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Utilization of Community Paramedics to Respond to the COVID-19 Pandemic

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Executive Summary

The COVID-19 pandemic has prompted many health care organizations in the United States to expand the range of places in which they provide care, the modalities by which they provide it, and the manner in which health professionals are utilized. Some health systems and emergency medical services agencies are leveraging the versatility and experience of community paramedics to meet needs for COVID-19 testing, care, and vaccination. This report describes models of community paramedic practice that communities across the country have utilized during the pandemic and discusses changes in law and regulation that would facilitate more widespread adoption of these models.

Methods

The authors searched databases of peer-reviewed literature, trade publications, and media reports, as well the websites of organizations that advocate for community paramedicine, to identify literature published from March 2020 through October 2021. Due to the emergent nature of the pandemic, few peer-reviewed studies of the use of community paramedics to meet COVID-19 needs were identified.

Results

Communities across the United States have utilized community paramedics to provide a wide range of services related to the COVID-19 pandemic, including:

- Administering tests
- Staffing quarantine and isolation sites
- Monitoring and caring for patients in their homes
- Providing vaccinations to homebound persons

Conclusions

The findings of this report highlight the potential of community paramedics to address a variety of needs associated with the COVID-19 pandemic. Maximizing community paramedics' ability to meet these needs will require changes to state laws and regulations that limit their scope of practice and the settings in which they can practice. Laws that require commercial health plans and Medicaid to reimburse emergency medical services agencies (EMS) for community paramedicine services need be enacted, and federal laws governing Medicare reimbursement changed.

Background

Nearly two years after the first case of COVID-19 was detected in the United States, the COVID-19 pandemic continues to create challenges for the country's health care system. Despite substantial progress on vaccination, the highly contagious Delta and Omicron variants have led to surges in cases in many parts of the country.[1,2,3] Although the Omicron variant appears less likely to result in severe illness, particularly among persons who are vaccinated, cases are rising rapidly as people congregate indoors to celebrate the holidays at the end of 2021. The Centers for Disease Control and Prevention has recommended booster shots for all adults and authorized them for adolescents age 16 to 17 years to maintain protection against severe COVID-19 infection.[4]

The ongoing crisis prompts questions about what more can be done to speed the pace of vaccination, maintain testing, and reduce demand for inpatient care. To meet these needs, many health care organizations are expanding the range of places in which they provide care and the modalities by which they provide it. Some are also deploying their health care workforce in innovative ways, such those health care systems and emergency medical services (EMS) agencies that have utilized community paramedics as part of their COVID-19 response strategy.

A relatively new occupation, community paramedics complete additional training beyond the requirements for licensure and provide services that differ from those that paramedics have traditionally provided (i.e., responding to 911 calls and treating patients at the scene or en route to an emergency department).[5] Services provided by community paramedicine programs include follow-up care after hospital discharge, care coordination for frequent users of emergency medical services, health education, immunization, and transportation to sites other than emergency departments (EDs), such as outpatient behavioral health services providers.[6,7,8] Community paramedicine programs have been developed in response to local needs and collaborate closely with local health and social services systems. They are overseen by primary care physicians or emergency medicine physicians.

An assessment of state community paramedicine laws conducted in 2019 found that 23 states had passed laws regulating community paramedicine programs, establishing community paramedicine pilot programs, or authorizing emergency medical personnel to provide non-emergency services.[9] Additional states had local community paramedicine programs that are not explicitly authorized under state law.

Community paramedics bring a unique combination of skills to the COVID-19 pandemic. Like all paramedics, they are trained to rapidly assess patients' conditions, enabling them to quickly distinguish patients who need immediate transport to an ED from those who can be managed at home or in other settings. They are accustomed to providing care to people from all walks of life. Their additional training is tailored to meet the specific needs of the populations they serve.[5] And they are often trained to adopt a public health mindset that encourages them to help address behavioral health and social needs as well as medical needs.

This report describes the roles that community paramedics have played in COVID-19 response across the United States and offers policy recommendations for maximizing their contributions.

