and social needs related problems, while others only include individuals experiencing a mental health or substance use-related crisis. The specific target populations often depend on the availability of community resources. To date, individuals with IDD have not explicitly been considered among the target populations of this response.
3. Method of Referral	Individuals eligible for these programs can be identified by 911 dispatchers, first responders, or EMS and ambulance providers themselves.
4. Days / Hours of Operation	Some programs are operated by full-time paramedics while others only operate during specified days and times depending on the operating hours of community partners and service provider contracts.
5. Nature of Response	In some programs, EMS providers administer on-scene treatment while others transport patients to alternative service providers for further assessment and treatment.
6. Amount / Type of Training	Training varies widely across programs, with some providing little additional training to EMS providers who screen individuals for potential diversion while others require substantial additional training to provide patient care on-scene.
7. Level of Follow-Up Care	The level of follow-up care depends on the program, with some not involving a follow-up component at all and others providing continual care until a participants' underlying needs are met.

EMS and ambulance-based responses may be implemented as standalone response programs or integrated into a broader network of crisis response and community resources. These responses typically address individuals who experience behavioral health crises. However, their capacity to engage with different populations, such as people with IDD, is dependent upon the service and treatment-options within the community (see Coffman & Blash, 2021; Creed et al., 2018; Gregg et al., 2021).

Individuals may be referred to EMS and ambulance-based response programs in several ways. Some programs rely on dispatchers to screen individuals and deploy specialized response teams for further assessment (Bouveng et al., 2017; Coffman & Blash, 2021; Faddy et al., 2017; Lindström et al., 2020). Alternatively, some programs rely on specially trained paramedics to identify eligible participants while others train all paramedics to screen individuals to assess their eligibility for diversion (Coffman & Blash, 2021; Creed et al., 2018; Gregg et al., 2021; Mechem et al., 2020; Sanko et al., 2020).

The days and hours of operation for EMS and ambulance-based response services can also vary across communities. Some programs provide services 24/7 (Creed et al., 2018). Others provide services during limited days/times depending on highest demand for services (Bouveng et al., 2017; Faddy et al., 2017; Lindström et al., 2020; Mechem et al., 2020). Still others are limited by the operating hours of partner agencies (Mechem et al., 2020; Zayed et al., 2020) or through union contracts (Sanko et al., 2020). Furthermore, the specific nature of the EMS and ambulance-based response may include an emphasis in the provision of on-scene treatment, referral of individuals to existing services, and/or transporting patients to various destinations for more directed services (Chan et al., 2019).

Training provided to program staff also varies widely. In some programs, community paramedics are provided additional training to fit the needs of the program, including patient screening for eligibility for diversion to an alternative destination, the process for transferring eligible clients, clinical training, and crisis intervention (Coffman & Blash, 2021; Creed et al., 2018; Mackey & Qiu, 2019; Trivedi et al., 2019). However, other programs do not provide additional mental or behavioral health training (Cheney et al., 2008). Finally, the level of follow-up care varies across programs. Many programs do not involve any follow-up after a patient has been diverted to an alternate treatment facility, received on-scene treatment, or been connected with a case manager.

B. Types of EMS & Ambulance-Based Response Programs

Keeping this variation in mind, a review of the available literature suggests there are three general types of EMS and ambulance-based response programs, including (1) frequent EMS user programs, (2) alternative destination programs, and (3) mobile response teams. Table 3, below, provides real-world examples of each of these response types.

Table 3. EMS and Ambulance-Based Programs in Practice

Site Example: San Diego Emergency Medical Services Resource Access Program (RAP)

Program Description:

San Diego Emergency Medical Services recognizes that a small number of individuals are frequent EMS users, often due to difficult health needs, social challenges, mental illness, substance use, and/or homelessness. The RAP identifies eligible individuals who frequently call 911 and refers them to specialized staff to provide intervention and to assist participants obtain needed services. The purpose of RAP is to address the underlying conditions that contribute to a high rate of EMS usage and to provide more coordinated care. This is intended to reduce costs and improve public safety through limiting the need for future EMS use.

For more information see: <https://www.sandiego.gov/fire/services/ems/rap>

Site Example: Regional Emergency Medical Service Authority (REMSA) Alternative Destination Transport (Washoe County, NV)

Program description

The Alternative Destination Transport program allows REMSA to divert 911 callers from emergency departments to more appropriate services. This includes urgent care for low acuity medical patients, a detoxification center for medically stable patients who are inebriated, and mental health hospitals for medically stable individuals presenting with psychiatric symptoms. This program is designed to improve patient care, reduce patient wait-time to receive services, reduce expenses associated with emergency medical services, and limit unnecessary emergency department visits. The core element is an advanced evaluation performed by specially trained field medics to determine whether 911 callers are eligible to be treated in an alternative facility.

For more information see: <https://www.remsahealth.com/community-health/%e2%80%8balternative-destination-transport/>

Site Example: Ohio Health Mobile Integrated Healthcare and Community Paramedicine

Program description

OhioHealth Mobile Integrated Healthcare and Community Paramedicine involves a collaboration between local healthcare and EMS Community Paramedic teams to provide a continuum of care for patients using services across the state. This facilitates connections and collaborations among caregivers and service providers. Community Paramedic teams provide patient assessments, on-scene treatment, provide referrals to services, and educate patients about available resources and health management practices. The goals of this program are to improve patient care and to reduce the use of emergency department and hospital visits.

