

Update of Evaluation of California's Community Paramedicine Pilot Program

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Abstract / Overview

Community paramedicine, also known as mobile integrated health (MIH-CP) is an innovative model of care that seeks to improve the effectiveness and efficiency of health care delivery by using specially trained paramedics in partnership with other health care providers to address the needs of local health care systems. In November 2014, the California Office of Statewide Health Planning and Development (OSHPD) approved an application from the California Emergency Medical Services Authority to establish a Health Workforce Pilot Project that has encompassed 17 projects in 13 communities across California that have tested seven different community paramedicine concepts. Eleven projects are currently enrolling patients. An additional project plans to begin enrolling patients as soon as it receives approval from its Institutional Review Board (IRB). Five of the initial projects have closed due to various challenges.

The Philip R. Lee Institute for Health Policy Studies and Healthforce Center at the University of California, San Francisco, are conducting an independent evaluation of these projects. This report presents findings through March 31, 2018, for projects currently enrolling patients and the projects that have closed. The evaluators conclude that Californians benefit from these innovative models of health care that leverage an existing workforce that operates at all times under medical control — either directly or by protocols developed by physicians experienced in emergency care. The projects have improved coordination among providers of medical, behavioral health, and social services and reduced preventable ambulance transports, emergency department visits, and hospital readmissions. They have not resulted in any adverse outcomes for patients. This report presents a summary of major findings from the evaluation for policymakers. All data submitted by project sites are reported to OSHPD on a quarterly basis.

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Research Report

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The mission of Healthforce Center is to equip health care organizations with the workforce knowledge and leadership skills to effect positive change.

Executive Summary

Community paramedicine, also known as mobile integrated health (MIH-CP) is an innovative model of care that seeks to improve the effectiveness and efficiency of health care delivery by using specially trained paramedics in partnership with other health care providers to address the needs of local health care systems.

On November 14, 2014, the California Office of Statewide Health Planning and Development (OSHPD) approved an application from the California Emergency Medical Services Authority to establish a Health Workforce Pilot Project (HWPP) to test multiple community paramedicine concepts. OSHPD has since renewed the HWPP for one-year periods in 2015, 2016, and 2017. The community paramedicine HWPP has encompassed 17 projects in 13 communities across California that have tested seven different community paramedicine concepts. Eleven projects are currently enrolling patients, including eight projects launched in 2015, one launched in 2017, and two launched in 2018. An additional project plans to begin enrolling patients as soon as it receives approval from its Institutional Review Board (IRB). Five of the initial projects have closed due to various challenges.

The HWPP regulations require organizations that sponsor pilot projects to retain an independent evaluator to assess trainee performance, patient acceptance, and cost effectiveness. The Philip R. Lee Institute for Health Policy Studies and Healthforce Center at the University of California, San Francisco, are conducting the evaluation funded by the California Health Care Foundation.

This report presents a summary of major findings from the evaluation for policymakers. All data submitted by project sites are reported to OSHPD on a quarterly basis. The report presents findings from the time the initial group of pilot projects began enrolling patients (June 2015 to October 2015) through March 2018, for nine of the eleven community paramedicine projects that are currently enrolling patients and the five projects that have closed. The tenth and eleventh projects that are currently enrolling patients, Santa Clara County EMS's alternate destination - mental health project and its alternate destination - sobering center project, are not included because they did not begin enrolling patients until June 2018.

The seven community paramedicine concepts that sites are testing are described below:

1. **Post-Discharge, Short-term Follow-Up:** Provide short-term, home-based follow-up care to people recently discharged from a hospital due to a chronic condition (e.g., heart failure) to reduce their risk of readmission and improve their ability to manage their condition.
2. **Frequent EMS Users:** Provide case management services to people who are frequent 911 callers and frequent visitors to emergency departments (EDs) to identify needs that could be met more effectively outside of an ED and assist patients in accessing primary care and obtaining services to address non-medical needs, such as food, housing, and substance use disorder treatment.
3. **Directly Observed Therapy for Tuberculosis:** In collaboration with a public health agency, provide directly observed therapy (DOT) to people with tuberculosis (i.e., dispense medications and observe patients taking them) to assure effective treatment of tuberculosis and prevent its spread.
4. **Hospice:** In response to 911 calls made by or on behalf of hospice patients, collaborate with hospice agency nurses, patients, and family members to treat patients in their homes according to their wishes instead of transporting them to an ED.
5. **Alternate Destination – Mental Health:** In response to 911 calls, offer people who have mental health needs, but no acute medical needs, transport directly to a mental health crisis center instead of to an ED with subsequent transfer to a mental health facility.

6. **Alternate Destination – Urgent Care:** In response to 911 calls, offer people with low-acuity medical conditions transport to an urgent care center for evaluation by a physician, instead of to an ED.
7. **Alternate Destination – Sobering Center:** In response to 911 calls, offer people who are acutely intoxicated but do not have an acute medical or mental health needs transport directly to a Sobering Center for monitoring instead of to an ED.

Key findings are as follows.

General Project Status

- The pilot projects enrolled 3,142 persons through March 31, 2018.
- Thirteen pilot projects were launched from June through October of 2015.
- San Francisco's alternate destination – sobering center project, began enrolling patients in February 2017.
- Two new projects, Santa Clara County EMS's alternate destination - mental health project and Santa Clara's alternate destination - sobering center project, began enrolling patients in June 2018.
- Fresno's alternate destination - mental health project plans to begin enrolling patients as soon as it receives approval from its Institutional Review Board (IRB).
- Five projects, the UCLA Center for Pre-Hospital Care's post-discharge project, San Diego's frequent EMS user project, and all three alternate destination – urgent care project, have closed. The post-discharge project and the frequent EMS user project closed due to lack of local resources. The alternate destination – urgent care projects closed due to low enrollment.
- OSHPD has approved six additional projects that are currently on hold pending action on community paramedicine legislation that the State Legislature is considering.

Post-Discharge

- From June 2015 through March 2018, the five post-discharge projects have enrolled 1,571 patients. Butte's project has the largest enrollment (903 patients) and Alameda had the smallest (119 patients).
- Four post-discharge projects (Alameda, San Bernardino-Rialto, Solano, and UCLA) have provided at least one home visit to every patient since they were launched in 2015. From July 2015 through October 2017, Butte's project provided a telephone call to every patient and provided a home visit to only a subset of patients. Effective November 2017, Butte changed its protocol to provide at least one home visit to every patient.
- The post-discharge projects are improving patient safety by performing home visits within a few days of a patient's hospital discharge to ensure that patients understand their discharge instructions, are taking medications as prescribed, have sufficient refills to manage their conditions, have scheduled follow-up visits with their physicians, and are adhering to any dietary restrictions pertinent to management of their condition.
- All five post-discharge projects have all-cause 30-day readmission rates for persons with one or more of the chronic conditions they target that are below the partner hospital's historical readmission rate. Butte's heart failure patients were the only group whose all-cause 30-day readmission rate was higher than the historical

rate. In response to these findings, Butte changed its protocol in November 2017 to provide at least one home visit to every patient but its readmission rate for patients with heart failure has not decreased.

- The five post-discharge projects avoided potential costs of approximately \$1.4 million, the majority of which (61%) would accrue to Medicare. Participating hospitals also reduced their risk of incurring Medicare penalties for excessive readmissions.

Frequent EMS User

- The two frequent emergency medical services (EMS) user projects have enrolled 114 persons from July 2015 through March 2018.
- San Diego's frequent EMS user project has not enrolled new clients since December 2016, because the community paramedics working on the project were reassigned to traditional 911 response crews. The pilot project manager, who had maintained the program at reduced capacity since 2016, was reassigned effective January 2018, in effect ending the program.
- The frequent EMS user projects have achieved large reductions in the number of times enrolled patients called 911 and were transported to an ED.
- Frequent EMS user projects linked patients to organizations that provide primary care, mental health services, substance abuse treatment, food, housing assistance, transportation assistance and other services that can address their needs more effectively than the EMS system.
- The two frequent EMS user projects avoided potential costs of approximately \$582,000 by reducing 911 calls, ambulance transports, and ED visits. San Diego's project also potentially reduced the amount of uncompensated care provided by ambulance services and hospitals because 43% of the patients enrolled in the project were uninsured.

Directly Observed Therapy for Tuberculosis

- The tuberculosis (TB) project enrolled 44 persons from June 2015 through March 2018.
- Most persons are enrolled for multiple months because treatment for TB typically spans six to nine months.
- Community paramedics dispensed appropriate doses of TB medications and their TB patients did not experience side effects any more frequently than typically associated with TB treatment.
- Twelve patients were admitted to a hospital in the period during which the project has been in operation, but only one patient was hospitalized for TB. This patient needed intravenous medication to treat TB meningitis, which had been diagnosed prior to enrollment in the program.
- People with TB who received directly observed therapy from community paramedics were more likely to receive all doses of TB medication prescribed by the TB clinic physician than people who received directly observed therapy from the TB clinic's staff, probably because community paramedics were available 24 hours per day, 7 days per week.

Hospice

- The hospice project enrolled 325 persons between August 2015 and March 2018.
- The hospice project reduced the likelihood that patients who preferred treatment at home were transported to an ED, which could result in loss of hospice benefits. Patients were not denied transport to an ED where it was indicated and consistent with the patient's preference.
- Among hospice patients enrolled in the pilot project, the percentage of 911 calls that resulted in transport to an ED decreased from 80% to 28%.
- The hospice project avoided potential costs of \$255,021 by reducing ambulance transports and ED visits.

Alternate Destination – Mental Health

- The alternate destination – mental health project enrolled 310 persons between September 2015 and March 2018.
- Twenty-eight percent of persons screened by the community paramedics were transported to the mental health crisis center. Additional patients could have been transported to the crisis center if the county had more inpatient psychiatric beds or if the crisis center accepted persons with private health insurance or Medicare. Some persons the community paramedics screened were not eligible for transport to the mental health crisis center because they had a medical need, were intoxicated, or were violent.
- In addition to responding to 911 calls regarding mental health emergencies, the community paramedics screen “walk-in” clients who come to the mental health crisis center on their own or who are brought by friends or family to determine whether they have any medical conditions that might necessitate transport to an ED instead of direct admission to the crisis center.
- Only 3% of patients enrolled in the project (n = 9) were transferred from the mental health crisis center to an ED within six hours of admission. None of the transfers involved a life-threatening condition and none of the patients transferred to an ED were admitted for inpatient medical care.
- The project also enhanced public safety because law enforcement officers called to the scene could transfer responsibility for the patient to paramedics and return to law enforcement duties instead of transporting the patient to an ED and waiting with the patient for evaluation.
- The project avoided potential costs of \$331,100 by reducing the number of 911 calls that resulted in an ED visit and subsequent transport of a patient from an ED to an inpatient psychiatric facility.

Alternate Destination – Urgent Care

- The three alternate destination – urgent care projects enrolled 48 persons from September 2015 through November 2017.
- One of the alternate destination – urgent care projects closed in May 2017 and the other two projects closed in November 2017.

- Enrollment in the alternate destination – urgent care projects was substantially lower than anticipated because fewer 911 calls than expected met the strict inclusion criteria and many calls for eligible patients occurred at times of the day during which urgent care centers are closed. In addition, clinicians at urgent care centers were reluctant to treat some conditions, such as a dislocated shoulder, that could be treated safely and effectively in that setting.
- Most patients enrolled had a laceration or an isolated closed extremity injury.
- Since the alternate destination – urgent care projects began enrolling patients, two patients (4%) were transferred from an urgent care center to an ED within six hours of arrival at the urgent care center. Nine patients (19%) were transported to an urgent care center and then rerouted to an ED because clinicians at the urgent care center declined to treat the patient.

Alternate Destination – Sobering Center

- The alternate destination - sobering center project enrolled 730 persons from February 2017 through March 2018. Ninety-four patients (13%) were repeat visitors to the sobering center.
- 97.6% of patients enrolled in the alternate destination – sobering project were treated safely and effectively at the sobering center. Only 17 patients (2.3%) were transferred to an ED within six hours of admission to the sobering center and only one (0.1%) was rerouted from the sobering center to an ED because registered nurses at the sobering center declined to accept the patient. None of these patients were admitted to a hospital for inpatient medical care.
- In addition, community paramedics participating in the project provide feedback to paramedics on 911 crews on how to screen acutely intoxicated persons to determine if they are candidates for transfer to the sobering center. They are also collaborating with homeless outreach workers to encourage people who use the sobering center frequently to seek treatment for chronic alcoholism, housing, and other services.
- During its first 14 months of operation, the project avoided potential costs of \$248,087 by replacing ED visits with visits to the sobering center. The majority of potential savings accrued to Medi-Cal because the majority of patients enrolled in the project are Medi-Cal beneficiaries.

Conclusion

The community paramedicine pilot projects have demonstrated that specially trained paramedics can provide services beyond their traditional and current statutory scope of practice in California. No adverse outcome is attributable to any of these pilot projects. The projects are enhancing patients' well-being by improving the coordination of medical, behavioral health, and social services, and reducing ambulance transports, ED visits, and hospital readmissions. The majority of potential savings associated with these pilot projects accrued to Medicare and hospitals serving Medicare patients because Medicare beneficiaries accounted for the largest share of persons enrolled in the pilot projects. Potential savings also accrued to the Medi-Cal program and providers that serve Medi-Cal beneficiaries.

These pilot projects integrate with existing health care resources and utilize the unique skills of paramedics and their availability 24 hours per day, seven days per week. The pilot projects have not displaced any other health professionals. Instead, they have demonstrated that community paramedics can collaborate with physicians, nurses, behavioral health professionals, and social services workers to fill gaps in the health and social services

safety net. The community paramedics operate at all times under medical control, either directly or by protocols developed by physicians experienced in EMS and emergency care.

Research conducted to date indicates that community paramedicine programs are improving the effectiveness and efficiency of the health care system. Findings from this research also suggest that the benefits of community paramedicine programs grow as they mature, solidify partnerships, and find their optimal structure and niche within a community. The evaluation of HWPP #173 yields consistent findings for six of the seven community paramedicine concepts tested. All of the post-discharge, frequent 911 users, DOT for TB, hospice, and alternate destination – mental health projects have been in operation for at least two and a half years and have improved patients' well-being and, in most cases, have potentially increased health care value by yielding potential savings for payers and other parts of the health care system. Findings regarding outcomes of a project testing the sixth concept, alternate destination – sobering center, suggest that this project is also benefitting patients and the health care system over the course of its first 14 months. The seventh concept, alternate destination – urgent care, shows potential but further research involving a larger volume of patients transported to urgent care centers with wider ranges of services and expanded hours is needed to draw definitive conclusions.

If California implements community paramedicine on a broader scale, the current EMS system design is well suited to utilize the results of these pilot programs to optimize the design and implementation of proposed programs and to assure effectiveness and patient safety. The two-tiered system enables cities and counties to design and administer community paramedicine programs to meet local needs while both local and state oversight and regulation ensure patient safety.