Methods

The authors searched databases of peer-reviewed literature, trade publications and media reports, as well the websites of organizations that advocate for community paramedicine. The search spanned the time period from March 2020 through October 2021. Due to the emergent nature of the pandemic, few peer-reviewed studies of the use of community paramedics to meet COVID-19 needs were identified.

Results

A review of trade publications and media reports identified four types of services that community paramedics are providing in response to the COVID-19 pandemic:

- Testing
- Staffing quarantine and isolation sites
- Monitoring and caring for patients in their homes
- Providing vaccinations to homebound persons

Examples of each of these types of services are discussed below.

Testing for COVID-19

Community paramedicine programs across the United States have collaborated with public health officials to carry out COVID-19 testing. These efforts focus primarily on testing people who would have difficulty accessing mass testing sites or sites operated by health care facilities.

Several jurisdictions have deployed community paramedics to perform COVID-19 tests in the home, enabling homebound individuals to obtain COVID-19 testing without the risks associated with leaving home to obtain testing. In Dane County, Wisconsin, public health officials have partnered with community paramedics employed by the City of Madison Fire Department to perform COVID-19 testing and contact tracing in nursing homes and congregant living facilities with suspected outbreaks.[10] The goal of this intervention is to rapidly identify persons with COVID-19 and to quarantine and isolate them and their close contacts. private In Harlingen, Texas, community paramedics are dispatched when people with COVID-19 symptoms call 911.[11] In Bella Vista, Arkansas, community paramedics collaborate with a multi-specialty medical group that prescreens patients via telehealth visits.[12]

Other jurisdictions have focused on utilizing community paramedics to provide COVID-19 testing to high-risk populations in the community. In Hennepin County, Minnesota, community paramedics have partnered with nurses from the Minnesota Visiting Nurse Association to provide testing at homeless shelters and public housing sites.[13] In the City and County of San Francisco, California, community paramedics employed by the San Francisco Fire Department work with nurse practitioners from the Department of Public Health's Street Medicine Team to test people experiencing homelessness for COVID-19, as well as those staying at shelter-in-place and quarantine sites across the city.[14] To locate people and persuade them to be tested and quarantine, these community paramedics leverage relationships developed through a program for frequent users of emergency services, which provide them with knowledge of the places in San Francisco where homeless people congregate and fostering trust.

In the Charlotte metropolitan area of North and South Carolina, Atrium Health, a large, multi-hospital system, has utilized community paramedics to provide screening and drive-through testing for COVID-19.[15] The community paramedics initially staffed a single remote site providing COVID-19 tests to symptomatic employees of the health system. The number of sites was rapidly expanded to six, operating seven days per week and serving the general public. A roving test site was subsequently deployed to improve the availability of testing in underserved communities.

Staffing COVID-19 Isolation and Quarantine Sites

San Francisco, California, also utilized community paramedics to staff a COVID-19 isolation and quarantine site. In May 2020, a person experiencing homelessness who had recently been a patient at the city's sobering center tested positive for COVID-19.[1] Before anyone knew that the person had COVID-19, they had exposed 17 other people at the sobering center to the virus. These people subsequently left the sobering center and interacted with others on the streets, in stores, and in health care facilities across the city.

Community paramedics were charged with finding these people and convincing them to enter a quarantine site staffed by community paramedics and other health professionals. At the quarantine site, community paramedics monitored clients for symptoms of COVID-19 or alcohol withdrawal, managed behavioral outbursts, and negotiated with those who attempted to leave before completing their quarantine period. As clients' physical and behavioral health stabilized, community paramedics worked with them to set goals and helped them identify resources for primary care, substance use disorder treatment, and housing.[14]

Caring for COVID-19 Patients in Their Homes

Community paramedics have also provided in-home care to people with COVID-19. In some communities, these services are provided in person, while in others they are provided via telehealth. These in-home services are similar to those provided by many community paramedic programs to people who have recently been discharged from a hospital or whose physicians believe they need assistance to continue living independently, and include monitoring symptoms, reviewing treatment plans, performing medication reconciliation, scheduling follow-up visits, identifying psychosocial needs, and connecting people with services to address those needs.[5]