For more information see: <http://www.ohiohealthems.com/ems-operations/community-paramedicine>

Frequent EMS user programs are geared toward individuals who repeatedly call 911 to request assistance. Many frequent 911 users experience mental health conditions, behavioral health challenges, or are homeless, with these underlying needs contributing to frequent EMS contacts (Coffman & Blash, 2021). In frequent EMS user programs, paramedics assess patients' physical, mental, and social needs and offer eligible patients the opportunity to voluntarily participate in case management services (Coffman & Blash, 2021). Case management is designed to link participants with mental health services, substance use treatment, and other community resources in order to reduce future needs for EMS (Coffman & Blash, 2021). Individuals who participate in these programs remain in the program until the case manager believes the patient is no longer in need of services (Coffman & Blash, 2021). Slightly less than half of the community-based paramedic programs in a review of 64 studies targeted repeat 911 callers (Chan et al., 2019).

Alternate destination programs divert 911 callers from emergency departments to other treatment facilities, such as mental health crisis centers and sobering centers, to better address the needs of the caller (Coffman & Blash, 2021; Mechem et al., 2020). These alternative destination programs require paramedics and their healthcare partners (e.g., nurse, physician's assistant) to assess patients to ensure that they are medically stable prior to transporting them to a mental health or substance use treatment facility (Cheney et al., 2008; Faddy et al., 2017; Ford-Jones & Daly, 2020; Trivedi et al., 2019).

Finally, *mobile response teams* or mobile integrated healthcare models use mobile resources such as paramedics and nurses to provide patient care outside of emergency departments (Mackey & Qiu, 2019). The range of services provided by these programs varies, with some providing advice over the phone to 911 callers, providing preventative care, delivering on-scene treatment, transporting or referring individuals to treatment services outside of emergency departments, and connecting individuals to needed social care services (Mackey & Qiu, 2019; Østergaard & Lyngby, 2019; Sanko et al., 2020). About 71% of community-based paramedic programs in a review of 58 unique models involved preventative home visits (Chan et al., 2019). Home visits often included assistance managing medication (40%), referral/transportation to community services (38%), and in-home assessment (30%) (Chan et al., 2019).

III. The Impact of EMS and Ambulance-Based Programs

EMS and ambulance-based programs are designed to achieve multiple interrelated goals, including improving patient care through increased access to services, reducing pressure on emergency medical services and hospitals, reducing pressure on the criminal justice system, and reducing costs associated with unnecessary EMS transports and emergency department visits. This section reviews the results of studies evaluating the impact of EMS and ambulance-based programs on each of these outcomes. Notably, this research has focused on the impact of these programs on individuals experiencing behavioral health-related concerns. The available research does not discuss these programs' interaction with or impact on individuals with IDD.

A. Increased Connections to Services

Several studies have evaluated the impact of EMS and ambulance-based programs on referrals to services for individuals with low-acuity medical problems and behavioral health conditions. However, the vast majority of these studies have been descriptive in nature, simply reporting the number of individuals who have been referred to services and the types of services provided. Collectively, this research suggests the number of patients connected to mental health services in lieu of emergency departments varies widely across programs.

For example, in Copenhagen, Denmark, 9% of individuals assessed by an ambulance-based response team were transported to an emergency psychiatric department (Østergaard & Lyngby, 2019). In Stockholm, an EMS-based response team (PAM) referred 22% of patients to inpatient psychiatric care (Bouveng et al., 2017). In Stanislaus County (CA), 27% of individuals evaluated for diversion were directly transported to a mental health facility (Mackey & Qiu, 2019). In North Carolina, 40% of individuals involved in behavioral health-related 911 calls were eligible for alternative destination transport, although 15% of patients declined transportation to an alternative destination and 9% were transported to an emergency department (Creed et al., 2018). In Western Sydney, Australia, 58% of patients assessed by an extended care paramedic and a mental health nurse were transported directly to a mental health facility (Faddy et al., 2017). Los Angeles patients who called 911 with a primary mental health complaint were medically cleared and directly transported to a psychiatric urgent care facility 96% of the time (Sanko et al., 2020). Patients transported to a mental health provider instead of an emergency department received services within 26 minutes, as opposed to the hours it often takes in Los Angeles hospitals (Sanko & Eckstein, 2021). Some studies have found that an even greater proportion of individuals could have been diverted to a mental health facility if enough beds were available or if the patient had different insurance (Coffman & Blash, 2021).

Fewer studies have examined the number of individuals transported to sobering centers (see Bouveng et al., 2017; Coffman & Blash, 2021), often finding that these patients experience multiple social needs. For example, in San Francisco, 90% of patients treated in sobering centers were also homeless when services were provided (Coffman & Blash, 2021). To address this concern, paramedics have partnered with homeless outreach programs and other service providers to encourage clients to participate in services, maximizing the potential for each of those groups to serve individuals in need (Coffman & Blash, 2021). The North Carolina mental health facility similarly provides access to mental health treatment, detoxification services, addiction treatment, education, and additional community resources (Creed et al., 2018).