Introduction

Community paramedicine (CP), also known as mobile integrated health (MIH-CP) is an innovative model of care that seeks to improve the effectiveness and efficiency of health care delivery by using specially trained paramedics in partnership with other health care providers to address identified patient needs in local health care systems. Community paramedics receive additional training beyond that required for licensure and provide care outside of their traditional role, which in California is restricted to responding to 911 calls, treating patients at the scene of an emergency, transporting patients to EDs, and inter-facility transfers.ⁱ They are supervised by physicians and nurses who work for the emergency medical services (EMS) agencies that employ them and by staff of the health care and community service agencies with which their EMS agencies partner. According to a survey conducted by the National Association of Emergency Medical Technicians, by 2017 there are 129 MIH-CP programs in 34 states and the District of Columbia.ⁱⁱ

On December 19, 2013, the California Emergency Medical Services Authority (EMSA) submitted an application to the California Office of Statewide Health Planning and Development (OSHPD) for a Health Workforce Pilot Project (HWPP) to evaluate community paramedicine. In 1972, California established the HWPP program (HSC §§ 128125-128195), which was originally called the Health Manpower Pilot Projects program, to enable health care organizations to test and evaluate innovative models of care that utilize health professionals in new roles. A HWPP is necessary to establish community paramedicine initiatives in California because the sections of the Health and Safety Code that govern paramedic scope of practice (HSC §§ 1797.52, 1797.218) limit the settings where paramedics can provide services and the settings to which they can transport patients. OSHPD approved HWPP #173 on November 14, 2014, for one year and renewed approval for additional one-year periods in 2015, 2016, and 2017.

The HWPP regulations require organizations that sponsor pilot projects to retain an independent evaluator to assess trainee performance, patient acceptance, and cost effectiveness. A team of evaluators at the Philip R. Lee Institute for Health Policy Studies and Healthforce Center at the University of California, San Francisco, serves as the independent evaluator for HWPP #173. The California Health Care Foundation funds the evaluation.

This report presents a summary of major findings from the evaluation for policymakers. All data submitted by the project sites are reported to OSHPD on a quarterly basis.

Overview of California Community Paramedicine Pilot Projects

The community paramedicine HWPP has encompassed 17 projects in 13 communities across California. Eleven projects are currently enrolling patients. An additional project plans to begin enrolling patients as soon as it receives approval from its Institutional Review Board (IRB). Five of the original projects have closed. A map that displays the locations of projects that are currently enrolling patients and the new project that is awaiting IRB approval can be found in Appendix A.

This report addresses nine of the eleven projects that are currently enrolling patients and projects that have closed. It covers the months from the launch dates for each of the pilot projects, which range from June 2015 to February 2017, through March 2018. Two projects that are currently enrolling patients, Santa Clara County EMS's alternate destination - mental health project and its alternate destination - sobering center project, are not included because they did not begin enrolling patients until June 2018.

These projects are testing seven different concepts for the practice of community paramedicine.

The seven concepts are:

1. **Post-Discharge, Short-term Follow-Up:** Provide short-term, home-based follow-up care to people recently discharged from a hospital due to a chronic condition (e.g., heart failure) to reduce their risk of readmission and improve their ability to manage their condition. These services are provided by paramedics who completed the full community paramedic training described below. Four projects provide at least one home visit to all patients; one initially provided a telephone call to all patients and a home visits to patients at high risk of readmission but began providing a home visit to every patient in November 2017.
2. **Frequent EMS Users:** Provide case management services to people who are frequent 911 callers and frequent visitors to EDs to identify needs that could be met more effectively outside of an ED and assist patients in accessing primary care and non-medical needs, such as food, housing, and substance use disorder treatment. Services are provided by paramedics who completed the full community paramedic training.
3. **Directly Observed Therapy for Tuberculosis:** In collaboration with a public health agency, provide directly observed therapy (DOT) to people with tuberculosis (i.e., dispense medications and observe patients taking them) to assure effective treatment of tuberculosis and prevent its spread. Services are provided by paramedic supervisors who completed the full community paramedic training.
4. **Hospice:** In response to 911 calls made by or on behalf of hospice patients, collaborate with hospice agency nurses, patients, and family members to treat patients in their homes according to their wishes, instead of transporting them to an ED. Services are provided by paramedic supervisors who completed the full community paramedic training.
5. **Alternate Destination – Mental Health:** In response to 911 calls, offer people who have mental health needs, but no emergent medical needs, transport directly to a mental health crisis center instead of to an ED with subsequent transfer to a mental health facility. Services are provided by paramedics who completed the full community paramedic training.
6. **Alternate Destination – Urgent Care:** In response to 911 calls, offer people with low-acuity medical conditions transport to an urgent care center for evaluation by a physician, instead of to an ED. Services were provided by paramedics on 911 response crews who were trained how to use a protocol to determine if patient would be eligible for transport to an urgent care center and how to follow procedures for enrolling patients who agree to be transported to an urgent care center. These paramedics were supervised by paramedics who completed the full community paramedic training.
7. **Alternate Destination – Sobering Center:** In response to 911 calls, offer people who are acutely intoxicated but do not have an acute medical or mental health problem transport directly to a Sobering Center for monitoring instead of to an ED. Services were provided by paramedics who were trained to use a protocol to identify eligible patients for transport to an sobering center and to follow procedures for enrolling patients who agree to be transported to a sobering center. These paramedics are mentored by other paramedics who completed the full community paramedic training and who also perform quality assurance reviews of transports to the sobering center.

All sites obtained approval from an institutional review board (IRB) and enrolled patients following consent procedures stipulated by the IRB.

OSHPD has approved six additional projects in five communities across the state to test four existing CP concepts: post-discharge, frequent EMS users, alternate destination – mental health, and alternate destination – sobering center. These projects are on hold pending action on community paramedicine legislation that the State Legislature is considering.

Training of Community Paramedics

Paramedics were eligible for training to perform new roles as community paramedics if they had at least four years of experience, volunteered to participate in the pilot, and were sponsored by their local EMS authority. The State of California Community Paramedic Educational Taskforce developed a core curriculum that OSHPD reviewed and approved. The curriculum was adapted from the Paramedic Foundation's National Community Paramedic Curriculum to better align with the standards and requirements of practice in California. The curriculum included 48 hours of didactic, classroom-based instruction and 48 hours of clinical, hands-on training, for a total of 96 hours of instruction. Community paramedic trainees were additionally required to complete 56 hours of study outside the classroom, which included required readings and other assignments.

The site supervisors from Alternate Destination – Urgent Care projects and paramedics recruited to coordinate the Alternate Destination – Sobering project were required to complete the core curriculum. At these pilot sites all other paramedics in the system received training focused on (1) screening patients according to a protocol to determine if they would be eligible to enroll in the pilot, and (2) the procedures for enrolling patients who agree to be transported to an urgent care center or a sobering center. This approach was pursued because these concepts focus on clinical decision-making in the field regarding where to transport a patient. This is routine practice for paramedics, who must identify which patients to take to specialty care centers, such as stroke and trauma centers, that may not be the closest ED.

The first cohort of community paramedics consisted of 79 paramedics who were enrolled in the core curriculum and site-specific coursework during the first quarter of 2015. Two of the 79 paramedics were unable to complete the training for nonacademic reasons. All of the 77 paramedics who completed the core curriculum passed a written final examination, a simulated patient scenario examination, and an oral examination by the pilot site's medical director. Since then, three sites (Solano, Stanislaus, and Ventura) have trained 12 additional community paramedics to expand their programs or replace paramedics who have left their agencies or been promoted to other positions. San Francisco trained 10 community paramedics prior to the launch of its pilot project in February 2017. Fresno has trained 11 community paramedics and Santa Clara has trained 10.

Patient Safety

Multiple procedures to ensure patient safety are incorporated into all levels of the pilot projects. Every project has a project manager, a medical director who is an emergency medicine physician, and a quality assurance officer who is most often a registered nurse with specialty in emergency medicine. Community paramedics have real-time access to physicians and registered nurses for consultation. Each project conducts a retrospective review of all patient encounters. In addition, each project has a local steering committee that approves protocols and reviews data on project outcomes. A statewide steering committee has oversight over all the projects and reviews quarterly reports from the sites. Sites are also required to report unusual occurrences to EMSA's project manager. The independent evaluator reviews data provided by sites for the evaluation and raises any concerns about patient safety that emerge from the data reported. Finally, OSHPD staff review the protocols and performance of the pilot sites and raise any patient safety issues they identify.

Funding

Funding for the pilot sites was provided primarily through in-kind services or funds from fire departments or approved operating budgets of private providers of EMS services. Two sites – Orange County's Alternate Destination – Urgent Care project and Solano's Post-discharge project received grants from health care systems that participated in their pilot projects.

Methods

Information presented in this report was obtained from multiple sources. Each of the pilot sites used a standardized, online data collection tool to report data to the independent evaluator on a quarterly basis. Metrics for which data were collected included numbers of people enrolled, characteristics of enrollees, and outcomes of community paramedic services, including patient safety outcomes. Sites also reported information about people who were eligible for their projects but not enrolled.

Estimates of potential savings for payers were derived from data that each site reported on the cost of ambulance transports, and from existing sources of data on the cost of ED visits and inpatient hospital admissions. Appendix C contains details about the methods the evaluator team used to estimate potential savings. It is important to note that the evaluation was not designed to be a cost effectiveness analysis that compares the costs and effects of community paramedics to other alternatives. With the exception of the directly observed therapy for tuberculosis concept, the services that community paramedics provide under the pilots differ from services furnished by other health care providers in their communities. Thus, the evaluation team concluded that an analysis of potential savings associated with the projects would be more informative.

The team collected data on the cost of operating the community paramedicine pilot projects. These data were reported in the initial public report and are not included in this update to the public report for two reasons. First, standardizing cost data across sites proved difficult due to differences in how projects were staffed (e.g., full-time community paramedics vs. paramedics who both provide community paramedicine services and respond to 911 calls), the generosity of employee benefits (e.g., pension vs. 401K plan), and allocation of costs for vehicles, and medical supplies. Second, the community paramedicine pilot projects are not authorized to bill for the services they provided. All costs for paramedic salaries, benefits, vehicles, and medical supplies are borne by the agencies that operate the pilot projects. Thus, at present payers do not bear any of the costs associated with these projects, although that could change in the future if private payers choose to pay for community paramedicine services or legislation is enacted that authorizes Medi-Cal or Medicare to pay for these services.

Evaluation team members conducted site visits at all project sites, where they interviewed EMS agency leaders, project managers, community paramedics, and representatives of hospitals and other partner agencies. The purpose of the site visits was to obtain a better understanding of how the projects operated and to hear the perspectives of multiple stakeholders. The site visits were augmented with conference calls with EMSA's project manager and the site-level project managers. The evaluation team also reviewed minutes of local steering committee meetings and reports that site-level project managers submitted to EMSA's project manager.

This evaluation focuses solely on the community paramedicine pilot projects and does not take into account other changes in health care delivery that may have affected the outcomes observed. This caveat is particularly important for the post-discharge projects. Since Medicare began imposing penalties on hospitals with "excessive" 30-day readmission rates in federal fiscal year 2013,¹ hospitals have deployed multiple strategies to reduce readmissions. These strategies include utilizing registered nurses to provide intensive discharge planning, patient education, and telephone support to patients following hospital discharge.ⁱⁱⁱ Recent research by the Medicare Payment Advisory Commission (MedPAC) suggests that hospitals nationwide are not responding the Medicare penalties by treating patients in EDs or admitting them for observation instead of readmitting them to inpatient care, because increases in observation stays and ED visits have been smaller than the decrease in readmissions and have not differed between patients who were recently admitted and patients who were not recently admitted.^{iv}

¹ Medicare penalizes hospitals that have 30-day readmission rates that exceed the national average adjusted for characteristics of patients who were readmitted and characteristics of the entire population of patients that a hospital serves. Hospitals that exceed this benchmark receive a 3% penalty across all Medicare admissions regardless of whether they resulted in a readmission within 30 days. C. Boccuti and G. Casillas. Aiming at Fewer Hospital U-Turns: The Medicare Hospital Readmissions Reduction Program. Menlo Park, CA: Kaiser Family Foundation, 2017. <http://files.kff.org/attachment/Issue-Brief-Fewer-Hospital-U-turns-The-Medicare-Hospital-Readmission-Reduction-Program>.

To the extent that hospitals participating in the post-discharge pilot projects utilize other strategies to reduce readmissions, it is possible that the findings of the evaluation are due to those strategies and not the post-discharge community paramedicine pilot projects.

Results

The results section begins with a summary of major findings related to all seven community paramedicine concepts. The summary is followed by a discussion of major findings regarding key metrics relevant to individual community paramedicine concepts.

Highlights

- Collectively, the community paramedicine pilot projects enrolled 3,142 people from June 2015 through March 2018.
- The post-discharge projects enrolled the largest number of persons and the tuberculosis project had the smallest enrollment.
- Two new projects opened in 2018.
 - Santa Clara's alternate destination – mental health center project
 - Santa Clara's alternate destination – sobering center project
- One additional project plans to begin enrolling patients as soon as it obtains IRB approval.
- Five projects have closed.
- The majority of patients enrolled in the projects were Medicare or Medi-Cal beneficiaries.

General Project Status

Table 1 lists the lead agencies for each pilot project operated under the auspices of HWPP #173, the concept tested, the date on which the project began enrolling patients, and the total number of patients enrolled from the time each project began through March 31, 2018. The longest running projects, Alameda's post-discharge project and Ventura's tuberculosis project, began enrolling patients in June 2015. The newest project included in this report, San Francisco's alternate destination – sobering center project, began enrolling patients in February 2017.² Santa Clara's alternate destination – mental health project and its alternate destination – sobering center project began enrolling patients in June 2018. Fresno's alternate destination – mental health project plans to begin enrolling patients as soon as IRB approval is obtained. Five projects have closed due to various challenges.

Collectively, the projects enrolled 3,142 people from June 2015 through March 2018. The number of people enrolled per project ranged from a low of two for the City of Carlsbad's Alternate Destination – Urgent Care project to a high of 903 for Butte County's Post-discharge --project.

² An additional project, Santa Clara County's Alternate Destination – Mental Health and Sobering Center project, is not included in this report because it did not begin enrolling patients until June 2018.