For example, Indianapolis, Indiana's Emergency Medical Services agency has increased the number of employees working in its community paramedic program from one to three paramedics to provide follow-up care to people with COVID-19 whose condition does not warrant hospitalization. In addition to monitoring COVID-19 symptoms, these community paramedics check with patients to ensure that they have food, water, and adequate supplies of their medications.[16]

Other examples include the community paramedic program operated by Regions Hospital in St. Paul, Minnesota, which published a case study about the provision of in-home care to a medically complex patient with COVID-19 following hospital discharge.[17] In this instance, the community paramedic made three visits to the patient's home. Due to the patient's deteriorating condition, the community paramedic conducted a telehealth call on the third visit with the physician overseeing the community paramedic program. The two persuaded the patient to return to the hospital, where she received additional treatment and was subsequently released with supplemental oxygen. In this case, the home visits provided a means for monitoring the patient's condition more closely, which facilitated a rapid response when it became apparent that the patient needed additional inpatient care.

Community paramedics who work for St. Peter's Health in Helena, Montana, also visit COVID-19 patients in their homes to draw blood and monitor their symptoms. Much like the experience at Regions Hospital, community paramedics from St. Peters reported that some of the patients they visited needed immediate medical care. Depending on the severity of the patient's condition, community paramedics either called 911 for ambulance transport or advised family members to transport the patient to an emergency department.[18]

A community paramedic program in Merrill, Wisconsin, operated by the Merrill Fire Department, provides a fourth example of in-home care for people with COVID-19. This program, established in 2018 to provide home visits to people discharged from the hospital with chronic obstructive pulmonary disease, congestive heart failure, or

[1] The sobering center is staffed by registered nurses and provides a safe alternative to the city's busy emergency departments for intoxicated people who need a place to recover. For further information about the sobering center, see Smith-Bernardin SM, Kennel M, Yeh C. EMS can safely transport intoxicated patients to a sobering center as an alternate destination. *Annals of Emergency Medicine*. 2019;74(1):112-118.

pneumonia, began providing home visits to people with COVID-19 in December 2020. At that time, hospitals in Wisconsin were nearing capacity and leaders of the local hospital, Ascension Good Samaritan Hospital, were seeking alternatives to hospitalization for COVID-19 patients with lower acuity. Leaders of emergency medical services at the hospital and fire department collaborated to develop protocols and train community paramedics on discharge instructions for people with COVID-19, use of equipment to monitor their condition, and decontamination procedures. People with COVID-19 who had insurance coverage for home health services were referred to home health agencies; those who did not were referred to the community paramedicine program.[19]

Some community paramedic programs monitor patients in their homes via telehealth. The Palm Beach County Fire Rescue's Mobile Integrated Health Program in Florida has used telehealth to provide in-home care to people under age 50 with COVID-19 symptoms and have no preexisting conditions. Screening to determine eligibility for the program takes place during the 911 call. Community paramedics then use an automated telehealth application to monitor eligible people via telephone for 14 days, following up with those who report symptoms that warrant medical attention. The program also incorporates conversations with a medical social worker, who screens patients for psychosocial needs, such as mental health needs, substance use disorder, food insufficiency, and housing and employment challenges, then assists them in addressing these challenges.[20]

In-home Care for Other Conditions to High-Risk Populations

Some community paramedic programs have expanded existing home visiting programs to reduce the need for people at high risk for COVID-19 to come to health care facilities for care. The community paramedic program of M Health Fairview, an integrated health system that serves the Minneapolis-St. Paul metropolitan area, utilizes data from the Minnesota Department of Health to identify people at elevated risk for contracting COVID-19 or having a more severe infection if they contract the disease. The program's community paramedics visit patients in their homes to assess their health, educate them about COVID-19 safety, and provide influenza vaccinations. They can also arrange telehealth visits with other providers for patients who are not able to access telehealth on their own.[21]

Vaccination for COVID-19

In some jurisdictions, community paramedics are contributing to vaccination efforts by providing in-home vaccinations to people who would have difficulty traveling to a health care facility or mass vaccination site. In Cabarrus and Stanly Counties in North Carolina, community paramedics have provided in-home vaccination to people who lack transportation. [22,23] In Cabarrus County, the community paramedics are affiliated with Atrium Health, mentioned previously for its use of community paramedics to provide COVID-19 testing. Prior to providing vaccinations, these community paramedics received specialized training in vaccine storage and distribution.