Importantly, an evaluation of multiple EMS and ambulance-based response programs in California found that providing a coordinated response enhances patient well-being by addressing medical, behavioral health, and social service needs while reducing reliance on emergency departments (Coffman & Blash, 2021). For example, frequent EMS user programs in California have provided clients with mental health services, substance use treatment, medical and dental care, and even housing, food, and transportation (Coffman & Blash, 2021). Mental health crisis centers admitted the vast majority of patients who were directly transported by an

ambulance service, resulting in faster access to mental health services in a calmer environment for individuals in need (Coffman, 2020). Individuals who were not admitted were generally turned away due to a lack of resources (e.g., methadone) at the alternative facility in question (Coffman, 2020).

B. Reduced Pressure on EMS Providers and Hospitals

One of the primary goals of EMS and ambulance-based responses is to reduce pressure on EMS providers and emergency departments by responding to behavioral health crises in the community and diverting individuals to appropriate treatment/services.

Several studies have found that these programs can reduce the number of EMS transports, hospital admissions, and future 911 calls for service by treating individuals on scene and enhancing connections to behavioral health services (Bouveng et al., 2017; Lindström et al., 2020; Mechem et al., 2020; Sanko & Eckstein, 2021; Sanko et al., 2020). For instance, the Los Angeles Advanced Provider Response Units were able to divert 50% of patients away from emergency departments by using on-scene treatment, by connecting patients with social workers, and by helping patients identify ongoing care (Sanko & Eckstein, 2021; Sanko et al., 2020). Assisting patients in this manner was found to result in a 67% decrease in EMS calls in the 90 days following patient contact with the unit (Sanko et al., 2020). These units were additionally found to enable 458 other EMS providers to return to service and to substantially reduce the amount of time spent by these providers in responding to 911-calls involving eligible patients (Sanko et al., 2020). In San Francisco, the number of emergency department visits decreased by 19% from the four months prior to the implementation of a frequent EMS user program to the four months after implementation—an average reduction of 63 emergency department visits per patient to 51 visits (Coffman & Blash, 2021). Additionally, a study of multiple California alternative destination programs found that 27% to 44% of individuals screened were diverted across programs, reducing the number of individuals in need of mental health services transported to emergency departments (Coffman & Blash, 2021).

It should be noted, however, that not all eligible individuals were able to be treated on scene or diverted from emergency departments across these studies (Creed et al., 2018; Gregg et al., 2021; Mackey & Qui, 2019). Indeed, there are several examples of EMS response team interactions that resulted in transport to an emergency department due to a lack of inpatient beds in local behavioral health facilities, insurance conflicts, and/or individuals' prior history in (e.g., previous violent behavior) or refusal to be transported to an alternate facility (see Mackey & Qui, 2019). In other instances, the behavioral health symptoms of individuals who engage with EMS response team were too severe to be effectively addressed in the field (see Gregg et al., 2021).

Importantly, several studies have found that these programs are medically safe for participants, suggesting EMS and ambulance-based response team can effectively screen individuals and appropriately refer them to non-emergency department resources. For example, in California, 97% of individuals diverted to mental health crisis centers by EMS response teams did not

require emergency medical treatment (Coffman & Blash, 2021). Similarly, less than 1% of Los Angeles patients diverted to a mental health center and less than 2% of patients transported to a sobering center required later transportation to an emergency department (Sanko & Eckstein, 2021). In Alameda County (CA), only 0.3% of patients diverted to a psychiatric facility had to be re-transported to an emergency department within 12 hours of the initial call (90% developed new symptoms and 10% were protocol failures) (Trivedi et al., 2019). Only 4% of Stanislaus County (CA) patients who were diverted to a mental health facility were transported to an emergency department within six hours of admission, though none of the patients who were re-transported were admitted to the emergency department (Mackey & Qiu, 2019).

C. Reduced Pressure on the Criminal Justice System

Comparatively little research has examined the impact of EMS and ambulance-based responses on the criminal justice system. However, it is generally expected that EMS and ambulance-based responses to behavioral health crises in the community mitigates police responsibility in managing these types of incidents and, as such, reduces the likelihood of criminal justice involvement (see Creed et al., 2018). Although many EMS and ambulance-based responses still require police involvement (see Trivedi et al., 2019), these programs have been associated with some reduced pressure on police officers and criminal justice resources. For instance, frequent EMS user programs in California were associated with notable reductions in 911 calls in the year following program implementation, including a 35% reduction in San Diego and a 29% reduction in Alameda County (CA), relative to the year before these systems were implemented (Coffman & Blash, 2021). Additional research is needed to establish whether these programs can reduce reliance on criminal justice resources to address mental, behavioral health-and other disability related challenges.

D. Cost-effectiveness

In addition to providing access to more appropriate treatment for individuals experiencing mental and behavioral health-related challenges, EMS and ambulance-based response programs are expected to facilitate cost savings by reducing unnecessary ambulance transportations and emergency department visits. Several studies have identified cost savings associated with these programs, although measuring the true impact of these programs on costs is challenging given the multiple agencies involved in these models. As such, future research examining the influence of these programs on costs and savings across multiple providers is needed.