Table 1. Pilot Sites, Community Paramedicine Concepts, and Enrollment through First Quarter 2018

Community Paramedicine Concept	Lead Agency	Date Implemented	Total Patients Enrolled
Post-Discharge	Alameda City EMS	June 1, 2015	119
Post-Discharge	Butte County EMS	July 1, 2015	903
Post-Discharge	San Bernardino County and Rialto Fire Depts.	August 13, 2015	217
Post-Discharge	UCLA Center for Prehospital Care*	September 1, 2015	154
Post-Discharge	Medic Ambulance Solano	September 15, 2015	178
All Post-Discharge Projects			1,571
Frequent EMS User	Alameda City EMS	July 1, 2015	68
Frequent EMS User	City of San Diego****	October 12, 2015	46
All Frequent EMS User Projects			114
Tuberculosis	Ventura County EMS	June 1, 2015	44
Hospice	Ventura County EMS	August 1, 2015	325
Alternate Destination – Mental Health	Mountain Valley – Stanislaus EMS	September 25, 2015	310
Alternate Destination – Urgent Care	UCLA Center for Prehospital Care**	September 8, 2015	12
Alternate Destination – Urgent Care	Orange County Fire Chiefs***	September 14, 2015	34
Alternate Destination – Urgent Care	Carlsbad Fire Dept***	October 9, 2015	2
All Alternate Destination – Urgent Care Projects			48
Alternate Destination – Sobering	San Francisco Fire Dept.	February 1, 2017	730
All Projects			3,142

* Ceased enrolling patients on August 31, 2017.

** Ceased enrolling patients on May 31, 2017.

*** Ceased enrolling patients on November 13, 2017.

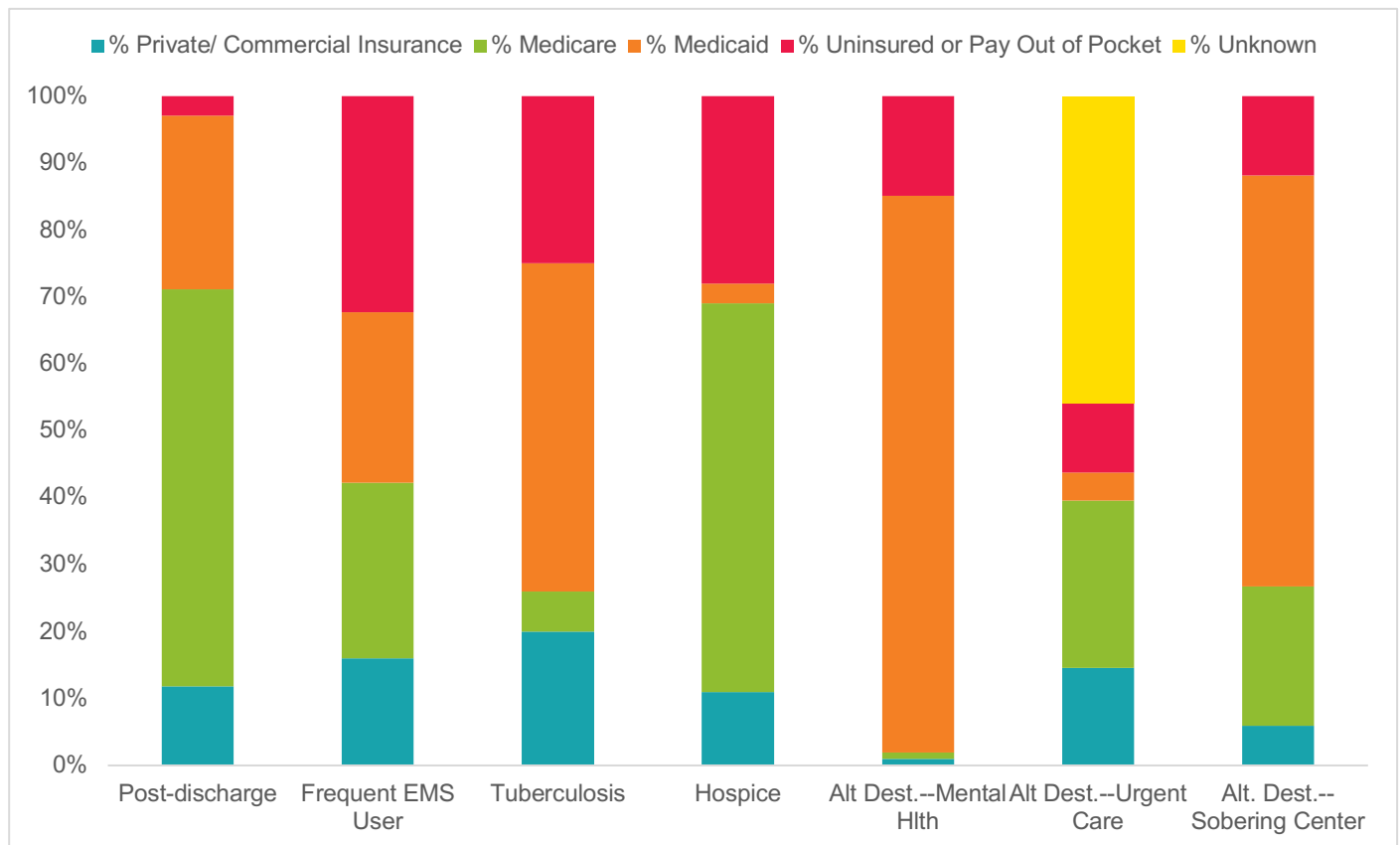
**** Ceased enrolling new patients December 2016.

Consistent with findings from the original evaluation report, the distribution of patients by health insurance status varied substantially across the 14 projects, in large part due to differences in the characteristics of the patients served. Medicare beneficiaries accounted for the largest percentage of patients enrolled by four of the five post-discharge projects (Alameda, Butte, Solano, UCLA – Glendale), one of the frequent EMS user projects

(Alameda), and the hospice project. For one of the post-discharge projects (San Bernardino), Medi-Cal beneficiaries constituted the largest share of enrollees and Medicare beneficiaries accounted for the second largest share. Medi-Cal beneficiaries and uninsured persons comprised the majority of patients enrolled in Ventura's tuberculosis project, San Diego's frequent EMS user project, Stanislaus' alternate destination – mental health project, and San Francisco's alternate destination – sobering center project. Many of the people who these projects serve have mental illness, substance use disorders, or other conditions that limit their access to employer-sponsored health insurance. Persons who are dually eligible for Medicare and Medi-Cal are classified as Medicare beneficiaries because Medicare is responsible for paying the majority of costs associated with their hospitalizations, ED visits, and office visits. Table 2 displays these findings in tabular form and Figure 1 displays them graphically.

Table 2. Health Insurance Status of Enrolled Patients (n =3,142)

Community Paramedicine Concept	Lead Agency	% Private/ Commercial Insurance	% Medicare	% Medi-Cal	% Uninsured or Pay Out of Pocket	% Unknown	Total Persons Enrolled
Post-Discharge	Alameda City EMS	16%	50%	26%	8%	0%	119
Post-Discharge	Butte County EMS	14%	67%	19%	0%	0%	903
Post-Discharge	San Bernardino County and Rialto Fire Depts.	9%	40%	44%	7%	0%	217
Post-Discharge	UCLA Center for Prehospital Care	7%	81%	11%	1%	0%	154
Post-Discharge	Medic Ambulance Solano	8%	47%	42%	2%	0%	178
Frequent EMS User	Alameda City EMS	17%	60%	19%	3%	0%	68
Frequent EMS User	City of San Diego	16%	14%	28%	43%	0%	46
Tuberculosis	Ventura County EMS	20%	6%	49%	25%	0%	44
Hospice	Ventura County EMS	11%	58%	3%	28%	0%	325
Alternate Destination – Mental Health	Mountain Valley – Stanislaus EMS	1%	1%	84%	15%	0%	310
Alternate Destination – Urgent Care	UCLA Center for Prehospital Care	0%	8%	0%	0%	92%	12
Alternate Destination – Urgent Care	Orange County Fire Chiefs	15%	32%	6%	15%	32%	34
Alternate Destination – Urgent Care	Carlsbad Fire Dept.	100%	0%	0%	0%	0%	2
Alternate Destination – Sobering	San Francisco Fire Dept.	6%	21%	62%	12%	0%	730

Figure 1. Enrollees by Insurance Status (n = 3,142)

Post-Discharge

Highlights
<ul style="list-style-type: none"> The post-discharge projects enrolled 1,571 persons from June 2015 through March 2018. One of the post-discharge projects closed in August 2016 because the partner fire department was unwilling to continue funding the project. All of the post-discharge projects reduced the rate of 30-day admission for any cause for at least one of the diagnoses targeted. The four post-discharge projects that provided at least one home visit to all patients outperformed the project that initially relied primarily on telephone calls. Community paramedics identified 266 patients who needed instruction on how to use their medications correctly. The post-discharge projects potentially avoided \$1.4 million in costs by reducing hospital readmissions; most potential savings would have accrued to Medicare and Medi-Cal.

Description

The goal of the five post-discharge projects is to reduce hospital readmissions for people discharged from a hospital for treatment of a chronic condition. A major impetus for the post-discharge projects is the Medicare Readmission Reduction Program, under which Medicare reduces payments to hospitals if they have rates of readmission that are deemed excessive. The projects aim to give patients the tools to manage their conditions more effectively so that they can avoid readmission. In collaboration with its partner hospital, each project identified one or more chronic conditions to address. Once a project enrolls a patient, a telephone call or home visit with a community paramedic is scheduled. During the call or visit, the community paramedic assesses the patient and reviews the patient's discharge instructions per the site's protocols. Some projects also provide home safety inspections during home visits.

The post-discharge projects worked with their partner hospitals to determine which conditions to target. UCLA – Glendale and San Bernardino – Rialto only enroll people with heart failure. Butte enrolls people with heart failure or myocardial infarction, and Solano enrolls people with heart

failure or chronic obstructive pulmonary disease. Alameda enrolls people with heart failure, acute myocardial infarction, chronic obstructive pulmonary disease, diabetes, pneumonia, or sepsis.

The post-discharge projects provide short-term assistance during the immediate post-hospital period and do not replace home health care or any other services available to patients. The sites' protocols call for community paramedics to complete phone calls or visits within the first few days of hospital discharge. Some partner hospitals focus on enrolling uninsured persons and Medi-Cal beneficiaries who do not have insurance coverage for home health. In other cases, community paramedics serve a stop-gap role by providing calls or home visits while patients wait to obtain home health services. Interviewees at partner hospitals consistently indicated that home health agencies in their communities often cannot schedule a home visit until one week after a patient is discharged from the hospital despite the fact that people are at the greatest risk of readmission during the first week after discharge. When community paramedics learn that a patient is receiving home health services, they coordinate with home health agency staff.

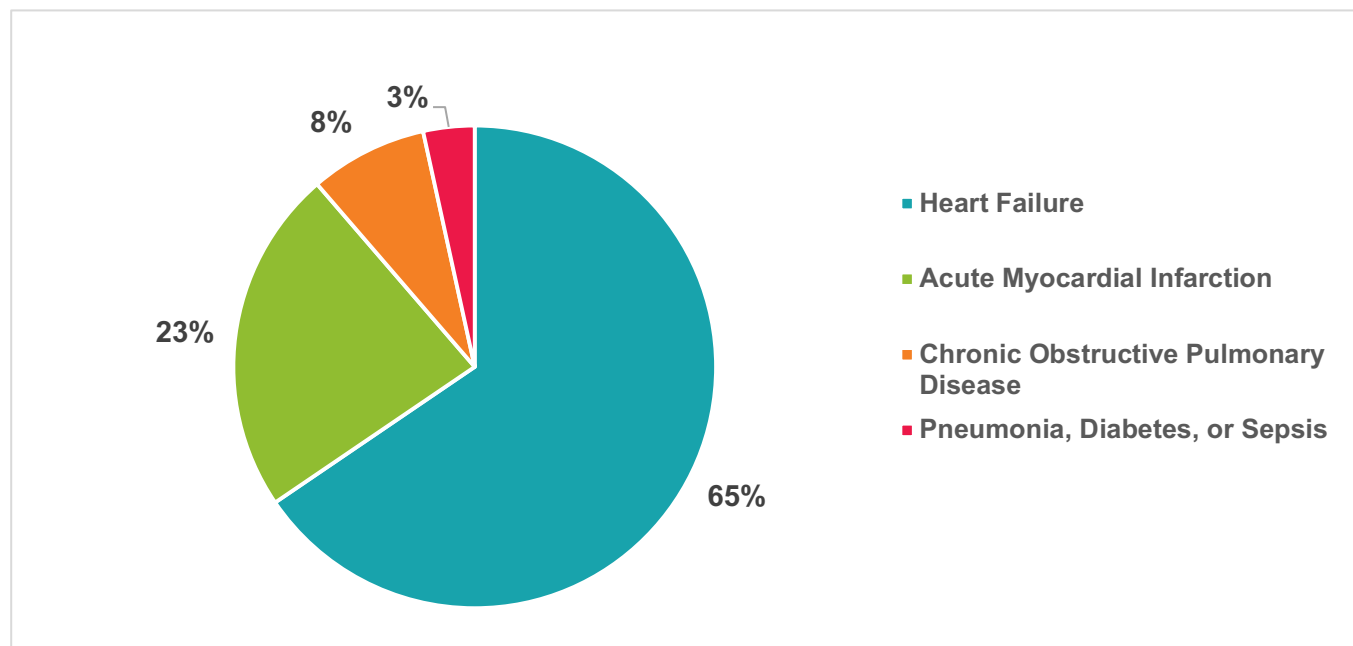
Two projects have full-time community paramedics (Alameda's project and the now closed UCLA-Glendale project) and three projects have part-time paramedics (Butte, San Bernardino-Rialto, and Solano). Since launching their projects, Alameda, San Bernardino-Rialto, and Solano (and formerly UCLA) have provided at least one home visit to all patients. Initially, Butte's protocol called for paramedics perform an initial assessment by telephone for all patients and use an algorithm to determine whether the patient needs additional assistance. If a

Butte community paramedic determined that a patient would benefit from a home visit, the community paramedic requested the patient's permission to do so. Butte's protocol changed effective November 2017. Its community paramedics now provide at least one home visit to all patients. This change was made in response to findings from the evaluation that Butte's project was less effective in reducing readmissions among patients with heart failure than the post-discharge projects that provided patients with at least one home visit.

Findings

The post-discharge projects enrolled 1,571 patients between June 2015 and March 2018. Butte had the largest enrollment (903 patients) and Alameda had the smallest (119 patients). Across the five projects, 65% of patients enrolled had heart failure, 23% had acute myocardial infarction, 8% had chronic obstructive pulmonary disorder, and 3% had pneumonia, diabetes, or sepsis. (Figure 2)

Figure 2. Post-Discharge Project Enrollees by Condition (n = 1,571)



Safety

The evaluation team found no evidence of any harm to patients enrolled in the post-discharge projects. On the contrary, there is substantial evidence that the projects reduced the risk of harm. The most compelling evidence of reduced harm concerns prescription medications. Community paramedics performed medication reconciliation for all patients, which involved examining all prescription drugs in a patient's possession and reconciling them with the instructions given to the patient when he or she was discharged from the hospital. The community paramedics identified 266 instances in which a patient needed additional instructions about how to take their medications as directed. Some patients had multiple prescriptions for the same medication and assumed they were supposed to take all of them. Other patients were discharged from the hospital with only a 30-day supply of medication and did not understand that they needed to obtain refills to control their condition. If a patient had a personal physician, the community paramedic worked with the patient to contact the physician to obtain refills. If a patient did not have a physician, the community paramedic helped the patient find one.