Community paramedics have vaccinated homebound people in several communities in Florida as part of a statewide initiative.[24,25,26] Other examples of community paramedic programs that have offered vaccinations to people who are homebound or have limited mobility include the Crawfordsville, Indiana, Fire Department, the Pittsford, New York, Volunteer Ambulance service, and the Dayton, Ohio, Fire Department.[27,28,29]

Many other jurisdictions are utilizing paramedics who may not be trained as community paramedics to provide in-home vaccinations.[30] These paramedics are providing valuable services, but community paramedics offer several additional assets. Community paramedics are accustomed to making scheduled visits to homes and are often trained to assess a person's home environment and their psycho-social needs in addition to their physical needs. They are also knowledgeable about community resources. In the case of Crawfordsville, Indiana, community paramedics leveraged their knowledge of the community to obtain the names and contact information for homebound persons from the local library and Meals on Wheels program, enabling them to reach people who might not otherwise have known that they could be vaccinated in their homes.[27]

Challenges

There are several challenges to maximizing the contributions of community paramedics to COVID-19 response. First, state laws regarding community paramedicine vary widely. In 2019, only 17 states had legislation that authorized deployment of paramedics statewide and only six states had statewide pilot programs.[9] In some states that have not enacted legislation, local EMS agencies have discretion to determine the scope of practice of paramedics, but other states' laws specifically limit the settings in which paramedics can practice and/or the services they can provide. Restrictions on scope of practice and setting may prevent EMS agencies in these states from utilizing community paramedics to provide in-home testing, vaccination, or treatment for COVID-19, unless state governments have issued emergency declarations that waive these restrictions.

Second, most community paramedicine programs do not have stable funding from health insurers. In 2019, only 16 states required commercial health insurers to cover services provided by community paramedics and only 7 states required their Medicaid programs to cover community paramedicine.[9] Many programs rely on funding from philanthropic foundations and health care systems. A few are funded through research grants. For example, Montana's Department of Public Health and Human Services is funding community paramedicine programs through a combination of grants from the federal government and the Montana Healthcare Foundation.[18] Lack of reimbursement is a major reason why a national survey conducted by the National Association of Emergency Medical Technicians (NAEMT) found that only 13 percent of the 435 EMS agencies that responded had utilized community paramedics to meet patient care needs during the pandemic. Only one third of these agencies were reimbursed for their services.[31]

Third, some EMS agencies are struggling to meet demand for emergency response services and may not be able to expand the services that their community paramedics provide. Many EMS agencies are having difficulty recruiting and retaining staff.[32,33] In addition, paramedics who work for some EMS agencies are spending large amounts of time waiting in EDs to transfer responsibility for their patients to ED clinicians or driving patients to hospitals in distant communities.[32,34] Expanding community paramedic services to include COVID-19 services may not be feasible for these EMS agencies.

Limitations

This study has several limitations. First, the authors relied on published reports about activities of community paramedicine programs. Additional community paramedicine programs may provide COVID-19 services. The authors also did not attempt to contact the community paramedicine programs to obtain further information about these services.

Second, the authors did not identify any studies regarding health outcomes associated with the provision of COVID-19 services by community paramedics. However, given what is known about the efficacy of COVID-19 testing, it is likely that community paramedics who performed tests helped to constrain the virus' spread by facilitating the identification of cases in their communities. Similarly, community paramedics who provided in-home vaccinations likely reduced transmission and increased the number of people protected from severe illness. The provision of in-home care by community paramedics also probably improved health outcomes for the patients served and may have indirectly affected outcomes for other people with COVID-19 by reducing demand for ED and inpatient care.

