Improving Austin-Travis County Emergency Medical Services Integration with Local Healthcare Networks

LYNDON B. JOHNSON
SCHOOL OF PUBLIC AFFAIRS
THE UNIVERSITY OF TEXAS AT AUSTIN

POLICY RESEARCH PROJECT REPORT

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Improving Austin-Travis County Emergency Medical Services Integration with Local Healthcare Networks

Project Directed by

Todd Olmstead

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List of Acronyms

ACA	Affordable Care Act
ALH	Austin Lakes Hospital
AMR	American Medical Response
APD	Austin Police Department
APP	Advanced Practice Paramedic
ARCH	Austin Resource Center for the Homeless
ATCEMS	Austin-Travis County Emergency Medical Services
ATCEMSEA	ATCEMS Employee Association
ATCIC	Austin-Travis County Integral Care
BLS	Basic Life Support
CART	Capital Area Rural Transit
CHP	Community Health Paramedic
CMS	Centers for Medicare and Medicaid Services
COPD	Chronic Obstructive Pulmonary Disease
DHHS	Department of Health and Human Services
DSRIP	Delivery System Reform Incentive Payment
ECN	Emergency Communications Nurse
ECNS	Emergency Communications Nurse System
ECP	Extended Care Paramedic
ED	Emergency Department
EMS	Emergency Medical Services
EMT	Emergency Medical Technician
ePCR	Electronic Patient Care Record

IHI	Institute of Healthcare Improvement
IOM	Institute of Medicine
LMEMS	Louisville Metro EMS
MAP	Medical Access Program
MCOT	Mobile Crisis Outreach Team
MIH	Mobile Integrated Healthcare
NHTSA	National Highway Traffic Safety Administration
NPV	Net Present Value
NSW	New South Wales
OIG	Office of the Inspector General
OECD	Organization for Economic Co-operation and Development
OMD	Office of the Medical Director
PRP	Policy Research Project
PSIAM	Priority Solutions Integrated Access Management
REMSA	Regional Emergency Medical Services Authority
SFSC	San Francisco Sobering Center
SPED	Seton Psychiatric Emergency Department
TCDES	Travis County Department of Emergency Services
TCHHS	Travis County Health & Human Services
TRVs	Transitional Response Vehicles
VMT	Vehicle-Miles Traveled

Foreword

The Lyndon B. Johnson (LBJ) School of Public Affairs has established interdisciplinary research on policy programs as the core of its educational program. A major part of this program is the nine-month Policy Research Project (PRP), in the course of which one or more faculty members from different disciplines direct the research of a group of graduate students of diverse backgrounds on a policy issue of concern to a government or nonprofit agency. This "client orientation" brings students face to face with administrators, legislators, and other officials active in the policy process and demonstrates that research in a policy environment demands special talents. It also illuminates the occasional difficulties of relating research findings to the world of political realities.

This publication presents the results of a PRP conducted during the 2014–2015 academic year, in partnership with Austin-Travis County Emergency Medical Services (ATCEMS), which sought to improve their integration with local healthcare networks in order to support patient-centered out-of-hospital care. The project was funded by the City of Austin. Sixteen LBJ School students conducted academic and in-field research to develop seven strategies aimed at providing alternate care destinations and transportation plans for ATCEMS. Collectively, these strategies integrate with the healthcare system, treat more patients at home and in the field, and connect individuals with the wrap-around services best suited for their needs.

The curriculum of the LBJ School is intended not only to develop effective public servants but also to produce research that will enlighten and inform those already engaged in the policy process. The project that resulted in this report has helped to accomplish the first task; it is our hope that the report itself will contribute to the second.

Finally, neither the LBJ School nor The University of Texas at Austin necessarily endorses the views or findings of this report.

Robert Hutchings

Dean

LBJ School of Public Affairs

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We would like to thank several individuals from the City of Austin and Travis County for their unique points of view and invaluable input into the formation of this project: Dr. Paul Hinchey, Dr. Jose Cabanas, and Jeff Hayes of the Austin Travis County Office of the Medical Director (OMD); Danny Hobby of the Travis County Department of Emergency Services; Lieutenant Justin Newsom of the Austin Police Department; Laura Slocum of Austin Travis County Integral Care; and Anthony Marquardt of the ATCEMS Employee Association.