Effectiveness

The post-discharge pilot projects achieved their primary goal of reducing inpatient readmissions within 30 days of discharge. Table 3 shows the historical 30-day readmission rates at the projects' partner hospitals and the 30-day readmission rates for patients enrolled in the post-discharge projects who had heart failure, myocardial infarction, congestive heart failure, or pneumonia. Patients with diabetes or sepsis are not included because historical data on readmission rates for persons with these diseases were not available. Figure 3 displays the data in a graphical format.

Table 3. Readmissions within 30 Days for Post-Discharge Project Enrollees versus Partner Hospitals' 30-Day Readmission Rates, 2012–2015 (Cumulative; n = 1,571)

Diagnosis	Sponsoring Agency	Number of Patients Enrolled	Number Readmitted	Historical 30-day Readmission Rate*	% Enrollees Readmitted*
Heart Failure	UCLA	154	10	24.4%	6.5%**
	Butte	547	158	22.5%	28.9%***
	Alameda	31	4	23.1%	12.9%**
	San Bernardino and Rialto	217	17	23.1%	7.8%**
	Solano	80	6	22.1%	7.5%**
Acute Myocardial Infarction	Butte	356	37	17.2%	10.4%**
	Alameda	8	0	16.8%	0.0%**
Chronic Obstructive Pulmonary Disease	Alameda	26	6	19.4%	23.1%
	Solano	98	8	18.9%	8.2%**
Pneumonia	Alameda	25	3	20.1%	12.0%**

* Includes readmissions for any reason.

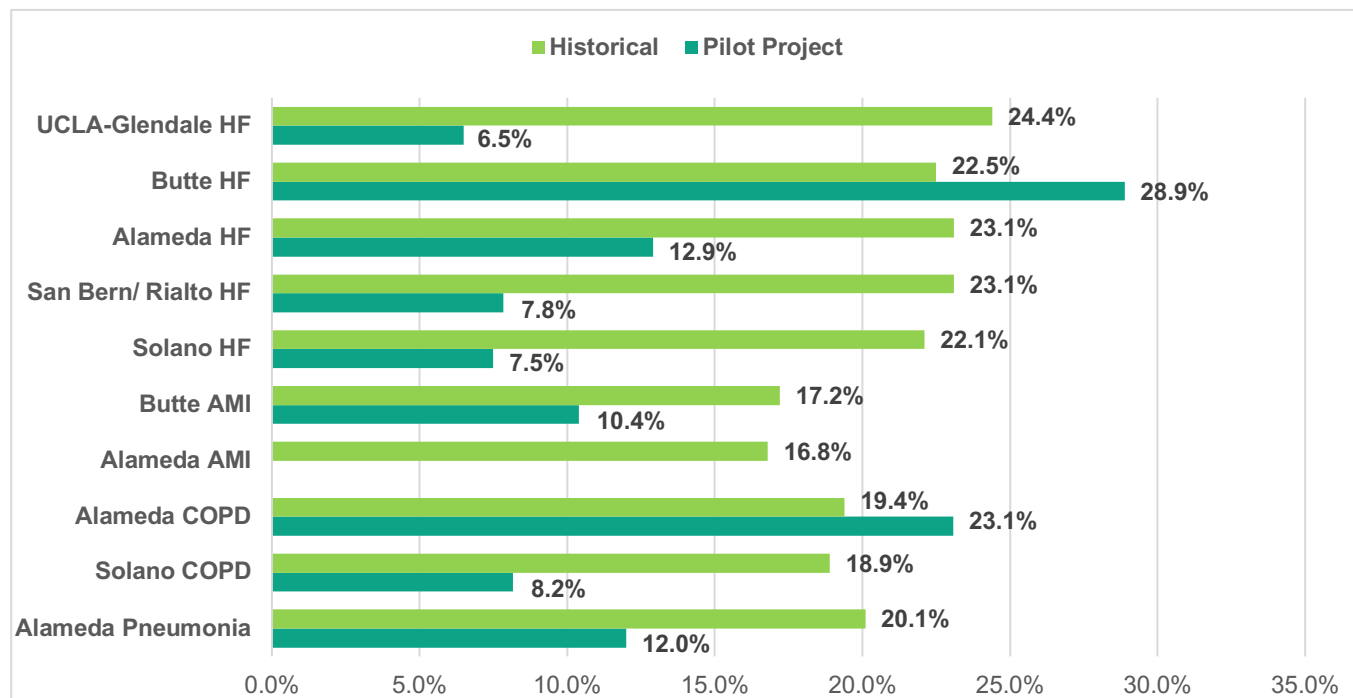
** 30-day readmission rate for enrolled patients was *lower* than the historical 30-day readmission rate.

*** 30-day readmission rate for enrolled patients was *higher* than the historical 30-day readmission rate.

Patients enrolled by all sites had lower rates of 30-day readmission than historical rates for their partner hospitals except Butte's heart failure patients and Alameda's chronic obstructive pulmonary disease patients. A notable difference from the original evaluation report is that the 30-day readmission rate for persons with chronic obstructive pulmonary disease who are enrolled in Alameda's post-discharge project is that there is no longer a statistically significant difference between the 30-day readmission rate for enrollees and the partner hospital's historical average. Butte's heart failure patients were the only group whose 30-day readmission rate has not been consistently at or below the partner hospital's historical rate.

To date, the change in Butte's protocol to require at least one home visit for every patient has not reduced its readmission rate for heart failure patients. Prior to the change in Butte's protocol, the project's 30-day all-cause readmission rate for persons with heart failure was 28.4%; following the change the 30-day all-cause readmission rate for persons with heart failure was 31.2%.

Figure 3. Readmissions within 30 Days for Post-Discharge Project Enrollees versus Partner Hospitals' 30-Day Readmission Rates, 2012–2015 (Cumulative; n = 1,571 Patients)



Another important indicator of the effectiveness of post-discharge projects is referral of patients to providers of other services to improve the patients' well-being. Through March 2018, community paramedics made at least 199 referrals to a wide range of service providers, using manuals of local resources that they prepared as part of their training. These services included primary care physicians, specialist physicians, pharmacists, mental health services, public health departments, home health providers, drug and alcohol treatment programs, senior home safety programs, food assistance agencies, housing assistance providers, transportation assistance agencies, and domestic violence resources. At least one community paramedic helped a patient enroll in Covered California to obtain health insurance. If community paramedics perceived the need as urgent and were concerned that a patient might not follow through on their own, they assisted the patient in obtaining these services.

Potential Savings

All of the post-discharge projects have potentially avoided costs for insurers by reducing 30-day all cause readmissions among the patients they enrolled. Estimates of potential savings are based on differences between rates of readmission among enrolled patients and historical readmission rates obtained from Medicare Hospital Compare and on estimates of the cost of admissions for targeted diagnoses derived from OSHPD's public hospital inpatient discharge dataset. The evaluators estimate that the five post-discharge projects avoided potential costs of approximately \$1.4 million through March 31, 2018. The amount of potential costs avoided ranged from a low of \$88,114 for Alameda's project to a high of \$475,299 for San Bernardino and Rialto's project.

Differences in potential savings across sites reflect differences in the total number of 30-day readmissions avoided and the cost of readmissions. Butte's project realized potential savings despite having a 30-day readmission rate for heart failure that is higher than the partner hospital's historical rate, because it reduced 30-day readmissions for acute myocardial infarction, a diagnosis with a much higher average cost per admission than heart failure (\$26,621 vs. \$14,403). Potential savings generated by Alameda's project may have been greater than the estimate reported because savings associated with reductions in admissions for diabetes and sepsis could not be estimated, since Medicare Hospital Compare does not report data on historical rates of readmission for these conditions.

The majority of potential savings associated with the post-discharge projects would have accrued to Medicare because 61% of patients enrolled are Medicare beneficiaries. Potential savings would also have accrued to Medi-Cal because 25% of enrollees are Medi-Cal beneficiaries. Partner hospitals also may have benefitted if reductions in readmissions were sufficient to avert a Medicare penalty for excessive readmissions.

Table 4. Potential Savings for Post-discharge Projects

	UCLA - Glendale	Butte	Alameda*	San Bernardino and Rialto	Solano
Total Enrollment	154	903	119	217	178
Difference in Readmission Rates (percentage points)	-17.9	+1.2	-6.2	-15.3	-12.5
Number of Readmissions Avoided	Heart failure = 28	Heart failure = -35 AMI = 24	Heart failure = 3 AMI = 1 COPD = -1 Pneumonia = 2	Heart failure = 33	Heart failure = 12 COPD = 11
Average Cost of Readmission	Heart failure = \$14,403	Heart failure = \$14,403 AMI = \$26,621	Heart failure = \$14,403 AMI = \$26,621 COPD = \$11,562 Pneumonia = \$14,923	Heart failure = \$14,403	Heart failure = \$14,403 COPD = \$11,562
Total Potential Savings from Readmissions Avoided	\$403,284	\$134,799	\$88,114	\$475,299	\$300,018
Potential Savings per Enrollee	\$2,619	\$149	\$740	\$2,190	\$1,685

* Savings estimate does not include 31 Alameda patients who had diabetes or sepsis because Medicare Hospital Compare does not report historical 30-day readmission rates for these conditions.

An important limitation of this analysis is that it does not taken into account repeat visits to an ED within 30 days of hospital discharge or use of observation status. If the community paramedicine projects were associated with an increase in repeat ED visits or use of observation status, potential net savings associated with the post-discharge projects would be lower. Effects on ED visits within 30 days were not discussed due to a lack of readily available data on repeat ED visits to partner hospitals by persons who were eligible for the program but not enrolled. Medicare Compare, the source of historical data on 30-day readmission rates at partner hospitals does not report rates of ED visits within 30 days of discharge.

The evaluation team did not compare 30-day ED revisit rates for participants to 30-day ED revisit rate reported in studies conducted in other hospitals, because the hospitals included in such studies may have patient populations that differ from those of participating hospitals in ways that could affect our conclusions. We did not attempt to assess the number of patients placed on observation status, because these patients can be difficult to track due to inconsistencies in availability of data on patients placed on observation status and the methods used to identify them.^v Furthermore, recent research by the Medicare Payment Advisory Commission (MedPAC) finds that nationwide increases in observation stays and ED visits have been smaller than the decrease in readmissions.^{iv} If the hospitals that participated in the post-discharge projects are similar to hospitals nationwide, observation stays and ED visits are not fully offsetting the reductions in readmissions that we observed.

Conclusion

The post-discharge projects have demonstrated capability to reduce hospital readmissions within 30 days among persons with the chronic conditions they target. The projects also increased the likelihood that patients will take medications for these conditions as directed, by reconciling their prescriptions, reviewing the instructions for taking the medications, and assisting patients with medication refills, if needed. Moreover, community paramedics have referred patients to providers of other services that can improve their ability to manage their conditions and their overall well-being. The projects potentially avoided costs, primarily for the Medicare and Medi-Cal programs.

Frequent EMS User

Highlights	Description
<ul style="list-style-type: none"> The two frequent EMS user projects enrolled 114 persons between July 2015 and March 2018. The San Diego project has not enrolled any new patients since December 2016 because its community paramedics were reassigned to traditional 911 response crews. Effective January 2018, the project manager was also reassigned, ending the project. The projects potentially avoided costs of \$582,000 by, reducing ambulance transports and ED visits. A substantial share of potential savings accrued to ambulance transport agencies and hospitals because a large percentage of patients were uninsured. 	<p>The two frequent EMS user projects enroll people who call 911 and/or who have ED visits frequently and whose use of emergency services is not routinely warranted by their medical condition. The goal of these projects is to reduce frequent EMS users' dependence on EMS agencies and EDs for care. Community paramedics assess patients' physical, psychological, and social needs and provide individualized case management to link them with nonemergency services. Patients remain enrolled in the projects until community paramedics believe that the patients no longer need the project's services. Criteria for determining that a patient no longer needs services emphasize reaching important individual milestones, such as obtaining housing or maintaining sobriety.</p>

Findings

The two Frequent EMS User projects enrolled 114 patients from July 2015 through March 2018. The two projects enroll different populations of frequent EMS users. San Diego's project primarily enrolled persons with 20 or more ED visits per year. Alameda's project, which serves a city whose population is much smaller than San Diego's (79,227 vs. 1,391,676),^{vi} is open to all persons referred by staff of the EMS agency or the partner hospital. San Diego's enrollees were younger than Alameda's enrollees and were more likely to be uninsured or enrolled in Medi-Cal.

Safety

The evaluation team found no evidence of any harm to patients enrolled in the frequent EMS user projects. On the contrary, there is substantial evidence that patients benefitted from the projects. The community paramedics visited patients multiple times to assess their physical, psychological, and social needs and assist them in obtaining nonemergency services to meet their needs, as discussed below in the section on effectiveness.

Effectiveness

The frequent EMS user projects achieved large reductions in the number of 911 calls and ED visits among enrolled patients. Reductions in 911 calls were highly correlated with reductions in ED visits, because most 911 calls for frequent EMS users result in transport to an ED. Data on 911 calls were examined to estimate the projects' impact for persons enrolled in both frequent EMS user projects for whom data were available for at least

12 months prior to enrollment and for at least 12 months following enrollment. Data on 911 calls and ED use during the month of enrollment were not analyzed to allow time for the intervention to affect patients' utilization.

Among persons enrolled in San Diego's frequent EMS user project during the time at which the community paramedics were on duty (November 2015 through December 2016) and for whom data are available for 12 months prior to enrollment and 12 months following enrollment ($n = 37$) the total number of 911 calls decreased from 955 to 625, a decrease of 35%. The average number of 911 calls per person decreased from 26 per year to 17 per year and some enrollees had much larger decreases in 911 calls. Among persons enrolled in Alameda's frequent EMS user project for whom data are available for 12 months prior to enrollment and 12 months following enrollment ($n = 37$) the total number of 911 calls decreased from 134 to 111, a decrease of 17%. In Alameda, the average number of 911 calls per person decreased from four calls per year to three calls per year. The difference in impact between the two projects reflects differences between the persons enrolled. San Diego's clients had substantially more 911 calls prior to enrollment than Alameda's clients and, thus, there was greater room for improvement.