Conclusions

Jurisdictions across the United States are utilizing the unique skill sets of community paramedics to address the COVID-19 pandemic. Multiple states are experiencing surges of cases due to the highly contagious Omicron variant. In some communities, hospitals are overwhelmed by the increase in hospitalizations, especially among unvaccinated persons, and by staffing shortages. Due to these circumstances, more jurisdictions with community paramedicine programs may want to consider following the examples laid out in this report.

Policy Implications & Recommendations

The findings from this review suggest that community paramedics can play valuable roles in the response to the COVID-19 pandemic and to future public health emergencies. Further research is needed to better assess the extent of their contributions to COVID-19 response across the United States and the outcomes of the services they have provided. For example, a follow-up study to the NAEMT survey could be conducted to identify the range of COVID-19 services provided by community paramedics employed by EMS agencies. Findings from such a study could generate estimates of the extent to which community paramedics furnished each of the three major types of COVID-19 services (i.e., testing, care, and vaccination).

Retrospective studies should also be conducted to assess the outcomes associated with provision of in-home care for COVID-19 by community paramedics. Such studies could be carried out at the patient level to compare people with similarly severe cases of COVID-19 who have received in-home care from community paramedics versus care from other health professionals, or to compare in-person care provided by community paramedics to telehealth services provided by community paramedics or other professionals. Retrospective studies could also be conducted at the hospital or community level to compare rates of hospitalization and re-hospitalization for COVID-19, as well as measures of ED and hospital overcrowding, such as rates of diversion of patients to other EDs, length of time for ambulance crews to transfer care to ED staff, and length of time patients are “boarded” in an ED while waiting for an inpatient bed.

To fully realize community paramedics’ potential, some states will need to change laws that restrict the settings in which they are authorized to practice and the scope of services they are authorized to provide. States will also need to pass laws that require commercial insurers and Medicaid to reimburse EMS agencies for COVID-19 services furnished by community paramedics. In addition, the federal government will need to authorize the Medicare program to reimburse for these services. Medicare’s new Emergency Triage, Treat, and Transport (ET3) program may improve the ability of EDs to cope with surges in COVID-19 patients by enabling EMS providers to obtain reimbursement for transporting Medicare beneficiaries to other types of health care facilities, but does not authorize reimbursement for COVID-19 testing, treatment, or vaccination. Such changes in state and federal policy would enhance the ability of community paramedics to contribute to ongoing efforts to mitigate the COVID-19 pandemic.

References

1 Daley J. Colorado hospitals in 'critical condition' as state weathers another surge. *Kaiser Health News* December 15, 2021. Accessed December 31, 2021. https://khn.org/news/article/colorado-hospitals-critical-covid-surge/

2 Elamroussi A. Omicron surge is 'unlike anything we've ever seen,' expert says. *CNN.* December 30, 2021. Accessed December 31, 2021. https://www.cnn.com/2021/12/30/health/us-coronavirus-thursday/index.html

3 Lovelace B, Murphy J, Hersher M. Six states account for more than half of the country's recent Covid hospitalizations. *NBC News.* December 7, 2021. Accessed December 31, 2021. https://www.nbcnews.com/health/health-news/6-states-account-half-countrys-recent-covid-hospitalizations-rcna7776

4 Centers for Disease Control and Prevention. COVID-19 Vaccine Booster Shots. December 28, 2021. Accessed December 31, 2021. https://www.cdc.gov/coronavirus/2019-ncov/vaccines/booster-shot.html

5 Kizer KW, Shore K, Moulin A. *Community Paramedicine: A Promising Model for Integrating Emergency and Primary Care* UC Davis Institute for Population Health Improvement. July 2013. Accessed December 31, 2021. https://emsa.ca.gov/wp-content/uploads/sites/71/2017/07/CPReport.pdf

6 Gregg A, Tutek J, Leatherwood MD, et al. Systematic review of community paramedicine and EMS mobile integrated health care interventions in the United States. *Population Health Management* 2019;22(3):213-222.