This project required a deep understanding the emergency medical field. The research team had the pleasure of working with many physicians and representatives from local healthcare organizations. We give a special thank you to Matt Zavadksy and Doug Hooten of MedStar Mobile Healthcare, Dr. Edward Racht of American Medical Response, Jesus Garza of the Seton Healthcare Family, Chris Dillie of ESO Solutions, Dr. T.J. Milling of the Seton Clinical Research Institute at Austin, Patricia Young Brown of Central Health, Carole Tamayo of Integrated Care Collaboration, and Dr. Dave Williams of Medic Health.

This project would not have been possible without the support of the administrative staff at the University of Texas and the LBJ School of Public Affairs. We would like to recognize our Graduate Research Assistant Amelia Manning for her help in understanding emergency medical practices, UT Librarian Pedro Moreno for his assistance accessing resources in the UT libraries, and LBJ Writing Center Director Sasha West for her helpful advice and guidance during the writing of this report. Editing was coordinated by PRP students Rachel Gandy, Matti Hautala, and Nikki Metzgar. Lauren Jahnke performed final copyediting and formatting.

Finally, the students would like to convey special appreciation for Professor Todd Olmstead for the opportunity to contribute to the ongoing conversation on American healthcare reform. He provided continuing guidance and vision throughout the learning process.

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Chapter 1. Introduction

Over the past decade, shifts in policy, culture, and technology have changed the United States healthcare system. In response to escalating healthcare expenditures, elected officials have implemented national policy initiatives to reduce per capita costs. In local communities, individuals have been empowered to demand optimal outcomes from primary care physicians, hospital networks, and insurance providers. Healthcare practices of the past are being replaced by innovations designed to simultaneously improve the population's health and protect its pocketbook. As the system's safety net, emergency medical providers have the opportunity to capitalize on the shifting healthcare climate to expand their impact, fulfill patient needs, and solidify their role as integral healthcare professionals.

National Healthcare Trends

Rising Costs

Over the past two decades, U.S. healthcare expenditures have been on the rise. In 2014, the nation experienced its smallest growth in healthcare costs since the federal government began tracking such figures 50 years ago.[1] However, U.S. costs continue to outpace those reported in other industrialized nations.

In 2010, public and private healthcare expenditures in the U.S. were approximately $8,233 per person.[2] Norway, the next highest healthcare spender among Organisation for Economic Co-operation and Development (OECD) countries, spent $5,388 per capita in health costs; in the U.K., less than $3,500 per resident was spent on healthcare.[3] While other nations project slight growth in healthcare expenditures over the next decades, U.S. costs are expected to rise to over $13,000 per person by 2030.[4]

High expenditures across the nation have not been matched by improved health outcomes. Though the U.S. pays almost $5,200 more per capita on healthcare than Japan, Japanese citizens enjoy five more years of life in "full health" than their American counterparts do.[5] Among the 34 OECD member countries, the U.S. ranks first in per capita healthcare spending. Despite this high allocation of funds, Americans rank 26th in healthy life expectancy, second in diabetes rates, and first in both obesity and infant mortality rates.[6]

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[1] Jeffrey Young, "U.S. Experiences Unprecedented Slowdown in Healthcare Spending," Huffington Post, December 3, 2014, http://www.huffingtonpost.com/2014/12/03/health-care-spending_n_6256166.html.

[2] Matt Zavadsky and Douglas Hooten, *Mobile Integrated Healthcare: Approach to Implementation* (Burlington: Jones & Bartlett Learning, 2015).

[3] Ibid.

[4] E. Munoz, W. Munoz, and L. Wise, "National and Surgical Healthcare Expenditures, 2005-2025," *Annals of Surgery* 251, no. 2 (2010): 195-200. doi: 10.1097/SLA.0b013e3181cbcc9a.

[5] Zavadsky and Hooten, Mobile Integrated Healthcare.

[6] Ibid.