The San Diego frequent EMS user program was associated with a \$551,760 cost reduction in emergency department visits (Coffman & Blash, 2021). A San Francisco frequent EMS user program reduced costs by \$318,388 and an Alameda County (CA) program reduced costs by \$95,992 (Coffman & Blash, 2021). California programs that diverted individuals from emergency departments into mental health services were associated with an estimated \$5.4 million cost savings in ambulance transports and other costs (Coffman & Blash, 2021). This is the equivalent

of a \$1,062 savings per patient (Coffman & Blash, 2021). San Francisco and Los Angeles programs that diverted individuals to sobering centers were estimated to reduce the costs of emergency department visits by over \$1 million, a \$344 savings for each patient diverted (Coffman & Blash, 2021). Many individuals served by these programs have mental and/or behavioral health conditions that limit their access to employer-sponsored health insurance. As a result, most of these cost savings benefit ambulance providers and Medicare/Medi-Cal (Coffman & Blash, 2021).

Fire department personnel in Alabama reported that identifying the impact of their EMS response (ACTION) on costs was challenging given the multiple components and organizations involved in these programs (Gregg et al., 2021). Although respondents suggested that patients could save money on emergency department visits and hospitals could save money by reducing the number of services rendered to individuals who are unable to pay, it was observed that ambulance providers could lose money as a result of these programs (Gregg et al., 2021). Respondents further reported that dispatch policies were unclear and often resulted in both a firetruck and an ACTION team vehicle responding to calls, resulting in an unnecessary and potentially costly duplication of efforts (Gregg et al., 2021).

IV. Stakeholders' Perceptions of EMS and Ambulance-Based Programs

In addition to examining the impact of EMS and ambulance-based responses, several studies provide insights on stakeholder perceptions of these programs. This section discusses service provider and service user perceptions of these programs. Similar to the quantitative research presented above, this literature focuses upon stakeholders' perceptions of these programs as potential responses to individuals experiencing behavioral health crises in the community. To date, the perceptions of disability service providers and service users have not been considered.

A. Service Providers

EMS and ambulance service providers have reported mixed perceptions of community paramedicine and alternative destination programs. Although some EMS personnel have identified benefits of these programs, many paramedics have reported frustration with responding to non-medical incidents involving behavioral health-related issues.

Alabama fire department personnel who participated in focus groups about the ACTION program reported that the program was helpful in educating patients about the costs of emergency services and the impact of using emergency departments for non-emergencies (Gregg et al., 2021). Respondents further felt the program was beneficial for providing referrals to mental health services (Gregg et al., 2021). However, personnel suggested that asking EMS to slow down on-scene assessments to determine appropriate treatment is challenging, particularly given that first responders are culturally oriented around responding to and resolving calls quickly (Gregg et al., 2021). These respondents additionally reported receiving

limited information about the ultimate outcomes of patients referred to ACTION (Gregg et al., 2021).

EMS providers have sometimes reported frustration with the types of calls they are dispatched to, reporting that addressing non-medical problems associated with mental illness and substance use should not be their responsibility (Campbell & Rasmussen, 2012; Prener & Lincoln, 2015). Some paramedics have reported feeling like a revolving door for transporting patients experiencing mental health- or substance use-related issues to emergency departments without resolving the underlying problem (Ford-Jones & Daly, 2020; Prener & Lincoln, 2015). Other EMS providers have reported that they often transport individuals to emergency departments for an initial medical evaluation and later have to transport the same patients to a second location for mental health treatment (Prener & Lincoln, 2015), highlighting a desire to directly transport patients to appropriate care. However, some paramedics have reported frustration with long protocols required to evaluate individuals for diversion to an alternative destination (Ford-Jones & Daly, 2020). In other instances providers have suggested that these programs may function better as a post-911 response as opposed to a 911 response, given that eligible calls are low severity incidents (Gregg et al., 2021).

In turn, paramedics in some studies suggest that responding to non-medical emergencies, such as mental health calls, rewards individuals who abuse the 911 system (Brewis & Godfrey, 2019; Prener & Lincoln, 2015). EMS providers have additionally reported that transporting low-risk individuals experiencing a mental health or substance use problems inhibits their ability to respond to medical emergencies (Prener & Lincoln, 2015). An observational study in British Columbia examined paramedic perceptions of the importance of social work in their roles, finding that paramedics want to preform paramedic services, not social work, and do not feel like they can successfully provide both skill sets (Campbell & Rasmussen, 2012). The authors suggest that including social workers in paramedic teams could enhance patient outcomes through allowing paramedics to focus on medical tasks while social workers address the psychosocial needs of patients, bystanders, and even the paramedics themselves (Campbell & Rasmussen, 2012).