The frequent EMS user projects also succeeded in linking patients to services that address the needs that led them to make frequent ED visits. During their first visits with patients, community paramedics in Alameda and San Diego reported making 60 referrals to medical care providers, mental health providers, drug and alcohol treatment programs, food assistance programs, housing assistance programs, transportation assistance programs, domestic violence resources, and other social services. They may have made additional referrals during subsequent visits because some patients were not interested in referrals initially. In addition, community paramedics transported patients to these types of providers on 50 occasions to ensure that they obtained services. In some cases, community paramedics collaborated with staff of multiple service providers to go beyond routine care to meet patients' complex needs.^{vii}

Providing assistance with housing is an important component of frequent EMS user projects because many frequent EMS users are homeless. Among the 46 patients enrolled in San Diego's frequent EMS user project, 33 patients (72%) were homeless. Community paramedics are uniquely positioned to assist homeless persons because they are often familiar with the patient already. They are also mobile and can be dispatched or consulted when one of their enrolled patients contacts 911, and they are familiar with the sites at which homeless persons congregate and can meet patients at any location.

San Diego's project encountered challenges that constrained its ability to meet patients' needs. In December 2016, the community paramedics working on San Diego's project were reassigned to traditional 911 response crews. The project manager and an emergency medicine fellow operated the program to the best of their ability but they were not able to manage clients as intensively as the community paramedics had. The project manager was reassigned effective January of 2018, ending the program.

Potential Savings

Among persons enrolled in San Diego's project during the months in which community paramedics were on duty (November 2015 through December 2016) and for whom 12 months of data on 911 calls pre- and post-enrollment were available, the project reduced the number of 911 calls and ED visits by 330, avoiding potential costs of \$551,760. (See Table 5.) A substantial percentage of potential savings from the reduction in ED visits would have accrued to ambulance transport providers and hospitals because 43% of San Diego's enrollees were uninsured. From July 2015 through March 2018, Alameda's frequent EMS user project avoided potential costs of \$31,096. The majority of potential savings by Alameda's project would have accrued to Medicare because the majority of its patients are Medicare beneficiaries.

Table 5. Potential Savings Associated with Frequent EMS User Projects

Variable	Amount	
	Alameda	San Diego
Total Enrollment	68	46
Number of Enrollees with 12 Months of Data on 911 Calls Pre and Post Enrollment	37	37
Number of Transports and ED Visits Avoided	23	330
Average Cost of Ambulance Transport	\$603	\$923
Average Cost of ED Visit	\$749	\$749
Potential savings from Ambulance Transports Avoided (patients with 12 months pre-post data)	\$13,869	\$304,590
Potential savings from ED Visits Avoided (patients with 12 months pre-post data)	\$17,227	\$247,170
Total Potential Savings (patients with 12 months pre-post data)	\$31,096	\$551,760
Potential Savings per Patient Enrolled (patients with 12 months pre-post data)	\$840	\$14,912

Conclusion

The frequent 911 user projects have achieved substantial reductions in 911 calls, transports, and ED visits among the patients they have enrolled, often by linking patients with primary care, behavioral health, food, housing, and social services. These reductions in 911 calls, transports, and ED visits have potentially avoided costs for public health insurance programs (i.e., Medicare and Medi-Cal) and health care providers.

Directly Observed Therapy for Tuberculosis

Highlights	Description
<ul style="list-style-type: none"> The directly observed therapy for tuberculosis project has enrolled 44 persons between June 2015 and March 2018. The community paramedics dispensed all but two (0.05%) doses of TB medications prescribed by the TB clinic's physician. One patient was hospitalized twice for intravenous treatment of TB meningitis that was diagnosed prior to enrollment in the pilot project. Eleven other patients were hospitalized for reasons unrelated to their TB. 	<p>Tuberculosis (TB) is a highly contagious disease treated with special antibiotic medications. A physician with expertise in TB treatment determines the number of medications and frequency of dosing. People with TB must take their medication as directed, because stopping treatment too soon or missing doses of medication could lead to development of a drug-resistant strain of TB, which poses a major public health risk to a community.^{viii} To ensure that people with TB take their medication as directed, TB treatment clinics often provide directly observed therapy (DOT). Under DOT, a health care worker gives a patient medication, observes the patient taking the medication, and monitors the patient for side effects.</p> <p>In Ventura County, public health officials asked the county's EMS provider to collaborate with the TB clinic</p>

to provide DOT, because the TB clinic does not have sufficient staff to provide DOT to all TB patients in the county. Ventura covers a large geographic area and it is not feasible for some patients to travel to the TB clinic for DOT. The TB clinic utilizes community health workers (CHWs) to administer DOT at remote locations, but the CHWs only work Mondays through Fridays and thus do not provide DOT on weekends. In addition, the CHWs are based in Oxnard, where the TB clinic is located, and have to drive as long as 60 minutes to reach some patients. In contrast, the community paramedics are available 24 hours per day seven days per week and are stationed throughout the county, so they usually can reach patients within 15 minutes.

Findings

Ventura's TB project enrolled 44 patients through March 2018. Because the management of tuberculosis often spans six to nine months,^{vi} the community paramedics usually carry a caseload of patients whom they treat for multiple months. Over the course of the pilot project, the community paramedics' caseload averaged seven patients per month.

TB clinic leaders indicated that there were conscious decisions to assign patients to either community paramedics or CHWs based on the likelihood that patients would comply with treatment. They often assigned patients to community paramedics who resist treatment or who were verbally abusive or sexually inappropriate because paramedics have more experience and training than the CHWs in managing persons with challenging behavior. They were also more likely to be assigned homeless persons and other patients who are difficult to locate.

Safety

The evaluation team found no evidence that the TB project harmed patients. Community paramedics dispensed appropriate doses of TB medications, and their TB patients did not experience any greater frequency of side effects or symptoms beyond those typically associated with taking TB medications.

Twelve patients enrolled in the pilot project have been hospitalized. One patient was hospitalized twice for TB meningitis, which had been diagnosed prior to enrollment in the program. The other eleven patients were hospitalized one time for a reason other than their TB diagnosis; one hospitalization was for a scheduled surgical procedure.

Effectiveness

People with TB who received DOT from community paramedics were more likely to receive all doses of TB medication prescribed by the TB clinic physician than people who received DOT from the TB clinic's CHWs. Since the project was launched in June 2015, the community paramedics were unable to dispense only two (0.05%) DOT treatments prescribed by the TB clinic physician (Table 6). In contrast, the CHWs were unable to dispense 851 (7.0%) prescribed DOT treatments. This difference is due primarily to the availability of community paramedics on nights and weekends. Availability on weekends ensures that patients have DOT seven days per week if needed, and availability in evenings improves compliance among patients who travel outside of Ventura County for work during business hours. Taking all recommended doses of TB medications as prescribed increases the likelihood that a patient will be cured and will not spread TB to others. It also decreases the risk that the patient could develop a drug-resistant strain of TB that would be much harder to treat and to control in the community.

Community paramedics also helped patients address health care needs other than TB. For example, some TB patients also have diabetes, which is associated with worse outcomes of TB treatment, especially if it is not well controlled. One TB patient treated by community paramedics had severely impaired vision and had difficulty filling syringes with the prescribed amount of insulin. The community paramedics found a local pharmacy that would prefill syringes for the patient to ensure that he would receive the correct dose.

Table 6. Instances of Non-Completion of Directly Observed Therapy among Patients Treated by Community Paramedics (Cumulative)

	Community Paramedic Patients	TB Clinic Patients
Number of Times Community Paramedic Could Not Complete Scheduled DOT	2 (0.05%)	851 (7.0%)
Reasons Why Patient Did Not Complete Treatment	One patient went out of town without making prior arrangements for the DOT. The other was not home at the scheduled time and did not respond to phone calls in a timely manner.	Most missed doses occur on holidays and weekends when the TB clinic was closed and CHWs were not available to treat patients outside the clinic.

Potential Savings

There was a small increase in adherence to the prescribed TB medication schedule when community paramedics administered DOT instead of CHWs, but we cannot estimate the effect of increased adherence in this range in the United States. If the project substantially increased adherence among hard-to-reach patients, the project may have increased the number of patients in Ventura treated successfully for TB and, thus, reduced medical and public health expenditures associated with public health investigation to identify, test, and treat close contacts of people who did not complete treatment. The project also reduced the need for CHWs to travel long distances to provide DOT, increasing their availability to complete other tasks.

Conclusion

Community paramedics can safely administer DOT for TB and monitor patients for side effects, under the direction of a physician who specializes in treatment of TB and in collaboration with public health nurses. Due to their unique schedule and mobility, they can achieve a very high rate of adherence to TB treatment, augmenting the resources of the public health clinic and reducing the risk that patients will develop a drug-resistant strain of TB and transmit it to other persons. They can also assist with patients' other social and medical needs that might create barriers to TB treatment.

Hospice

Highlights
<ul style="list-style-type: none"> The hospice project enrolled 325 persons between August 2015 and March 2018. Community paramedics collaborate successfully with nurses on the staffs of partner hospices to provide care consistent with patients' wishes. The percentage of patients of partner hospices transported to an ED after a 911 call decreased from 80% prior to the pilot project to 28% during the pilot project. The project has potentially avoided costs of \$255,021 by reducing ambulance transports and ED visits.

Description

The goal of hospice care is to provide medical, psychological, and spiritual support to persons dying from a terminal illness in a patient's home, a residential care facility, a nursing home, or an inpatient hospice facility. Hospice staff members tell hospice patients, their family members, and other caregivers to contact the hospice instead of 911 if they believe there is a medical need or if they become concerned about the patient's comfort. Despite this instruction, some hospice patients and their families call 911 instead of the hospice.

The standard response to a 911 call made on behalf of a hospice patient is to transport the patient to an ED, which may be upsetting and uncomfortable for hospice patients. In addition, clinicians in EDs may perform medical interventions that the hospice patient would prefer not to receive and may admit the hospice patient for inpatient

care. Moreover, insurers may revoke hospice benefits if the patient receives treatment or hospitalization for their terminal illness that is incompatible with the hospice approach of comfort care.

Ventura County's hospice project seeks to prevent transports that are not consistent with hospice patients' wishes. This is especially important for hospice patients who reside in a residential care or skilled nursing facility. In those facilities, staff may call 911 without discussing the decision with the patient or family members.

In Ventura, if a 911 dispatcher or a first responder on scene determines that a person is under the care of a hospice agency participating in the pilot project, the dispatcher or first responder requests that a community paramedic come to the patient's home, which may be in a private residence, residential care, or skilled nursing facility. The community paramedics are supervisors who can respond to hospice calls while other paramedics respond to different 911 calls.

Once on scene, the community paramedic assesses the patient, talks with family members and caregivers, and contacts a registered nurse employed by the hospice agency. The hospice nurse directs the community paramedic regarding what care to provide. Depending on the circumstances, the hospice nurse may ask the community paramedic to wait with the patient, family members and/or caregivers until the nurse can arrive on scene. The hospice nurse may also ask the community paramedic to administer pain medications to the patient that the hospice has provided in a "comfort care" pack. ***No hospice patient who requests transport to an ED is denied transportation.***

Findings

Ventura's hospice pilot project responded to 325 calls made on behalf of patients of participating hospice agencies. Hospice patients, family members, or staff of residential or skilled nursing facilities in which hospice patients resided initiated most 911 calls, but hospice nurses made some 911 calls during visits with patients. The reasons for 911 calls to which Ventura's community paramedics responded varied and included altered level of consciousness, cardiac arrest, constipation, fall, seizure, shortness of breath, syncope, and family concern about hospice care.

Safety

The evaluation found no evidence that the hospice project harmed patients. After an assessment to determine that the patient could remain at home under hospice care, the community paramedics' work consisted primarily of providing emotional support to hospice patients and their families and administering medications in patients' "comfort care" packs as directed by a hospice nurse until the hospice nurse could arrive and further evaluate the patient.

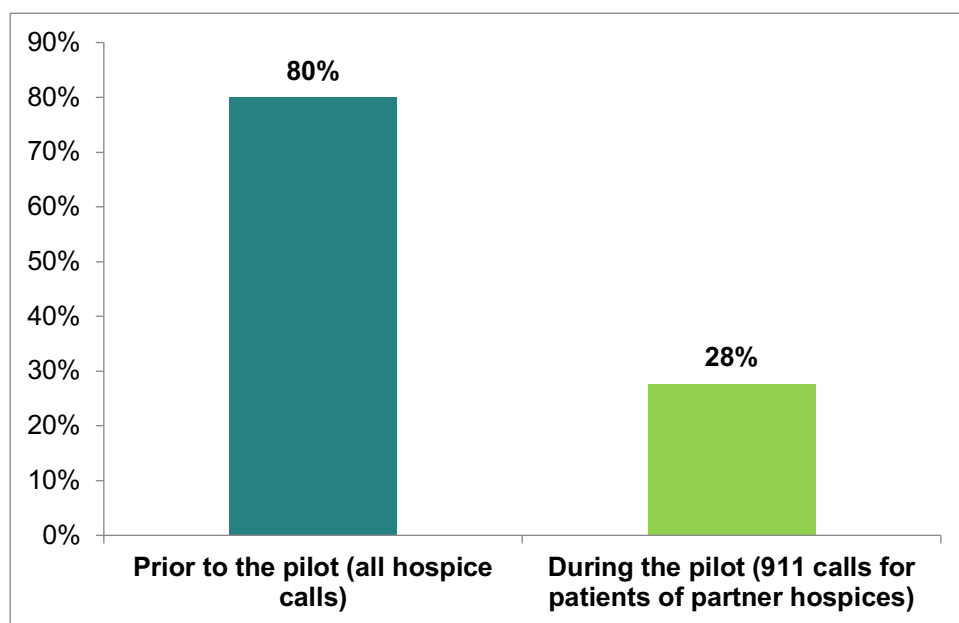
The hospice project reduced harm by honoring patients' wishes and reducing the likelihood that they would experience an undesired and uncomfortable trip to the ED and potentially lose hospice benefits. Community paramedics worked with patients, families, and hospice nurses to avoid ED transports, unless a patient requested transport or had a medical need that could not be met in the patient's home, such as a fracture. No patient was denied ED care when it was indicated and consistent with his or her wishes.

Effectiveness

The project achieved its goal of honoring patients' wishes to remain in their homes by integrating EMS and hospice protocols. Figure 4 shows the impact of the pilot project on the percentage of 911 calls for hospice patients that resulted in transport of the patient to an ED. Prior to the launch of the pilot project, 80% of 911 calls for hospice patients resulted in the transport of a patient to an ED.³ Among patients of partner hospices, the percentage of patients transported decreased to 28% after the pilot project was implemented. Although data on hospice revocation rates prior to the pilot project are not available, it is very likely that the large reduction in ED transports also led to a reduction in the percentage of patients of partner hospices whose benefits were revoked.

Community paramedics also alerted hospices and family members to patients' unmet needs for additional assistance. For example, the project's very first hospice call involved a patient who had fallen during the night while walking to the bathroom. With the patient's permission, the community paramedic who responded to the call contacted a family member who arranged for the patient to have a caregiver at night as well as during the day to assist her with toileting and other needs.^{ix}

³ The 80% rate of transport to an ED prior to the launch of the pilot project differs from the rate that AMR Ventura reported in its proposal to participate in the pilot project (42%). The 42% rate was based on a manual search of electronic records for 911 calls on which a specific box had been checked. The 80% estimate is derived from an electronic search of AMR Ventura's records to identify all records in which the term "hospice transport" appeared. The evaluation uses the latter rate because it reflects the results of a more thorough search of AMR Ventura's records.