Perverse economic incentives create the foundation upon which high health expenditures are built and maintained. The U.S. has traditionally operated a fee-for-service healthcare model. As a result, medical professionals are rewarded for providing billable services, not for the outcomes of those services. They are thus motivated to conduct more tests and perform more surgeries than the vast majority of physicians in comparable nations undertake. For example, in 2007, U.S. health workers completed 226 knee replacements per 100,000 citizens; on average, only 121.6 knee replacements per 100,000 citizens were performed in the other OECD member countries during the same year.[7] Furthermore, this particular surgery cost over $4,000 more for an American patient than it did for a Canadian patient receiving the same medical care.[8]

Emergency medical service (EMS) agencies are marred by the same economic structure. EMS system reimbursements are determined by the quantity of transports provided, not the quality of services rendered. Consequently, paramedics and their supervisors are incentivized to increase the number of patients that utilize ambulances.

In 2012, the Centers for Medicare & Medicaid Services (CMS) expressed concerns about this revenue design. Ambulance transports are primarily reimbursed by Medicare Part B payments, which cover certain doctors' services, outpatient care, medical supplies, and preventive activities.[9] The Office of the Inspector General (OIG) reported that Medicare payments for ambulance transports grew at a faster rate than all other Part B payments between 2002 and 2011.[10] The 2002 transition to a national fee schedule for Medicare ambulance transports can be credited for part of this increase. However, a portion of the growth may also be traced to system abuses.

Between 2002 and 2011, the number of ambulance transports nationwide increased by 69 percent.[11] The OIG asserted that, in an average year, a quarter of these transports did not meet Medicare program requirements. In previous decades, up to two-thirds of EMS transports either did not result in hospital admissions or did not require emergency department services.[12]

Inappropriate use of ambulance services and emergency departments results in two problems for health consumers. First, unnecessary transports to hospitals contribute to rising healthcare costs in the United States. This perpetuates the current cycle of increased healthcare spending, enabling health costs to surpass $3.8 trillion in 2014.[13] Second, this lack of coordinated and appropriate care fails to maximize patient impacts. Without initiating a change in prevailing

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[7] Ibid.

[8] Ibid.

[9] Centers for Medicare & Medicaid Services, "What Part B Covers," *Medicare.gov*, accessed April 7, 2015, http://www.medicare.gov/what-medicare-covers/part-b/what-medicare-part-b-covers.html.

[10] Office of the Inspector General, U.S. Department of Health and Human Services, "Utilization of Medicare Ambulance Transports, 2002-2011," by Stuart Wright, September 2013, https://oig.hhs.gov/oei/reports/oei-09-12-00350.pdf.

[11] Ibid.

[12] Office of the Inspector General, U.S. Department of Health and Human Services, "Medical Necessity of Medicare Ambulance Services," by June Gibbs Brown, December 1998, https://oig.hhs.gov/oei/reports/oei-09-95-00412.pdf.

[13] Dan Munro, "Annual U.S. Healthcare Spending Hits $3.8 Trillion," *Forbes*, February 2, 2014, http://www.forbes.com/sites/danmunro/2014/02/02/annual-u-s-healthcare-spending-hits-3-8-trillion/.

financial and delivery practices, the U.S. healthcare system will continue to produce suboptimal health outcomes at unsustainable costs.

The Shift to Patient-Centered Healthcare

To tackle the problems associated with a fee-for-service model, reforms have taken root to implement a value-based healthcare system. In the previous structure, healthcare stakeholders attained revenue by billing for expensive services and shifting costs. A new patient-centered emphasis seeks to cut costs by increasing the value added to consumers' lives. By crafting a new business model for healthcare, practitioners strive to achieve a higher return for every dollar invested in the population's health. This requires a reorganization of delivery and finance mechanisms around patient needs.