B. Service Users

Only a handful of studies have examined service users' perceptions of EMS and ambulance-based response programs. These studies have found that participants have primarily positive experiences with these programs, express satisfaction with the services they receive, and experience limited EMS needs following their interactions with these programs (see Gregg et al., 2019 for review). For example, a study in Los Angeles found that the vast majority of patients (97%) reported that the quality of care during their interaction with the Advanced Provider Response Unit was good, very good, or excellent (Sanko et al., 2020). Similarly, patients in Sweden reported that PAM personnel created a safe environment, treated patients respectfully, and allowed patients to participate in decisions surrounding their care (Lindström et al., 2020). Patients additionally reported that PAM personnel provided them with helpful information based on their individual needs and histories (Lindström et al., 2020). Additionally,

patients reported that working with PAM was better than working with the police or ambulance personnel who were less able to connect with the patient to help them address the current situation (Lindström et al., 2020). Although patients perceived PAM staff as caring, they felt that police officers and ambulance personnel were less caring in prior psychiatric emergencies they have experienced (Lindström et al., 2020). Patients transported to mental health providers and sobering centers in Los Angeles similarly reported being more satisfied with their experience with the alternate destination transport than prior services received in the emergency department (Sanko & Eckstein, 2021). Only 6% of patients interviewed after being treated by the Los Angeles Advanced Provider Response Unit reported a subsequent emergency department visit during the 18-month study period (Sanko et al., 2020).

V. Discussion

EMS and ambulance-based response models use paramedics and EMS providers to respond to individuals experiencing behavioral health crises with the intention of providing more appropriate patient care through on-scene treatment, alternative destination transportation, and/or case management services and referrals to community-based services. In addition to increased connections to needed services, these programs are intended to reduce pressure on the healthcare system and to result in financial savings by providing targeted patient care.

Prior evaluations of EMS and ambulance-based models have found that these programs can successfully increase patient connections to services, reduce pressure on the healthcare system, and achieve financial savings. Much less is known, however, about these programs' interaction with and impact on the police and broader criminal justice system. Finally, although paramedics and EMS providers have raised some concerns about the implementation of these programs and the use of EMS to respond to behavioral health-related incidents, patients have largely reported favorable perceptions of these programs. Findings from the evaluations of EMS and ambulance-based responses reviewed are summarized in Table 4, below.

A. Practical Implications

There are multiple considerations for communities interested in adopting EMS and ambulance-based crisis response programs. Specifically, the available research highlights specialized training for paramedics, the importance of interagency collaboration and challenges associated with multiagency partnerships, and the needs of populations served by these programs. Each of these areas is discussed in greater detail below.

It is important to highlight the central role of paramedics in EMS and ambulance-based programs. A review of multiple programs emphasized the importance of training paramedics to understand and effectively respond to individuals experiencing behavioral health crises (Emond et al., 2019). Despite the frequency with which EMS responders are called to address behavioral health incidents, EMS providers have reported receiving limited formal training surrounding these issues, learning most of their skills on the job (Prener & Lincoln, 2015). Future efforts to

improve these trainings to maximize the capacity of these responders could improve program effectiveness.

In terms of collaboration, successful EMS and ambulance-based response programs require collaboration between paramedics, hospitals, mental health professionals, substance use treatment providers, dispatchers, emergency responders, and numerous other services to provide more integrated and appropriate patient care (Emond et al., 2019; Ford-Jones & Daly, 2020; Zayed et al., 2020). However, establishing collaborative agreements can be challenging due to various policies and systems used by representatives from different agencies (Gregg et al., 2021; Mechem et al., 2020). Efforts to clarify the purpose of EMS and ambulance-based programs and to create workflows establishing how EMS providers, law enforcement, and program team members should interact on-scene could enhance the implementation of these programs (see Gregg et al., 2021).

Table 4. Summary of Findings from Evaluations of EMS & Ambulance-Based Responses

Outcome	Findings
Increasing Connections to Services	Several studies have found that these programs successfully connect clients with mental health, substance use, case management, and other social services (e.g., housing, food, transportation).
Reducing Pressure on EMS Providers and Emergency Departments	Research generally indicates that these programs can reduce the number of patients who need to be transported using EMS and ambulance services. Studies have also found that these programs reduce the number of individuals admitted to emergency departments. A few studies indicate that these programs can reduce future requests for EMS among participants.
Reducing Pressure on the Criminal Justice System	Limited research has assessed the influence of these programs on the criminal justice system, although preliminary findings suggest that these programs can improve interactions between police officers and EMS providers when responding to individuals experiencing behavioral health crises.
Cost-effectiveness	Prior research suggests that these programs can achieve substantial cost-savings through reducing ambulance transportations and admissions to emergency departments for patients who can be better treated on-scene, in an alternative facility, or using case management services.
Stakeholder Perceptions	Service providers have reported some hesitation about these programs due to the types of incidents being addressed and the lack of training among paramedics to respond to patients experiencing behavioral health challenges. Clients who have used these services report overwhelmingly favorable perceptions.

While EMS providers work 24/7, many community-based service providers do not, which limits the services individuals can be referred to at certain times (Zayed et al., 2020). Other barriers to using EMS to provide on-scene services or transportation to alternative destinations include regulations prohibiting these practices, financial incentives to transport patients to emergency departments, and a lack of available alternative services (Mechem et al., 2020; Sanko et al., 2020; Sanko & Eckstein, 2021). Some programs have included alternative service providers in the development of diversion protocols (Cheney et al., 2008), which could improve these processes. Program managers should also be selected to provide oversight and to continually evaluate program needs across participating agencies (Mechem et al., 2020).