Figure 4. Percentage of 911 Calls for Hospice Patients That Result in Transport to an ED (Cumulative)**Potential Savings**

As indicated in Table 7, the hospice project avoided potential costs of \$255,021 (\$785 per patient enrolled). These estimates are based on reductions in ambulance transports to an ED and ED visits. Potential savings could be higher than these estimates because some hospice patients who were transported to an ED were probably admitted to a hospital for inpatient care. However, cost avoidance associated with inpatient admissions could not be estimated because the pilot project was unable to obtain data from hospitals in Ventura County on the number of enrolled hospice patients who were transported to their EDs who were subsequently admitted to their hospitals.

Table 7. Potential Savings Associated with the Hospice Community Paramedicine Project

Variable	Amount
Total Number of Patients Enrolled	325
Total Number of ED Visits Avoided (# if baseline rate persisted - # ED visits during pilot project)	169
Average Cost of ED Transport Avoided	\$520
Average Cost of ED Visit Avoided	\$989
Potential Savings from ED Transports Avoided	\$87,880
Potential Savings from ED Visits Avoided	\$167,141
Total Potential Savings	\$255,021
Potential Savings per Patient Enrolled	\$785

Conclusion

The hospice project demonstrates that community paramedics can partner with hospice nurses to safely reduce the number of hospice patients unnecessarily transported to an ED. Reducing ED transports increases the health care system's ability to honor the wishes of hospice patients, reduces the risk that they will lose their hospice benefits, and potentially reduces health care costs.

Alternate Destination – Mental Health

Highlights
<ul style="list-style-type: none"> The alternate destination – mental health project enrolled 310 persons between September 2015 and March 2018. The project has enabled persons with mental health needs to obtain mental health services more quickly. In addition to 911 calls involving patients with mental health needs, the community paramedics have begun performing medical screening examinations for “walk-in” clients who come to the mental health crisis center for treatment. 97% of patients transported to the mental health crisis center were treated safely and effectively and no patients experienced adverse outcomes. Nine persons (3%) were transferred to an ED within six hours of transport to the mental health crisis center. Most transfers occurred during the first months of operation. The project has potentially avoided \$331,100 in costs by reducing ED visits for medical clearance and subsequent ambulance transports to a mental health facility. Additional costs potentially could have been avoided if the county's inpatient mental health facility had more inpatient beds.

Description

Many EDs in California are overcrowded. Some of the people they serve can be treated safely and effectively in other settings, including some who arrive at EDs via ambulance. Alternate destination pilot projects focus on transporting such patients to settings in which they can obtain appropriate care more efficiently. In California, the need for alternatives is particularly critical for people with mental health needs. Since 1995, the number of beds in inpatient psychiatric facilities in California has decreased by nearly 30%.^x Patients with mental health needs routinely spend hours in an ED waiting for medical clearance. In some cases, they spend days in an ED waiting for a bed to become available in an inpatient psychiatric facility, without getting definitive mental health care.^{xi} Nationwide, the mean length of ED visits is longer for psychiatric patients than medical patients (194 minutes vs. 138 minutes), and psychiatric patients are more likely to have stays in an ED lasting greater than 24 hours^{xii}

The community paramedics participating in the Stanislaus County pilot project provide medical clearance for people with mental health needs and arrange for them to be transported directly to a county-operated mental health crisis center. Community paramedics are dispatched in response to 911 calls that a dispatcher believes involve a mental health problem, or when another paramedic or a law enforcement officer identifies a patient as having mental health needs. The community paramedics respond to these calls as needed in addition to responding to traditional 911 calls.

Once on scene, a community paramedic assesses the patient to determine whether he or she has any medical needs or is intoxicated due to alcohol or drug consumption. If the patient has no emergent medical needs, is not intoxicated, and is not violent, the community paramedic contacts the mental health crisis center to determine whether the county inpatient psychiatric facility located next door to the crisis center has beds available. If the inpatient psychiatric facility has the capacity to accept the patient through the crisis center, the community paramedic gives the patient the option to be transported by ambulance to the mental health crisis center instead of an ED. The only exceptions are patients who the crisis center staff decline to admit because their behavior was disruptive during past visits to the crisis center; such patients are always transported to an ED.

After a patient arrives at the crisis center, mental health professionals on the crisis center staff evaluate the patient further to determine what mental health services he or she needs. Eligibility for the pilot project is limited to adults who are uninsured or enrolled in Medi-Cal because the county inpatient psychiatric facility does not accept

patients with other types of health insurance. A private psychiatric facility is available to persons in Stanislaus County who have Medicare or commercial health insurance.

In recent months, the mental health crisis center staff have asked community paramedics to provide medical screening to “walk in” clients (i.e., persons not transported by ambulance). In the past, the crisis center had relatively few walk-in clients and these clients were sent to a nearby ED for medical clearance. As the volume of walk-in clients has increased, the mental health crisis center staff has requested that the community paramedics come to the crisis center to screen clients. This has enabled clients to obtain medical screening more quickly and begin mental health treatment more quickly, if they do not have any acute medical needs.

Findings

Stanislaus's alternate destination – mental health project enrolled 310 persons from September 2015 through March 2018. Many patients enrolled in recent months were “walk in” clients who come to the mental health crisis center for care. The crisis center's protocol requires screening these patients for medical needs prior to admission to the crisis center.

Safety

The evaluation team found no evidence of patient harm caused by the alternate destination – mental health project. The community paramedics accurately screened patients to determine which of them could be safely transported directly to the mental health crisis center. Only nine of patients enrolled in the project (3%) were transferred to an ED within six hours of arrival at the crisis center.

Table 8 lists the reasons why the nine patients were transferred to an ED. None of the transfers to an ED involved life-threatening conditions and none of the patients transferred were admitted for inpatient medical care. Seven of these nine patients were subsequently transferred to an inpatient psychiatric facility. The other two patients were discharged from an ED without transfer. Eight of the nine transfers occurred during the first six months in which the project was in operation. The sharp decrease in transfers reflects the efforts of the project's medical director to develop protocols and screening methods that maximized the likelihood that the mental health crisis center would accept patients.

Table 8. Reasons for Transfer to an ED within Six Hours of Admission to Mental Health Crisis Center (9 of 310 Patients)

Reason for Transfer to an ED	Number of Patients
Agitation	2
Blood pressure above the mental health crisis center's threshold	2
Urinary incontinence	2
Patient had sleep apnea, and the county inpatient psychiatric facility did not have a continuous positive airway pressure (CPAP) machine	1
Change in patient condition	1
No capacity at psychiatric hospital	1
Total	9

The alternate destination – behavioral health project has also improved public safety. Law enforcement officers interviewed by the evaluation team stated that having community paramedics available enhanced their ability to respond effectively to persons with mental health needs because community paramedics are better prepared to address mental health needs and can arrange ambulance transports for mental health patients. This allows law enforcement officers to return to other law enforcement duties instead of transporting patients to an ED in their squad cars and waiting in the ED to transfer responsibility for the patient to a clinician.

Effectiveness

The pilot project substantially reduced the rate at which 911 calls involving patients with mental health needs resulted in a transport to an ED for medical screening. After the pilot project was implemented, 28% of mental health patients (n = 310) were transported to the mental health crisis center instead of an ED. An additional 27% (n = 300) met the eligibility criteria and could have been transported to the crisis center if additional beds were available in the county's inpatient psychiatric facility or if the crisis center accepted patients who have a form of health insurance other than Medi-Cal. The community paramedics also determined that 429 people (38% of people assessed) were not eligible for transport to the mental health crisis center because they had a medical need, had vital signs outside parameters for admission to the crisis center, were intoxicated, violent, agitated, or over age 65 years. Five percent (n = 56) met the medical criteria for admission to the mental health crisis center but were not admitted due to a history of disruptive behavior during previous admissions to the crisis center. Only two percent of eligible patients (n = 25) did not consent to be transported to the mental health crisis center.

The pilot project also reduced the time to treatment by a mental health professional, which improved patients' well-being. A mental health professional assessed people transported directly to the mental health crisis center within minutes of arrival. In contrast, people initially transported to an ED had a much longer wait for a medical screening evaluation before they were transported to an inpatient psychiatric facility to be assessed by a mental health professional.

Potential Savings

As indicated in Table 9, the alternate destination – mental health project potentially avoided an estimated \$331,100 in costs (\$1,068 per patient) because transporting a mental health patient to the crisis center avoids an ED visit and a secondary transport of a patient from an ED to an inpatient mental health facility. Most of these potential savings would have accrued to the Medi-Cal program because 84% of patients enrolled in the project were Medi-Cal beneficiaries.

Table 9. Potential Savings Associated with the Alternate Destination – Mental Health Project

Variable	Amount
Total Number of Patients Enrolled	310
Total Number of ED Visits Avoided	301
Average Cost of ED Transport Avoided	\$554
Average Cost of ED Visit Avoided	\$546
Potential Savings from ED Transports Avoided	\$166,754
Potential Savings from ED Visits Avoided	\$164,346
Total Potential Savings	\$331,100
Potential Savings per Patient Enrolled	\$1,068

Conclusion

The alternate destination – mental health project demonstrates that community paramedics can perform medical screening examinations for persons with mental health needs and determine which of them can be transported directly to a mental health crisis center. Transporting these persons directly to a crisis center enables them to obtain mental health services more quickly, which is likely to improve their well-being. The project also potentially avoids health care costs by reducing the numbers of persons transported to and assessed in an ED. Most of these potential savings would accrue to Medi-Cal because most persons participating in this project are Medi-Cal beneficiaries.

Alternate Destination – Urgent Care

Highlights
<ul style="list-style-type: none"> The three alternate destination – urgent care projects enrolled 48 patients between September 2015 and November 2017. All three of the alternate destination – urgent care projects closed in 2017 due to low enrollment. Most patients enrolled had a laceration or an isolated closed extremity injury. Patients did not experience any adverse outcomes. Two patients (4%) were transferred to an ED within six hours of admission to an urgent care center; nine (19%) were rerouted to an ED because the urgent care center declined to treat the patient. The projects potentially avoided costs of \$3,640 because insurers pay urgent care centers less than EDs for treatment of eligible conditions.

Description

Three pilot projects offered patients who have minor injuries or minor medical conditions the option of transportation to an urgent care center, instead of to an ED for evaluation by a physician. Urgent care centers are walk-in clinics that treat persons with illnesses or injuries that can be evaluated and treated safely without the full range of resources available in an ED. California does not license urgent care centers as a distinct category of health care provider; they operate under the licenses of hospitals or of the physicians who operate them.^{xiii} This means that there are no requirements regarding operating hours, equipment, or the types of medical services provided.

All three alternate destination – urgent care projects enrolled patients who had any of the following five conditions: isolated closed extremity injury, laceration with controlled bleeding, soft tissue injury, isolated fever or cough, and other minor injury. One site, Carlsbad, also enrolled patients who had generalized weakness. Patients were screened by paramedics on 911 response crews who were trained to use a protocol that was developed by emergency physicians

to determine whether transporting a patient to an urgent care center was an appropriate option. The protocols excluded patients with medical conditions that were emergent, complex, or inappropriate for transport to an urgent care center.

If paramedics concluded that a patient could be treated safely at an urgent care center, the paramedics offered transport to an urgent care center approved by the jurisdiction's local emergency medical services agency (LEMSA). Urgent care centers approved by the LEMSAs were required to provide respiratory therapy treatments, x-rays, and point of care laboratory testing for blood and urine and to have an automated external defibrillator.

Patients who declined to be transported to an urgent care center were transported to an ED. After transporting a patient to an urgent care center, paramedics were available to reroute the patient to an ED if a clinician at the urgent care center determined that the urgent care center could not treat the patient safely and appropriately. ***It is important to note that these projects did not involve evaluation and release of patients by paramedics. All patients were transported to a facility where they were evaluated by a physician.***

Findings

Forty-eight persons were enrolled in the three alternate destination – urgent care projects through November 2017. Orange County's project had the largest enrollment (34 patients) and Carlsbad's project had the smallest enrollment (2 patients). UCLA's alternate destination – urgent care project closed in May 2017 and Carlsbad and Orange County's projects closed in November 2017. All closures of alternate destination – urgent care projects were due to low enrollment.

There are multiple reasons why enrollment in the alternate destination – urgent care projects was substantially lower than anticipated. All three sites had fewer patients than expected who met all of the criteria for inclusion in the pilot project. In addition, many 911 calls occurred at times of the day during which urgent care centers were closed. In the case of Carlsbad's project, enrollment was limited to non-elderly adults who have insurance coverage through a single health plan.

Most of the patients for whom information on type of injury or illness was reported had a laceration or an isolated closed extremity injury, such as a dislocation, sprain, or fracture (Table 10).

Table 10. Number of Enrollees in Alternate Destination – Urgent Care Projects by Condition (Cumulative)

Lead Agency	Total Enrollees	Closed Extremity	Laceration	Soft Tissue	Fever or Cough	Other Minor Injury	Generalized Weakness
UCLA – Glendale and Santa Monica	12	5	0	0	0	7	0
Orange	34	17	15	0	1	1	0
Carlsbad	2	0	0	0	0	0	2
Total	48	22	15	0	1	8	2

Safety

The alternate destination – urgent care projects did not harm patients. Among the 48 patients enrolled in the alternate destination – urgent care projects, two patients (4%) were subsequently transferred to an ED within six hours of arrival at an urgent care center. In addition, nine patients (19%) were transported to an urgent care center but then rerouted to an ED because clinicians at the urgent care center declined to treat the patient. None of these patients had life-threatening conditions and there were no adverse outcomes. The reasons for transport from an urgent care center to an ED are listed in the table below. Additional detail about the two secondary transfers can be found in the initial public report on the community paramedicine pilot projects.^{xiv}

Table 11. Reasons for Transfer or Rerouting to an ED within Six Hours of Admission to an Urgent Care Center (11 of 48 Patients)

Reason for Transfer to an ED	Number of Patients
<i>Secondary Transfers</i>	
Patient experienced shortness of breath and heart rate slowed after transport to an urgent care center for treatment of nausea without abdominal pain	1
Patient required surgery for injury	1
<i>Rerouted Transfers (aka Continuous Transfers)</i>	
Patient requested opioid pain medication	3
Diagnostic equipment broken or unavailable	2
Urgent care physician believed shoulder injury needed further evaluation	2
Urgent care center physician believed patient needed to be examined by an orthopedist	2
Total	11

Effectiveness

While paramedics participating in the pilot projects were able to triage patients according to protocol effectively, it was challenging for the paramedics and project leaders to determine which patients the urgent care centers would accept. Urgent care centers sometimes rejected patients who have conditions that can be safely treated outside an ED, such as a dislocated shoulder. Interviews with project managers and paramedics suggest that urgent care centers may be hesitant to accept patients transported by an ambulance since that is a new practice for them. In addition, the range of services offered by urgent care centers varies substantially. For example, some urgent care centers do not have the capacity to administer intravenous fluids, which limits their ability to treat persons with dehydration and other conditions that can be treated safely outside of an ED.