The shift to a value-based model involves a restructuring of priorities and incentives. Previously, healthcare suppliers and providers underinvested in services that tend to generate the greatest patient value such as preventive activities, wellness screenings, and routine health maintenance services.[14] The new system steps beyond the reactive healthcare model to realign all stakeholder interests with patient outcomes. Medical professionals must now assess more than the survival of a patient; practitioners have been pushed to measure the degree of health achieved by the patient and the sustainability of the individual's recovery.[15]

Upfront costs are created, as evidence-based, patient-centered practices change the dynamics of the entire healthcare industry. However, when operationalized effectively, patient-centered practices lead to cost reductions. For example, preventive care initiatives have been shown to reduce malpractice claims, shorten patients' recovery time, and ultimately lower costs per patient.[16]

The prioritization of patient needs also increases satisfaction scores reported by healthcare workers. This helps to alleviate turnover at a time when demand for medical care outstrips supply. By 2025, the Association of American Medical Colleges projects a shortage of up to 90,400 physicians.[17] Thus, improvements to the healthcare system today could diminish a supply crisis in future years when the population will age and health insurance will expand more widely.

Over the past ten years, two developments have led the shift to a value-based healthcare system—the Triple Aim Initiative and the Affordable Care Act (ACA). While the ACA reformed how healthcare is financed, the Triple Aim Initiative changed how healthcare is delivered and

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[14] Michael Porter, "A Strategy for Health Care Reform: Toward a Value-Based System," *The New England Journal of Medicine* 361 (2009): 109-112.

[15] Ibid.

[16] Patrick Charmel and Susan Frampton, "Building the Business Case for Patient-Centered Care," *Healthcare Financial Management Association*, March 2008, http://www.henlearner.org/wp-content/uploads/2012/03/HFM-business-case-for-Planetree.pdf.

[17] Tim Dall, Terry West, Ritashree Chakrabarti, and Will Iacobucci, "The Complexities of Physician Supply and Demand: Projections from 2013 to 2025," *Association of American Medical Colleges*, March 2015, https://www.aamc.org/download/426242/data/ihsreportdownload.pdf.

evaluated. Together, the measures attempt to improve the population's health by rewarding system performance.

The Triple Aim Initiative

In 1999, the Institute of Medicine (IOM) altered the trajectory of the healthcare industry. The organization produced a report detailing the discrepancy between what Americans define as good health and the healthcare that they actually receive.[18] The report was followed by a series of six broad aims designed to improve the system as a whole. The IOM challenged medical professionals to modify their practices to ensure that healthcare is safe, effective, patient-centered, timely, efficient, and equitable.[19]

Eight years later, the Institute of Healthcare Improvement (IHI) condensed these six goals into its Triple Aim Initiative. IHI provided a framework of three objectives that, once realized, should refine the delivery of U.S. healthcare. The simultaneous aims include an enhancement of the patient care experience, an improvement of population health, and a reduction of per capita healthcare costs.[20]

Over 150 organizations around the globe have formally adopted the Triple Aim Initiative. In the U.S., medical professionals have turned to a variety of innovations to meet IHI's goals. For example, predictive modeling is now used to determine how a patient's needs can be met proactively, while preventive care programs seek to decrease the utilization of emergency departments by frequent users.[21]

The Affordable Care Act

In 2010, President Obama signed the Patient Protection and Affordable Care Act (ACA) into law. The ACA focused specifically on addressing the financial pitfalls of a fee-for-service healthcare model. By targeting the nation's 46 million uninsured individuals, the ACA aimed to make health insurance more affordable for those harmed most by rising healthcare costs.[22]

Instead of creating a national health insurance plan, the ACA established health insurance exchanges. These exchanges allowed people who previously could not afford insurance to locate health coverage. To further defray healthcare expenses, the ACA placed a cap on out-of-pocket healthcare costs and provided federal subsidies to lower-income individuals with remaining

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[18] Institute for Healthcare Improvement, "Across the Chasm: Six Aims for Changing the Health Care System," *IHI.org*, 2012, http://www.ihi.org/resources/Pages/ImprovementStories/AcrosstheChasmSixAimsforChangingtheHealthCareSystem.aspx.

[19] Ibid.

[20] Ninon Lewis, "A Primer on Defining the Triple Aim," *IHI Leadership*, October 2014, http://www.ihi.org/communities/blogs/_layouts/ihi/community/blog/itemview.aspx?List=81ca4a47-4ccd-4e9e-89d9-14d88ec59e8d&ID=63.