Finally, the populations targeted by these programs often experience multiple healthcare and social service needs (Østergaard & Lyngby, 2019). Target patient populations can also be highly transient and have high rates of homelessness, which creates challenges in effectively following up with patients over time (Mechem et al., 2020; Sanko & Eckstein, 2021). Some researchers have found that individuals under the age of 18 are also likely to be involved in calls related to behavioral health, highlighting the importance of including services for juveniles (Faddy et al., 2017; Fische & Lynch, 2019). Although none of the studies reviewed discussed the use of EMS and ambulance-based services for individuals with intellectual and/or developmental disabilities, establishing specific policies for members of these populations could further enhance the effectiveness of these programs.

B. Research Implications

Despite the continuing implementation of EMS and ambulance-based response programs in various communities in the United States, these models have been subject to relatively few evaluations. Although many of the studies reviewed in this report have been peer-reviewed publications, the analyses were primarily descriptive. Additional research using more rigorous methodologies could better assess the impact of these programs on patient outcomes, healthcare system efficiency, and cost-savings.

Given the multiple goals of EMS and ambulance-based response programs, numerous outcomes should be examined by future researchers. Although EMS and ambulance-based programs are intended to improve patient outcomes, studies have yet to fully assess the long-term impact of these programs on patient physical health, mental health, substance use, and/or other social needs. Future studies should also examine the impact of alternative response models using a broader range of outcomes, such as ambulance and EMS usage and financial reimbursements (Mechem et al., 2020). Researchers should additionally assess whether the use of specialized services to respond to mental health calls reduces response time for other EMS providers responding to medical emergencies, thereby improving broader system efficiency (Sanko et al., 2020). Furthermore, although behavioral health-related crises have traditionally required police responses, there have not been any studies specifically examining the impact of EMS or ambulance-based responses on the criminal justice system. Assessing the impact of these programs on the use of criminal justice resources is a fruitful avenue for future research. Finally, none of the studies reviewed specifically addressed the interaction or impact

of these programs on individuals with intellectual and/or developmental disabilities. This is a considerable oversight that needs to be addressed in future research to understand the effects of these programs on patients with different needs.

C. Conclusion

EMS and ambulance-based response programs represent an emerging practice to enhance community responses to individuals experiencing behavioral health crises without relying on EMS or emergency department visits. These programs are intended to improve patient access to needed services and to provide more efficient and appropriate care, while reducing pressure on EMS and hospitals to address low acuity medical problems. Research has found that these programs can result in a large number of diversions from emergency departments, thereby achieving substantial cost savings. Although EMS providers have reported some hesitation surrounding these programs, participants have largely reported positive experiences. Future implementations of EMS and ambulance-based response models should be guided by well-defined collaborative agreements among participating agencies. Researchers should additionally conduct more rigorous evaluations of these programs to assess their long-term impact on patients, with particular attention to the suitability of these programs for individuals with intellectual and/or developmental disabilities.

VI. References

- Bouveng, O., Bengtsson, F. A., & Carlborg, A. (2017). First-year follow-up of the Psychiatric Emergency Response Team (PAM) in Stockholm County, Sweden: A descriptive study. *International Journal of Mental Health, 46*(2), 65–73. <https://doi.org/10.1080/00207411.2016.1264040>
- Brewis, J., & Godfrey, R. (2019). From extreme to mundane? The changing face of paramedicine in the UK Ambulance Service. In P. Wankhade, L. McCann, & P. Murphy (Eds.), *Critical Perspectives on the Management and Organization of Emergency Services* (pp. 179–199). Routledge. <https://doi.org/10.4324/9781315104447>
- Campbell, H., & Rasmussen, B. (2012). Riding third: Social work in ambulance work. *Health and Social Work, 37*(2), 90–97. <https://doi.org/10.1093/hsw/hls012>
- Chan, J., Griffith, L. E., Costa, A. P., Leyenaar, M. S., & Agarwal, G. (2019). Community paramedicine: A systematic review of program descriptions and training. *Canadian Journal of Emergency Medicine, 21*(6), 749–761. <https://doi.org/10.1017/cem.2019.14>
- Cheney, P., Haddock, T., Sanchez, L., Ernst, A., & Weiss, S. (2008). Safety and compliance with an emergency medical service direct psychiatric center transport protocol. *American Journal of Emergency Medicine, 26*(7), 750–756. <https://doi.org/10.1016/j.ajem.2007.10.019>
- Coffman, J. M. (2020). Can Paramedics Safely Screen Patients for Transport to a Mental Health Crisis Center? Evidence from California. *Health Services Research, 55*(S1), 101–102. <https://doi.org/10.1111/1475-6773.13474>
- Coffman, J. M., & Blash, L. (2021). *Update of Evaluation of California's Community Paramedicine Pilot Program*. <https://ems.ca.gov/wp-content/uploads/sites/71/2017/11/2019-Public-Report-on-California-Community-Paramedicine-Project-2.27.19.pdf>
- Creed, J. O., Cyr, J. M., Owino, H., Box, S. E., Ives-Rublee, M., Sheitman, B. B., Steiner, B. D., Williams, J. G., Bachman, M. W., Cabanas, J. G., Myers, J. B., & Glickman, S. W. (2018). Acute Crisis Care for Patients with Mental Health Crises: Initial Assessment of an Innovative Prehospital Alternative Destination Program in North Carolina. *Prehospital Emergency Care, 22*(5), 555–564. <https://doi.org/10.1080/10903127.2018.1428840>
- Emond, K., O'Meara, P., & Bish, M. (2019). Paramedic management of mental health related presentations: a scoping review. *Journal of Mental Health, 28*(1), 89–96. <https://doi.org/10.1080/09638237.2018.1487534>
- Faddy, S. C., McLaughlin, K. J., Cox, P. T., & Muthuswamy, S. S. (2017). The mental health acute assessment team: A collaborative approach to treating mental health patients in the community. *Australasian Psychiatry, 25*(3), 262–265. <https://doi.org/10.1177/1039856216689655>