Potential Savings

Table 12 displays estimates of the potential savings associated with two of the three alternate destination –urgent care projects. Data for the third site are not included because it had only enrolled two patients before it closed in November 2017. These projects potentially avoided costs of \$3,640. The estimates of potential savings are based on estimates of the difference between the amounts insurers pay for treatment of the same condition in an ED and an urgent care center. Costs for ambulance transports were not reduced because no transports were avoided.

Table 12. Potential Savings Associated with the Alternate Destination – Urgent Care Projects

Variable	Amount	
	UCLA – Glendale and Santa Monica	Orange
Total Enrollment	12	34
Total Patients Treated in an Urgent Care Center and Released	6	29
Estimated Difference Between the Cost of an ED Visit and an Urgent Care Visit	\$104	\$104
Total Potential Savings	\$624	\$3,016
Potential Savings per Patient Enrolled	\$52	\$89

Conclusion

More data are needed to draw firm conclusions about the alternate destination – urgent care concept. Paramedics participating in the alternate destination – urgent care projects have demonstrated capacity to evaluate patients according to triage protocols to determine whether they are candidates for treatment at an urgent care center. No patients experienced adverse outcomes. However, only 48 patients were enrolled across the three sites over 26 months, in large part because many people with eligible conditions called 911 at times at which urgent care centers were not open. The only concept for which fewer people were enrolled – Directly Observed Therapy for Tuberculosis – is being tested at only one site and involves people who have a rare condition. In addition, two of the 48 patients enrolled were transferred to an ED following admission to an urgent care center and nine were rerouted to an ED because the urgent care center declined to accept the patient. These findings suggest that for alternate destination – urgent care projects to offer a viable alternative to EDs, screening protocols will need to be more closely aligned with the capabilities of urgent care centers and the illnesses and injuries they are willing to treat. The savings generated were modest due to the low enrollment and the design of the project, which only changed the location to which patients were transported and did not reduce the number of transports.

Alternate Destination – Sobering Center

Highlights
<ul style="list-style-type: none"> The alternate destination – sobering center project enrolled 730 patients from February 2017 through March 2018. 97.6% of patients (n = 712) were treated safely and effectively at the sobering center. Only 2.3% (n = 17) were transferred to an ED within six hours of admission. Only one patient (0.1%) was rerouted to an ED because the sobering center's registered nurses did not accept the patient. Persons treated in the sobering center have better access to social workers who can help them obtain detoxification, supportive housing, and other services. The projects potentially avoided costs of \$241,157 because the cost of treating intoxicated persons in the sobering center is less than the cost of treating them in an ED.

Description

Acutely intoxicated persons are another population for whom alternatives to routine transport to an ED are needed. Nationwide an estimated 9.7% of ED visits are due to inebriation.^{xv} In busy EDs, clinicians have little time to assist intoxicated patients unless they also have an acute medical need. They may not counsel patients about their drinking or give them information about detoxification programs, case management, or other resources.

Cities around the US have established sobering centers to care for these patients.^{xvi} Sobering centers are less expensive to operate than EDs and their staff are able to focus on the needs of intoxicated persons.^{xvii} In February 2017, the City and County of San Francisco began a pilot project under which paramedics transport eligible persons directly to its sobering center. The sobering center has cared for over 50,000 persons since it opened in 2003. It serves people who are acutely intoxicated but do not have other urgent health care needs. The sobering center is open 24 hours per day, 7 days per week and staffed by registered nurses who monitor patients throughout their stay. The registered nurses follow standardized

procedures for treatment of a variety of medical and mental health conditions. There are also social workers on the sobering center's staff who help patients obtain treatment for alcohol use disorders and mental health conditions, housing, Medi-Cal, Supplemental Social Security, and General Assistance. Most patients stay for 4 to 12 hours. Approximately 33% of patients are treated at the sobering center multiple times per year and approximately 90% of patients are homeless at the time that services are provided.^{xviii}

San Francisco has trained all paramedics on 911 response crews to screen intoxicated patients to determine if they are eligible to enroll in the pilot project. Patients are deemed eligible for transport to the sobering center if they have acute alcohol intoxication but do not have any acute medical or mental health needs. If a patient meets all eligibility criteria, the paramedics offer the patient a choice of transport to the sobering center or an ED. Patients who do not meet all eligibility criteria are transported directly to an ED, as are patients who express a preference for transport to an ED.

Ten experienced paramedics have completed the full community paramedic training. The community paramedics work with 911 response crews and the sobering center's staff to perform quality assurance reviews for patients transported to the sobering center. They provide training and are available to paramedics by telephone or in person for consultation if paramedics in the field are unsure whether a patient is eligible for transport to the sobering center. In addition, the community paramedics collaborate with San Francisco's Homeless Outreach Team (HOT) outreach workers to engage sobering center patients who are high utilizers of county health care services.

Findings

The alternate destination – sobering project enrolled 730 patients during its first 13 months of operation (February 1, 2017 through March 31, 2018). Ninety-four of the 730 patients (13%) enrolled in the project have visited the sobering center more than once.

Safety

The community paramedics and the staff of the sobering center review the records of all patients transported to the sobering center by ambulance. Cases that involve a secondary transport of a patient to an ED are also reviewed by a committee that consists of the sobering center's deputy director, the sobering center nurse coordinator, the San Francisco Emergency Medical Services Agency's Medical Director, and the San Francisco Fire Department's Medical Director.

The most common risk to sobering center patients is an unforeseen need for medical detoxification, which is difficult to predict initially among people with chronic alcohol consumption. A patient may also have taken another drug that paramedics cannot detect when they examine the patient in the field. Clients are monitored via comprehensive nursing protocols that assess potential effects of other drugs, including the impact of sedating medications on orientation and respiratory status.

Among the 730 patients enrolled in the alternate destination – sobering project, 17 patients (2.3%) were transferred to an ED within six hours of admission to the sobering center. These secondary transfers were due to falls, abdominal pain, agitation, alcohol withdrawal, chest pain, confusion, hallucinations seizure, suicidal ideation, tachypnea (i.e., rapid shallow breathing), and a client request for oxygen despite not having symptoms of respiratory distress. (Table 13) In 16 cases, the transfer to the ED could not have been avoided because the need for transfer was not evident when the paramedics assessed the patient in the field. When the community paramedics reviewed records for the patient with tachypnea, they concluded that the patient's respiration rate in the field had been outside the range for admission to the sobering center and that the paramedics on the 911 crew that transported the patient to the sobering center had not relayed this information to the registered nurse on duty. The community paramedics coached the 911 response crew and their supervisor on how to use a patient's respiration rate in the field to determine if a patient is eligible for transport to the sobering center. One additional patient (0.1%) was rerouted from the sobering center to an ED due to hypothermia and bradycardia. When this patient arrived at the sobering center, his temperature was below the threshold for admission to the sobering center based on nursing protocols. The registered nurses directed the paramedics to reroute the patient to an ED because he could not be rewarmed within 15 minutes. Among the 18 patients transferred or rerouted to an ED, 11 were treated in an ED and released. Four patients were medically cleared in the ED and transferred to a psychiatric ED. Two left an ED's waiting room without being seen. The disposition of one patient is unknown.

Effectiveness

The alternate destination – sobering center project has reduced the number of intoxicated persons transported to an ED. Interviews with project leaders indicate that one of the greatest benefits of treating these clients in the sobering center is that the sobering center social workers have greater ability to connect clients with medical detoxification, social work, case management services, and permanent housing. EDs have social workers but they are not able to focus exclusively on intoxicated patients. In addition, the sobering center is equipped to provide withdrawal management for patients if a bed is available in a medical detoxification center, which helps patients cope with withdrawal and increases their willingness to complete detoxification.

Table 13. Reasons for Transfer to an ED within Six Hours of Admission to Sobering Center or Rerouting from the Sobering Center (18 of 730 Patients)

Reason for Transfer to an ED	Number of Patients
<i>Secondary Transfers</i>	
Fall	5
Confusion/Hallucinations	3
Alcohol withdrawal	2
Suspected suicide attempt/suicidal intentions	2
Agitation with chest pain	1
Chest/abdominal pain	1
Client requested oxygen despite lack of respiratory distress	1
Seizures/history of seizures	1
Tachypnea/Increasing temperature	1
<i>Rerouted Transfers (aka Continuous Transfers)</i>	
Hypothermic/bradycardia	1
Total*	18

*Some patients are listed in multiple categories.

Another strength of the alternate destination – sobering center project is the use of paramedics in two complementary roles. Paramedics on 911 response crews can contact community paramedics for guidance if they are uncertain whether a patient meets the criteria for transport to the sobering center. Community paramedics review transports of patients to the sobering center and give 911 crews feedback on their use of the protocol for screening patients.

In addition, the community paramedics' partnership with the HOT outreach workers extends the project beyond transport to the sobering center to encompass outreach to high utilizers to encourage them to seek treatment for their alcohol use disorder. According to the project's leaders, this outreach is important because San Francisco has substantial services for homeless people with alcohol use disorders, but people often do not know how to access these services or will not seek help on their own. Pairing community paramedics with homeless outreach workers leverages the strengths of both groups of workers. Community paramedics contribute medical knowledge, ability to access medical records, and relationships with ambulance crews. Homeless outreach workers, many of whom are formerly homeless and or in recovery from substance use disorders, can form closer relationships with clients due to their lived experience.

Potential Savings

Table 14 displays estimates of potential savings associated with the alternate destination – sobering center project. For this project, savings were due to the difference in the cost of caring for intoxicated persons in the sobering center versus in an ED. For patients who were treated in the sobering center and released, savings were estimated by multiplying the number of patients by the difference between the cost of treating them in an ED or in the sobering center (\$385). These savings were offset by the cost of a sobering center visit for the nine patients who were transferred to an ED and the cost of a second ambulance transport. During its first fourteen months of

operation, the project generated \$241,157 in potential savings (\$330 per person) due to the reduction in ED visits. Actual savings realized by insurers may have differed because the data used to estimate costs are not used for billing purposes.^{xvi} The majority of potential savings accrued to Medi-Cal because sobering center staff estimate that 62% of the patients enrolled in the project are Medi-Cal beneficiaries. Costs for ambulance transports were not reduced because no transports were avoided.

Table 14. Potential Savings Associated with the Alternate Destination – Sobering Center Project

Variable	Amount
Total Number of Patients Enrolled	730
Total Number of ED Visits Avoided	712
Average Cost of Ambulance Transport	\$1,675
Average Cost of ED Visit	\$649
Average Cost of Sobering Center Visit	\$264
Potential Savings Associated with Sobering Center Visits	\$274,120
Number of Secondary Transfers to ED	17
Potential Cost Associated with Sobering Center Visit for Secondary Transfers to an ED	\$4,488
Potential Cost Associated with Secondary Transfers to an ED	\$28,475
Total Potential Savings (Net of Cost)	\$241,157
Potential Savings per Patient Enrolled	\$330

Conclusion

Preliminary findings suggest that paramedics participating in the alternate destination – sobering center project can accurately screen intoxicated patients to identify those who can be treated safely and effectively in a sobering center. To date the project has resulted in the transport of 713 fewer persons to an ED. Only two patients (0.1% of all patients enrolled) were transported to the sobering center who did not meet the eligibility criteria (i.e., the patient rerouted from the sobering center to the ED and the patient accepted by the sobering center who had tachypnea). Only 17 patients (2.3%) were transferred to an ED subsequent to admission to the sobering center. There were no adverse outcomes from secondary transfers to an ED. The project potentially reduced costs because providing care to intoxicated persons in the sobering center is less expensive than caring for them in an ED. In addition, the community paramedics participating in the project provide valuable feedback to paramedics on 911 response crews and are collaborating effectively with homeless outreach workers to encourage people with chronic alcoholism to seek treatment.

Summary and Conclusion

The community paramedicine pilot projects have demonstrated that specially trained paramedics can provide services beyond their traditional and current statutory scope of practice in California. No adverse outcome is attributable to any of these pilot projects. These projects are enhancing patients' well-being, improving the integration and efficiency of health services in the community, and reducing ambulance transports, ED visits, and hospital readmissions. The majority of potential savings associated with these pilots would accrue to Medicare and Medi-Cal and to hospitals serving Medicare and Medi-Cal patients.

Specifically, the sites testing the seven concepts have demonstrated the following.

Post-Discharge

- All five post-discharge projects decreased hospital readmissions within 30 days of discharge for at least one of the diagnoses targeted. Butte's heart failure patients were the only group of patients whose 30-day readmission rate exceeded the partner hospital's historical all-cause readmission rate. The difference may have been due to differences in protocols. Prior to November 2017, Butte's project did not provide home visits to all patients, whereas all patients enrolled in the other four post-discharge projects received at least one home visit. In November 2017, Butte changed its protocol to provide every patient with at least one home visit.
- The projects improved patients' knowledge of their medications and their ability to take medications as prescribed by their physicians.
- The projects avoided potential costs for payers (primarily Medicare and Medi-Cal) and hospitals due to reductions in readmissions within 30 days of discharge. Participating hospitals also reduced their risk of incurring Medicare penalties for excessive readmissions.

Frequent EMS User

- These projects achieved substantial reductions in the number of 911 calls, ambulance transports, and ED visits among enrolled patients.
- Community paramedics assisted patients in obtaining housing and other nonemergency services that address the physical, psychological, and social needs that led to their frequent EMS use.
- Both projects avoided potential costs for payers by reducing 911 calls, ambulance transports, and ED visits. San Diego's project also potentially decreased the amount of uncompensated care furnished by ambulance providers and hospitals because 43% of the patients it enrolled were uninsured.

Directly Observed Therapy for Tuberculosis

- Community paramedics dispensed appropriate doses of TB medications and monitored side effects and symptoms that could necessitate a change in treatment regimen.
- Persons with TB who received directly observed therapy (DOT) from community paramedics were more likely to receive all doses of TB medication prescribed by the TB clinic physician than patients who received DOT from the TB clinic's community health workers. Receiving all doses prescribed by the TB clinic physician increased the likelihood that a patient will be treated successfully and will not spread TB to others or develop a drug-resistant strain of TB that would be much harder to treat and to control in the community.