[21] Institute for Healthcare Improvement, "The Triple Aim: Optimizing Health, Care, and Cost," *Healthcare Executive*, February 2009, http://www.ihi.org/Engage/Initiatives/TripleAim/Documents/BeasleyTripleAim_ACHEJan09.pdf.

[22] Stephen Adams, Jules Clark, and Luke Delorme, "Understanding the Affordable Care Act," *American Institute for Economic Research*, May 2014, https://www.aier.org/research/understanding-affordable-care-act.

expenses. As a result, 18 million individuals and families became eligible to receive tax credits to fund their health insurance coverage in the law's first year of implementation.[23]

The ACA represented a step toward a new patient-centered care model. Insurance companies were held accountable while the health status of vulnerable citizens, such as those with preexisting conditions, was given precedence.

Local Healthcare Trends

EMS systems around the nation have also been tasked with accomplishing the patient-centered goals set forth by the Triple Aim Initiative and the ACA. Paramedics have been called upon to demonstrate their value to the public, contribute to the health of focal populations, and reduce unnecessary use of limited healthcare resources. The national trends impacting EMS systems, however, are filtered through local contexts, in which agency leaders must balance broad goals with community realities. In Travis County, Austin-Travis County EMS (ATCEMS) has been charged with implementing national efforts while the local population expands and call volumes continue to rise.

Demographic Changes

In 2015, Austin ranked second behind Houston on the *Forbes* list of America's Fastest-Growing Cities.[24] Between 2000 and 2010, the area's population increased by 37 percent, making Austin the eleventh largest city in the United States.[25] Migration has not been limited to the city alone. In 2012, Austin was deemed the fastest-growing metropolitan area among those with one million residents or more.[26] Travis, Hays, Williamson, Bastrop, and Caldwell Counties comprise Austin's metropolitan scope. Between 2010 and 2014, Texas as a whole experienced a 5.2 percent increase in population; in the same time period, Travis County reported an increase of 9.4 percent to become the seventh largest U.S. county in numerical growth.[27]

As the Austin metropolitan population multiplies, the area continues to build a reputation as "a haven for young creative types."[28] The University of Texas at Austin attracts students from around the nation, while city officials provide incentives for technology firms to migrate south.

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[23] The White House Office of the Press Secretary, "Fact Sheet: The Affordable Care Act: Secure Health Coverage for the Middle Class," *WhiteHouse.gov*, June 2012, https://www.whitehouse.gov/the-press-office/2012/06/28/fact-sheet-affordable-care-act-secure-health-coverage-middle-class.

[24] Erin Carlyle, "America's Fastest-Growing Cities 2015," *Forbes*, January 27, 2015, http://www.forbes.com/sites/erincarlyle/2015/01/27/americas-fastest-growing-cities-2015/2/.

[25] The Greater Austin Chamber of Commerce, "Population," *AustinChamber.com*, last modified 2014, http://www.austinchamber.com/site-selection/greater-austin-profile/population.php.

[26] Juan Castillo, "Old Story, New Chapter: Austin Leads US in Growth Among Biggest Metro Areas," *The Austin American-Statesman*, March 15, 2013, http://www.statesman.com/news/news/state-regional-govt-politics/old-story-new-chapter-austin-leads-us-in-growth-am/nWs72/?__federated=1.

[27] The Greater Austin Chamber of Commerce, "Population."

[28] Jeremy Schwartz, "Austin Not Ready for 'Silver Tsunami' of Poor Seniors, Experts Warn," *The Austin American-Statesman*, April 8, 2012, http://www.statesman.com/news/news/local/austin-not-ready-for-silver-tsunami-of-poor-seni-1/nRmpp/.

As a result, the average age of metropolitan residents is over four years younger than the nation's overall average.[29]

However, a demographic shift is occurring. Dubbed "the silver tsunami," an increase in those 65 years and older has taken place over the past decade. In Austin, the elderly cohort grew by over 27 percent in ten years, and the number of individuals between the ages of 55 and 64 increased by 110 percent.[30] By 2040, adults who are 65 years and older will comprise almost one-fifth of the Central Texas population.[31]

The growing elderly population adds new costs and demands to healthcare systems. In the past five years, the national average cost of emergency department visits for those over 65 years of age was $1,306.[32] Other areas of the country have turned to local EMS systems to quell these rising healthcare costs. For example, in New York, EMS-based screenings and case management succeeded in identifying persons with geriatric-specific needs, reducing emergency department use, and expanding collaboration within the regional healthcare system.