7 Patterson DG, Coulthard C, Garberson LA, Wingrove G, Larson EH. What Is the Potential of Community Paramedicine to Fill Rural Health Care Gaps? *Journal of Health Care for the Poor and Underserved.* 2016;27(4):144-158.

8 van Vuuren J, Thomas B, Agarwal G, et al. Reshaping healthcare delivery for elderly patients: the role of community paramedicine; a systematic review. *BMC Health Services Research*. 2021;21(29). https://doi.org/10.1186/s12913-020-06037-0

9 Coffman J, Kwong C. *Left Behind in California: Comparing Community Paramedicine Policies Across States*. California Health Care Foundation. November 2019. Accessed December 31, 2021. https://www.chcf.org/wp-content/uploads/2019/11/LeftBehindCaliforniaComparingCommunityParamedicine.pdf

10 City of Madison Fire Department. Community paramedics pivot to testing, outbreak response during COVID-19. August 27, 2020. Accessed December 31, 2021. https://www.cityofmadison.com/fire/blog/community-paramedics-pivot-to-testing-outbreak-response-during-covid-19

11 Del Valle, F. Texas ambulance service offering home COVID testing. *EMS World* June 21, 2020. Accessed December 31, 2021. https://www.hmpgloballearningnetwork.com/site/emsworld/news/1224521/texas-ambulance-service-offering-home-covid-testing

12 City of Bella Vista. BVFD community paramedics screening patients for COVID-19. No date. Accessed December 31, 2021. https://www.bellavistaar.gov/news_detail_T12_R186.php

13 Here for Life: Hennepin Healthcare. Hennepin EMS community paramedics and MVNA lead the charge in COVID-19 community testing. September 29, 2020. Accessed December 31, 2021. https://hereforlife.blog/hennepin-ems-community-paramedics-and-mvna-lead-the-charge-in-covid-19-community-testing/

14 Boyd-Barrett C. San Francisco Puts Community Paramedics on Front Lines of the Pandemic. *CHCF Blog*. July 28, 2020. Accessed December 31, 2021. https://www.chcf.org/blog/san-francisco-puts-community-paramedics-front-lines-pandemic/

15 Constantine ST, Callaway D, Driscoll JN, Murphy S. Implementation of drive-through testing for COVID-19 with community paramedics. *Disaster Medicine and Public Health Preparedness.* Published online February 16, 2021. https://doi.org/10.1017/dmp.2021.46

16 Cantrell A. Community paramedics at IEMS helping COVID-19 patients at their home. *CBS4*. April 22, 2020. Accessed December 31, 2021. https://cbs4indy.com/news/community-paramedics-at-iems-helping-covid-19-patients-at-their-home/

17 Burnett A, Murphree J, Ebben K, et al. Regions Hospital (MN) community paramedic response to COVID-19. *Journal of Emergence Medical Services* Not dated. Accessed December 31, 2021. https://www.jems.com/administration-and-leadership/community-paramedicine-and-mobile-health/regions-hospital-mn-community-paramedic-response-to-covid-19/?topic=82149

18 Aguayo A. St. Peter's Health starts Community Paramedicine program. *KTVH NBC.* February 5, 2021. Accessed December 31, 2021. https://www.ktvh.com/news/st-peters-health-starts-community-paramedicine-program

19 Community Paramedicine Program expands to offer new tactic to battle COVID-19. *Merrill Foto News.* February 10, 2021. Accessed December 31, 2021. https://merrillfotonews.com/2021/02/10/community-paramedicine-program-expands-to-offer-new-tactic-to-battle-covid-19/

20 Caring for COVID-19 patients with mobile integrated health. *EMS World* May 6, 2020. Accessed December 31, 2021. https://www.hmpgloballearningnetwork.com/site/emsworld/article/1224320/caring-covid-19-patients-mobile-integrated-health-community-paramedicine-coronavirus-emergency-medical-services