- Fishe, J. N., & Lynch, S. (2019). Pediatric Behavioral Health-Related EMS Encounters: A Statewide Analysis. *Prehospital Emergency Care*, 23(5), 654–662. <https://doi.org/10.1080/10903127.2019.1566423>
- Ford-Jones, P. C., & Daly, T. (2020). Filling the gap: Mental health and psychosocial paramedicine programming in Ontario, Canada. *Health and Social Care in the Community*, 1–9. <https://doi.org/10.1111/hsc.13189>
- Gregg, A., Parish, P., Condon, S., Scicolone, M., Crowther, M., & Friend, R. (2021). Lessons learned from an EMS treatment in place pilot program. *Journal of Interprofessional Education and Practice*, 23, 1–5. <https://doi.org/10.1016/j.xjep.2021.100417>
- Gregg, A., Tutek, J., Leatherwood, M. D., Crawford, W., Friend, R., Crowther, M., & McKinney, R. (2019). Systematic Review of Community Paramedicine and EMS Mobile Integrated Health Care Interventions in the United States. *Population Health Management*, 22(3), 213–222. <https://doi.org/10.1089/pop.2018.0114>
- Lindström, V., Sturesson, L., & Carlborg, A. (2020). Patients' experiences of the caring encounter with the psychiatric emergency response team in the emergency medical service—A qualitative interview study. *Health Expectations*, 23(2), 442–449. <https://doi.org/10.1111/hex.13024>
- Mackey, K. E., & Qiu, C. (2019). Can Mobile Integrated Health Care Paramedics Safely Conduct Medical Clearance of Behavioral Health Patients in a Pilot Project? A Report of the First 1000 Consecutive Encounters. *Prehospital Emergency Care*, 23(1), 22–31. <https://doi.org/10.1080/10903127.2018.1482390>
- McCann, T. V., Savic, M., Ferguson, N., Bosley, E., Smith, K., Roberts, L., Emond, K., & Lubman, D. I. (2018). Paramedics' perceptions of their scope of practice in caring for patients with nonmedical emergency-related mental health and/or alcohol and other drug problems: A qualitative study. *PLoS ONE*, 13(12), 1–16. <https://doi.org/10.1371/journal.pone.0208391>
- Mechem, C. C., Yates, C. A., Rush, M. S., Alleyne, A., Singleton, H. J., & Boyle, T. L. (2020). Deployment of Alternative Response Units in a High-Volume, Urban EMS System. *Prehospital Emergency Care*, 24(3), 378–384. <https://doi.org/10.1080/10903127.2019.1657212>
- Østergaard, S. L., & Lyngby, R. M. (2019). Evaluation of dispatch outcomes and staffing of the Copenhagen mobile health and social care unit. *BMJ Open*, 9. http://scioteca.caf.com/bitstream/handle/123456789/1091/RED2017-Eng-8ene.pdf?sequence=12&isAllowed=y%0Ahttp://dx.doi.org/10.1016/j.regsciurbeco.2008.06.005%0Ahttps://www.researchgate.net/publication/305320484_SISTEM_PEMBETUNGAN_TERPUSAT_STRATEGI_MELESTARI
- Prener, C., & Lincoln, A. K. (2015). Emergency medical services and “psych calls”: Examining the

work of urban EMS providers. *American Journal of Orthopsychiatry*, 85(6), 612–619.
<https://doi.org/10.1037/ort0000077>

Roggenkamp, R., Andrew, E., Nehme, Z., Cox, S., & Smith, K. (2018). Descriptive Analysis Of Mental Health-Related Presentations To Emergency Medical Services. *Prehospital Emergency Care*, 22(4), 399–405. <https://doi.org/10.1080/10903127.2017.1399181>

Sanko, S., & Eckstein, M. (2021). Mobile Integrated Health Care in Los Angeles: Upstream Solutions to Mitigate the Covid-19 Pandemic. *NEJM Catalyst Innovations in Care Delivery*, 2(2), 1–25. <https://doi.org/10.1056/cat.20.0383>

Sanko, S., Kashani, S., Ito, T., Guggenheim, A., Fei, S., & Eckstein, M. (2020). Advanced Practice Providers in the Field: Implementation of the Los Angeles Fire Department Advanced Provider Response Unit. *Prehospital Emergency Care*, 24(5), 693–703.
<https://doi.org/10.1080/10903127.2019.1666199>

Trivedi, T. K., Glenn, M., Hern, G., Schriger, D. L., & Sporer, K. A. (2019). Emergency Medical Services Use Among Patients Receiving Involuntary Psychiatric Holds and the Safety of an Out-of-Hospital Screening Protocol to “Medically Clear” Psychiatric Emergencies in the Field, 2011 to 2016. *Annals of Emergency Medicine*, 73(1), 42–51.
<https://doi.org/10.1016/j.annemergmed.2018.08.422>