Increased Healthcare Demands

Population growth and demographic changes in Travis County create a new set of challenges for existing ATCEMS practices. In recent years, call volumes and responses have increased. In March 2015, the EMS call volume reached over 12,000 calls. This represents an increase of almost 1,500 calls from March 2014.[33] The number of ATCEMS responses has similarly risen from 9,316 responses in March 2011 to 12,120 responses in March 2015. [34] The majority of this increase occurred within the City of Austin, where responses over the past four years rose from 7,938 in March 2011 to 10,395 in March 2015.[35]

As ATCEMS receives more calls and engages in more responses, the number of patient transports also tends to increase. However, the rate of transport has remained relatively stable in recent years. Since 2011, ATCEMS has maintained its target patient transport rate of about 80 percent.[36]

To manage rising demand, the ATCEMS Operations Division invested in additional stations and vehicles, deployed a regional Ambulance Bus (AmBus), and restructured promotional

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[29] The Greater Austin Chamber of Commerce, "Population."

[30] Schwartz, "Austin Not Ready for 'Silver Tsunami.'"

[31] Aging Services Council of Central Texas, "A Growing Senior Population in Central Texas: Opportunities and Needs," Spring 2013, http://www.agingservicescouncil.org/documents/agingServicesCouncilFactSheet Spring2013.pdf.

[32] Chun-Ju Hsiao and Esther Hing, "Emergency Department Visits and Resulting Hospitalizations by Elderly Nursing Home Residents," *Research on Aging* 36, no. 2 (2013): 207-227, doi: 10.1177/0164027512473488.

[33] Austin-Travis County EMS, "EMS 911 Calls Received," *AustinTexas.gov*, last modified April 2015, https://austintexas.gov/page/ems-911-calls-received-and-mpd-compliance.

[34] Austin-Travis County EMS, "Responses in City and County," *AustinTexas.gov*, last modified April 2015, https://austintexas.gov/page/city-county-responses.

[35] Ibid.

[36] Austin-Travis County EMS, "Patient Contact and Transport Data," *AustinTexas.gov*, last modified April 2015, http://www.austintexas.gov/page/patient-contact-and-transport-data.

mechanisms.[37] In 2012, ATCEMS paramedics responded to almost 24,000 more calls from the public than they did in 2005. As a result, the City of Austin was forced to purchase five new ambulances. The additions helped to decrease response times in the City from 11.42 minutes to 9.31 minutes.[38] However, a decrease in this metric has not been shown to significantly improve health outcomes for the majority of callers with low-acuity needs.[39]

Despite the acquisition of more vehicles and improved technology, several ATCEMS stations continue to operate above the utilization rate strived for by organizational leadership. ATCEMS management sets a 42 percent utilization threshold for stations in Travis County. Since March 2012, at least ten stations have consistently reported utilization rates that exceed the desired rate.

While utilization rates do not appear to be increasing, sustained high demands on EMS stations pose problems. For example, a 2013 City Council audit reported that almost 90 percent of ATCEMS staff often experience fatigue in their careers.[40] Over 60 percent of individuals surveyed felt that their fatigue was becoming more common, and the majority believed that this stress impacts the quality of their work.[41]

Healthcare Innovations

In the face of rising healthcare demands, EMS systems around the U.S. have piloted innovations to meet the patient-centered, cost-effective goals emphasized by national leaders. Local efforts differ in design and focus, but all programs seek to accomplish the Triple Aim objectives.

Over the past decade, some EMS organizations have targeted frequent 911 callers by constructing mobile integrated healthcare (MIH) programs. Paramedics involved in these pilots provide services using value-based, mobile resources in the community. These programs seek to manage patient needs, navigate high utilizers to proper networks of care, and integrate the larger healthcare system into a collaborative unit. Initiatives include partnering with hospitals to provide post-discharge patient visits, working alongside mental health professionals to address psychological conditions, and providing preventive patient education to avoid high future costs.