21 M Health Fairview. With at-home visits, community paramedics reduce COVID-19 risks for the most vulnerable. October 14, 2020. Accessed December 31, 2021. https://www.mhealth.org/blog/2020/oct-2020/community-paramedics-reduce-covid-19-risk-through-at-home-care

22 Cabarrus County EMS vaccinates homebound residents. *EMS World* March 11, 2021. Accessed December 31, 2021. https://www.hmpgloballearningnetwork.com/site/emsworld/press-release/1225650/cabarrus-county-ems-vaccinates-homebound-residents

23 Miller C. Community paramedics to provide in-home vaccines. *The Stanly News and Press.* January 29, 2021. Accessed December 31, 2021. https://www.thesnaponline.com/2021/01/29/community-paramedics-to-provide-in-home-vaccines/

24 Angers A. Paramedics make house calls to vaccinate homebound residents. *Bay Area News 9* March 25, 2021. Accessed December 31, 2021. https://www.baynews9.com/fl/tampa/coronavirus/2021/03/25/paramedics-make-house-calls-to-vaccinate-homebound-residents

25 LeFever B. Tampa paramedics deliver doses of relief to homebound residents. *Tampa Bay Times.* March 29, 2021. Accessed December 31, 2021. https://www.tampabay.com/news/health/2021/03/29/tampa-paramedics-deliver-doses-of-relief-to-homebound-residents/

26 Murphy J. Flagler County paramedic team vaccinates homebound – and lifts spirits. *Palm Coast Observer.* March 5, 2021. Accessed December 31, 2021. https://www.palmcoastobserver.com/article/flagler-county-paramedic-team-vaccinates-homebound-and-lifts-spirits

27 Spinelli C. Crawfordsville Fire Dept. reaches more homebound Hoosiers with at-home vaccination program. *Fox 59.* March 17, 2021. Accessed December 31, 2021. https://fox59.com/news/crawfordsville-fire-dept-reaches-more-homebound-hoosiers-with-at-home-vaccination-program/

28 Pittsford Volunteer Ambulance. Community paramedicine: Homebound COVID-19 vaccinations. June 24, 2021. Accessed December 31, 2021. https://www.pittsfordvolunteerambulance.org/news/ArticleID/643/pageindex3779/25

29 Balduf J. Dayton offers home COVID vaccinations for residents. *Dayton Daily News.* October 7, 2021. Accessed December 31, 2021. https://www.daytondailynews.com/local/dayton-fire-department-offers-mobile-covid-vaccinations-for-residents/53B3RYZJ5ZGERNO77KECQNOESE/

30 Har J. It takes a village to vaccinate homebound people. *Journal of Emergence Medical Services.* May 13, 2021. Accessed December 31, 2021. https://www.jems.com/administration-and-leadership/community-paramedicine-and-mobile-health/it-take-a-village-to-vaccine-homebound-people/

31 National Association of Emergency Medical Technicians. *How COVID-19 Has Impacted Our Nation's EMS Agencies*. June 2021. Accessed December 31, 2021. https://www.naemt.org/docs/default-source/covid-19/covid-impact-survey-06-03-2021.pdf?sfvrsn=c62fea93_4

32 Berlin S. EMS, Hospital bed shortages lead to long ambulance wait times amid record call numbers. *Newsweek* August 27, 2021. Accessed December 31, 2021. https://www.newsweek.com/ems-hospital-bed-shortage-lead-long-ambulance-wait-times-amid-record-call-numbers-1623756

33 American Ambulance Association. Congressional Letter on the EMS Workforce Shortage. Accessed December 31, 2021. https://ambulance.org/2021/10/04/workforceshortage/

34 Santoro H. As hospitals fill up, paramedics spend more time moving patients, less on emergencies. *Kaiser Health News* December 17, 2021. Accessed December 31, 2021. https://khn.org/news/article/ambulance-resources-911-demand-paramedics-busy-with-patient-transfers-pandemic-fills-hospitals/