Hospice

- Community paramedics assessed hospice patients, provided psychosocial support, and administered medications from the hospice patients' "comfort care" packs when necessary, in consultation with a hospice nurse.
- The hospice project enhanced ability to honor patients' wishes to receive hospice services at home by markedly reducing rates of ambulance transports to an ED and ED visits.
- The reduction in unnecessary transports and ED visits potentially avoided costs for Medicare and other insurers. Expenditures for inpatient care were also potentially reduced because some ED visits for hospice patients result in an inpatient admission.

Alternate Destination – Mental Health

- Twenty-eight percent of persons screened by the community paramedics were transported to the mental health crisis center rather than an ED and an additional 27% could have been transported to the crisis center if the county had more inpatient psychiatric beds or if the crisis center accepted people with private insurance or Medicare. (Forty-three percent of persons the community paramedics screened were not eligible for transport to the mental health crisis center because they had a medical need, were intoxicated, or were violent.)
- Ninety-seven percent of patients who participated in the project (301 of 310 patients) were treated safely and effectively at the mental health crisis center without the delay of a preliminary emergency department visit for medical screening. Only 3% of patients (n = 9) required subsequent transfer to the ED, and none experienced adverse outcomes.
- The project also improved public safety because community paramedics could take responsibility for a person with mental health needs, which allowed law enforcement officers to return to law enforcement duties instead of transporting the person to an ED and waiting to transfer responsibility for the person to clinicians in the ED.
- The project avoided potential costs for payers, primarily Medi-Cal, by reducing ED visits and transfers of patients from EDs to psychiatric facilities. For uninsured persons, the amount of uncompensated care provided by ambulance providers and hospitals also decreased.

Alternate Destination – Urgent Care

- Conclusions cannot be drawn about the impact of the alternate destination – urgent care projects due to low enrollment.
- Among patients who were enrolled, paramedics were able to screen patients according to protocol and identify those for whom transport to an urgent care center was an appropriate option.
- No patients experienced an adverse outcome, although two patients (4%) were transferred to an ED following admission to an urgent care center, and nine patients (19%) were rerouted to an ED because the urgent care center declined to accept the patient.
- To operate safely and efficiently, these projects need to closely match field screening protocols with the capabilities of urgent care centers and the illnesses and injuries they are willing to treat.
- The projects potentially yielded modest savings for payers because they pay less for treatment provided in urgent care centers than in EDs for the same illnesses and injuries.

Alternate Destination – Sobering Center

- 97.6% percent of patients enrolled in the alternate destination – sobering project (712 of 730) were treated safely and effectively at the sobering center. Only 17 patients (2.3%) were transferred to an ED within six hours of admission to the sobering center and only one (0.1%) was rerouted from the sobering center to an ED because the sobering center registered nurses declined to accept the patient. None of these patients were admitted to a hospital for inpatient medical care.
- In addition, community paramedics participating in the project provided feedback to paramedics on 911 crews on how to screen intoxicated persons to determine if they are candidates for transfer to the sobering center. They also partnered effectively with homeless outreach workers to encourage people who use the sobering center frequently to seek treatment for chronic alcoholism, housing, and other services.
- During its first 14 months of operation, the project avoided potential costs of \$241,157 by substituting sobering center visits for ED visits. The majority of potential savings accrued to Medi-Cal because the majority of patients enrolled in the project were Medi-Cal beneficiaries.

Conclusion

The California community paramedicine pilot projects were designed to integrate with existing health care resources and utilize the unique skills of paramedics and their round-the-clock availability. Findings from the evaluation indicate that Californians benefit from these innovative models of health care that leverage an existing workforce that operates at all times under medical control — either directly or by protocols developed by physicians experienced in EMS and emergency care. No other health professionals were displaced. Instead, these pilot projects have demonstrated that community paramedics can partner with physicians, nurses, behavioral health professionals, and social services workers to fill gaps in the health and social services safety net. No adverse patient outcome is attributable to any of these pilot projects.

At least 34 states are operating community paramedicine programs,ⁱⁱ and research conducted to date indicates that they are improving the efficiency and effectiveness of the health care system^{xix-xxiv}. These findings suggest that the benefits of community paramedicine programs grow as they mature, solidify partnerships, and find their optimal structure and niche. The evaluation of HWPP #173 yields consistent findings for six of the seven community paramedicine concepts tested. All of the post-discharge, frequent 911 users, DOT for TB, hospice, alternate destination – mental health projects have been in operation for at least two and a half years and have improved patients' well-being and, in most cases, have yielded savings for payers and other parts of the health care system. Findings for a project testing a sixth concept, alternate destination – sobering center, indicate that this project has also benefitted patients and the health care system during its first 14 months in operation. The seventh concept, alternate destination – urgent care, shows potential but projects that tested this concept did not enroll sufficient numbers of persons to draw conclusions about effectiveness. These projects were closed in 2017. Further research involving a larger volume of patients transported to urgent care centers with wider ranges of services and expanded hours would be needed to determine whether this concept is effective.

If community paramedicine is implemented on a broader scale, the current EMS system design is well suited to utilize the results of these pilot programs to optimize the design and implementation of proposed programs and to assure effectiveness and patient safety. The two-tiered system enables cities and counties to design and administer community paramedicine programs to meet local needs while both local and state oversight and regulation ensure patient safety.

Appendix A. Map of California Community Paramedicine Pilot Projects Currently Enrolling Patients and Projects Expected to Begin Enrolling Patients in 2018



Appendix B. Methods for Estimating Savings

This appendix describes the methods used to estimate savings associated with each of the seven community paramedicine concepts that are being tested as part of HWPP #173. Estimates of savings associated with the seven community paramedicine concepts reflect savings that accrue to parts of the health care system other than EMS transport providers, such as health insurers and hospitals. None of the projects realized savings for the EMS transport provider because they operate on fee-for-service basis and are reimbursed only for transport. These agencies had to provide in-kind contributions of supplies and labor to operate the pilot projects.

Different methods were used to estimate the savings associated with each concept due to the differences in the services provided and the types of outcomes each concept seeks to improve. For concepts that strive to reduce unnecessary ambulance transports, ED visits, and hospitalizations, the analysis focused on estimating the impact of these reductions on health insurers' expenditures because insurers typically pay for these services. Effects on hospitals' ability to manage "full risk" contracts with health insurers and avoid Medicare readmission penalties for excessive readmissions were addressed but could not be estimated quantitatively.

Post-Discharge

To generate estimates of savings, the differences between (1) the rates of readmission within 30 days of discharge among persons enrolled in the post-discharge projects, and (2) historical 30-day readmission rates for partner hospitals were calculated. Historical readmission rates were obtained from Medicare Hospital Compare.^{xxv} a system for reporting and publicly releasing data on the quality of care provided by Medicare-certified hospitals. Medicare Compare collects data on readmissions for persons with four of the six conditions targeted by the post-discharge projects: heart failure, acute myocardial infarction, chronic obstructive pulmonary disease, and pneumonia. A dataset containing data on readmission rates of partner hospitals between July 2012 and June 2015 was downloaded from Data.Medicare.gov.^{xxvi} These data were used to assess the projects' impact on 30-day readmission rates because all partner hospitals used similar methods to report the data to Medicare and because there was minimal overlap between the time period for which Hospital Compare data were collected and the implementation of the post-discharge projects.

The difference in the rate of readmission was multiplied by the number of people enrolled in each pilot project to generate an estimate of the number of readmissions avoided for each of the targeted diagnoses. The number of readmissions avoided was multiplied by an estimate of the average cost of admissions for patients with diagnoses targeted by the projects. Estimates of the cost of admissions for targeted diagnoses were derived from OSHPD's public hospital inpatient discharge dataset. Costs per admission were calculated by multiplying the hospital's average charges for a diagnosis by the hospital's cost-to-charge ratio. This is a widely used method for estimating the cost of inpatient care. Using this method, costs per admission varied substantially across diagnoses targeted by the pilot projects, ranging from \$11,562 for chronic obstructive pulmonary disease to \$26,621 for acute myocardial infarction. For each project, the average cost per readmission was calculated as a weighted average of the costs of admissions of persons with targeted diagnoses with weights assigned based on the proportion of total readmissions that occurred among persons with each targeted diagnosis.

Frequent EMS User

Savings were estimated by multiplying the numbers of ambulance transports and ED visits avoided by (1) the average cost per transport to an ED, and (2) the mean Medicare reimbursement for ED visits. Based on interviews with manager of San Diego's frequent 911 user projects, we assumed that every 911 call prevented resulted in avoidance of an ambulance transport and an ED visit.

For San Diego's project, the number of ambulance transports and ED visits avoided was estimated by comparing the number of 911 calls made by enrolled patients during the 12 months prior to their enrollment to the number of

911 calls made during the 12 months following enrollment. Calls made during the month of enrollment were excluded in recognition that the month of enrollment is a time of transition for patients. Data on 911 calls pre- and post-enrollment were available for 35 of the 46 enrollees from November 2015 through June 2017. The reduction in 911 calls over the 12 months post-enrollment was divided by 12 to estimate the numbers of 911 calls, ambulance transports, and ED visits avoided per month.

Estimates of the cost of ambulance transports avoided were obtained from the sites. Data for ED cost estimates were obtained from the University of California Research Exchange (UC ReX) and reflect visits to EDs at University of California medical centers in 2015. Hospitals bill insurers for ED visits at one of five levels based on the amount of equipment and supplies needed to care for a patient. Level 1 is the lowest level and level 5 is the highest. For the frequent EMS user projects, we used the national average Medicare reimbursement rate for all five levels of ED visits because information was not available to enable us to determine the most common reasons why frequent EMS users visit EDs or the severity and complexity of their needs. Medicare reimbursement rates were used because Medicare is the payer whose reimbursement is widely considered to be closest to the cost of care. The analysis was not limited to ED visits for any particular diagnoses because diagnosis is not a criterion for enrolling in the Frequent EMS User projects. We could not use the cost-to-charge ratio method used to estimate the cost of inpatient readmissions avoided, because OSHPD does not collect complete data on charges for ED visits.

Tuberculosis

A quantitative analysis of savings associated with the project that provides directly observed therapy (DOT) for tuberculosis (TB) was not conducted due to challenges associated with estimating the impact of the project. As discussed in the main body of the report, the project found that community paramedics missed a smaller percentage of prescribed DOT treatments than community health workers (0.06% vs. 6.7%). However, we found no research that addressed the impact of a difference in adherence in a US population that compared groups of people with adherence rates of over 90%. In the absence of such research, we concluded that the most we could do would be to make directional statements about the potential impact of the increase in adherence on public health expenditures associated with investigation of close contacts of persons with TB and treating people infected by a noncompliant patient. We also make a directional statement about the impact of the use of community paramedics on the TB clinic's use of community health workers.

Hospice

Savings for the Hospice project were estimated by multiplying the number of transports and ED visits avoided by (1) the average cost per ambulance transport to an ED and (2) the average Medicare reimbursement for an ED visit for a high-acuity patient. The estimate of costs per transport reflects data reported by the pilot site for June 2015 through September of 2016. The estimates represented actual "cash collected" by the agency from insurers and other payers. The number of transports avoided equals the difference between the number of transports that would have occurred if the percentage of hospice 911 calls that resulted in a transport to an ED remained at the level observed prior to the pilot project (80%) and the number of transports that occurred among hospice patients enrolled in the pilot project.

As indicated above in the description of the estimates of savings for the Frequent EMS User projects, data for ED cost estimates were obtained from the University of California Research Exchange (UC ReX) and reflect visits to EDs at University of California medical centers in 2015. To estimate the cost of ED visits that do not result in a hospital admission, we applied national average Medicare reimbursement rates for all care provided to patients. For the hospice project, the median reimbursement for level 4 and 5 visits was used because terminally ill patients are likely to have acute needs. Mean reimbursement for level 4 and 5 visits across all diagnoses were used in lieu

of the costs related to specific diagnoses because information was not available to determine the diagnoses for which hospice patients were transported to an ED.

Alternate Destination – Mental Health

Savings for the Alternate Destination – Mental Health project were estimated by multiplying the numbers of ambulance transports and ED visits avoided by (1) the average cost per transport and (2) the average Medicare reimbursement for an ED visit for persons who only have behavioral health diagnoses. Because patients enrolled in the project are transported directly to the mental health crisis center, an ED visit is avoided every time a patient is enrolled as well as a secondary transport from an ED to a behavioral health facility.

The estimate of the average cost per ambulance transport was based on information provided by Stanislaus' EMS provider.

As indicated above in the description of the estimates of savings for the Frequent EMS User projects, data for estimates of the cost of ED visits were obtained from the University of California Research Exchange (UC ReX) and reflect visits to EDs at University of California medical centers in 2015. To estimate the cost of ED visits that do not result in a hospital admission, we applied national average Medicare reimbursement rates for all care provided to patients for which the only diagnoses reported are mental health diagnoses. These diagnoses were chosen because the alternate destination – mental health project serves persons who only have acute mental health needs.

Alternate Destination – Urgent Care

Savings for the Alternate Destination – Urgent Care project were calculated based on an estimate from the literature of the difference in the cost of treating minor illnesses and injuries in an ED versus an urgent care center. Estimates published in the literature suggest that insurers pay urgent care centers 45% of what they pay hospitals for ED visits for the same minor illnesses and injuries.^{xxvii} The difference between reimbursement for ED visits and urgent care center visits was multiplied by the number of persons enrolled in the alternate destination – medical care projects to obtain an estimate of total savings.

No estimate of savings associated with reduction in ambulance transports is included because, unlike other community paramedicine concepts that reduce ED visits, the Alternate Destination – Urgent Care projects did not reduce ambulance transports. Transport costs do not change because all enrolled patients are transported to an urgent care center.

As indicated above in the description of the estimates of savings for the Frequent EMS User projects, data for estimates of ED costs were obtained from the University of California Research Exchange (UC ReX) and reflect visits to EDs at University of California medical centers in 2015. To estimate the cost of ED visits that do not result in a hospital admission, we applied national average Medicare reimbursement rates for level 1 and level 2 ED visits. These levels were used because these projects enrolled people with minor illnesses or injuries. This rate was multiplied to estimate the average cost of treating people with minor illnesses or injuries in an urgent care center.

Alternate Destination – Sobering Center

Savings for the Alternate Destination – Sobering Center project were estimated by multiplying the numbers of ambulance transports and ED visits avoided per month by the cost of treating an intoxicated person with no co-morbidities in an ED. Costs for ambulance transports were included in the calculation only for patients who were secondarily transferred from the sobering center to an ED. The cost of initial transport to the sobering center was

not included because the San Francisco Fire Department would have incurred the cost of an ambulance transport regardless of whether a patient was transported to an ED or the sobering center.

The estimate of the average cost of treating an intoxicated person with no co-morbidities in an ED was based on an estimate generated by the San Francisco Department of Public Health.^{xv} This estimate represents average total costs for a patient to be served at Zuckerberg San Francisco General Hospital, the county's public hospital, by dividing total operational and facility expenses by the number of patients served. These costs are not used for billing purposes and, thus, may not reflect what the hospital charges insurers for treating these patients.

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