Zayed, M. G., Williams, V., Glendenning, A. C., Bulger, J. K., Hewes, T., Porter, A., Snooks, H., & John, A. (2020). Care-pathways for patients presenting to emergency ambulance services with self-harm: National survey. *Emergency Medicine Journal*, 37(12), 752–755.
<https://doi.org/10.1136/emered-2019-208967>

APPENDIX A. Evaluations of EMS and Ambulance-Based Response Programs

Author(s) / Year	Publication Type	EMS and Ambulance-Based Response Program	Location	Methodology	Outcomes of Interest
Bouveng et al. (2017)	Peer-Reviewed Article	Psychiatric Emergency Response Team (PAM)	Sweden	Descriptive Analysis	<ul style="list-style-type: none"> • Program components • Response time • Transportation to services
Campbell & Rasmussen (2012)	Peer-Reviewed Article	Paramedic Ambulance Station	British Columbia, Canada	Qualitative: Observations; Interviews	<ul style="list-style-type: none"> • Stakeholder perceptions
Chan et al. (2019)	Peer-Reviewed Article	Various	Various	Systematic review	<ul style="list-style-type: none"> • Program components • Training
Cheney et al. (2008)	Peer-Reviewed Article	EMS diversion to psychiatric services	Anonymous mid-sized U.S. city	Descriptive Analysis	<ul style="list-style-type: none"> • Program components • Transportation to services
Coffman (2020)	Peer-Reviewed Article	Ambulance diversion to mental health crisis center	Four California communities	Descriptive Analysis	<ul style="list-style-type: none"> • Patient outcomes • Program components • Transportation to services
Coffman & Blash (2021)	Report	Health Workforce Pilot Project	Twenty California projects in fourteen communities	Descriptive Analysis	<ul style="list-style-type: none"> • Cost effectiveness • Emergency department visits
Creed et al. (2018)	Peer-Reviewed Article	Wake County EMS Advanced Practice Paramedic Program	North Carolina	Descriptive Analysis	<ul style="list-style-type: none"> • Patient outcomes • Emergency department visits • Transportation to services
Emond et al. (2019)	Peer-Reviewed Article	Various Paramedic Responses to Mental Health-Related Individuals	Multiple	Systematic review	<ul style="list-style-type: none"> • Program components • Service provider perceptions

Author(s) / Year	Publication Type	EMS and Ambulance-Based Response Program	Location	Methodology	Outcomes of Interest
Faddy et al. (2017)	Peer-Reviewed Article	Mental Health Acute Assessment Team	Western Sydney, Australia	Descriptive Analysis	<ul style="list-style-type: none"> • Emergency department visits • Transportation to services
Ford-Jones & Daly (2020)	Peer-Reviewed Article	Paramedic Services in Ontario, Canada	Canada	Qualitative: Interviews; Shift observations	<ul style="list-style-type: none"> • Service provider perceptions
Gregg et al. (2021)	Peer-Reviewed Article	Appropriate Care and Treatment in Our Neighborhoods (ACTION)	Alabama	Qualitative: Focus groups; Review of 911 call notes	<ul style="list-style-type: none"> • Program components • Service provider perceptions
Lindström et al. (2020)	Peer-Reviewed Article	Psychiatric Emergency Response Team (PAM)	Sweden	Qualitative: Interviews	<ul style="list-style-type: none"> • Client perceptions
Mackey & Qiu (2019)	Peer-Reviewed Article	Mobile Integrated Health Care Paramedics	Stanislaus County, California	Descriptive Analysis	<ul style="list-style-type: none"> • Emergency department visits • Transportation to services
Meechem et al. (2020)	Peer-Reviewed Article	Alternative Response Units	Philadelphia, Pennsylvania	Descriptive Analysis	<ul style="list-style-type: none"> • Program components
Østergaard & Lyngby (2019)	Abstract	Copenhagen Mobile Health and Social Care Unit	Denmark	Descriptive Analysis	<ul style="list-style-type: none"> • Emergency department visits • Transportation to services
Sanko et al. (2020)	Peer-Reviewed Article	Los Angeles Fire Department Advanced Provider Response Unit	Los Angeles, California	Descriptive Analysis	<ul style="list-style-type: none"> • Client perceptions • Emergency department visits • Program components • Subsequent 911 calls • Transportation to services

Author(s) / Year	Publication Type	EMS and Ambulance-Based Response Program	Location	Methodology	Outcomes of Interest
Sanko & Eckstein (2021)	Peer-Reviewed Article	Mobile Integrated Health Care strategy	Los Angeles, California	Descriptive Analysis	<ul style="list-style-type: none"> • Client perceptions • Cost effectiveness • Program components
Trivedi et al. (2019)	Peer-Reviewed Article	Alameda County, California Emergency Medical Services (EMS) System	Alameda County, California	Descriptive Analysis	<ul style="list-style-type: none"> • Emergency department visits • Transportation to services
Zayed et al. (2020)	Peer-Reviewed Article	UK Ambulance Services	United Kingdom	Descriptive Analysis	<ul style="list-style-type: none"> • Program components