Other systems created new staff positions and partnerships to treat low-acuity patients in the field and avoid unnecessary transports to emergency departments. For example, nurse practitioners are now used to provide telephone advice to callers with non-emergent needs. When patients do require in-person care, advanced practice paramedics or extended care paramedics in some regions may provide on-site treatment in lieu of hospital care. Finally, when transport to a medical setting is needed, paramedics around the nation have begun to utilize community clinics to avoid crowding emergency departments with patients struggling with low-level medical needs.

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[37] City of Austin, *Austin-Travis County Emergency Medical Services 2012-2013 Annual Report,* by Business Analysis and Performance Improvement (BAR) Team (Austin: Austin City Hall, 2013).

[38] James Shamard, Chief of Staff, ATCEMS, interview February 6, 2015.

[39] Teresa McCallion, "The Great Ambulance Response Time Debate Continues," *Journal of Emergency Medical Services*, February 16, 2012, http://www.jems.com/articles/2012/02/great-ambulance-response-time-debate.html.

[40] City of Austin, Office of the City Auditor, *Austin-Travis County Emergency Medical Services (ATCEMS) Outcomes Audit*, by Kenneth J. Mory and Corrie E. Stokes (Austin: Austin City Hall, 2013).

[41] Ibid.

Finally, EMS leaders have invested in technological advancements to improve service efficiency and patient experiences. For example, telemedicine tools allow paramedics to communicate with remote care providers, acquire medical advice on the scene, and update patient medical information in real time.[42]

ATCEMS Innovations

In 2009, ATCEMS implemented its first IHI-inspired innovation—the Community Health Paramedic (CHP) Program. This initiative identifies frequent EMS utilizers, evaluates their needs, and decreases their reliance on ambulance services by navigating them to appropriate care venues.

Following the initial success of the CHP Program, the City of Austin funded a Policy Research Project (PRP) with graduate students at the LBJ School of Public Affairs. Students were tasked with analyzing how ATCEMS could better integrate with local healthcare networks to support patient-centered, effective, out-of-hospital care. For nine months, the PRP team reviewed relevant innovations around the nation. With input provided by ATCEMS and the OMD, the group identified seven innovations that have the potential to be impactful in Austin's changing environment. This report provides program descriptions, cost and impact estimates, and possible implementation strategies for each of the seven innovations studied.

[42] April Fischer, "UA Medical Students Work to Implement Google Glass in EMS," *EMS World*, November 6, 2013, http://www.emsworld.com/news/11224510/ua-medical-students-work-to-implement-google-glass-in-ems.

Chapter 2. Policy Research Project Structure and Timeline

The two-semester Policy Research Project comprised four phases, with Phase One beginning in August 2014 and Phase Four ending in May 2015.

Phase One focused on gaining a foundational knowledge of the basic operations and culture of the EMS industry in general and ATCEMS in particular. Students were assigned various readings from medical journals and emergency healthcare textbooks, heard from a wide-range of guest speakers, participated in two ambulance ride-alongs, and observed a shift at the Combined Transportation, Emergency & Communications Center (CTECC) 911 call center. Table 2.1 shows the topics covered in each class meeting, guest speakers, and assigned readings during the fall 2014 semester. Concurrently, students began working in smaller groups to research a variety of EMS-related topics and presented their findings both in research papers and class presentations. For example, students conducted an in-depth analysis of the current ATCEMS workforce structure, investigated other EMS systems and programs in and outside of the United States, researched the financing structure of ATCEMS, and analyzed the federal, state, and local regulations that affect daily EMS operations.

Table 2.1.
Schedule of Guest Speakers and Assigned Readings

Date	Guest Speakers	Assigned Readings
Aug. 28, 2014	None	• Woolsey, Gene. "Where Were We, Where are We, Where are We Going, and Who Cares?" *Interfaces*, Vol. 23, pp. 44-46, 1993. • Hewitt, R. "Siting a Fire Station by Leveraging Soft Constraints and Supporting Science." *Interfaces*, Vol. 32, pp. 69-74, 2002.
Sept. 4, 2014	**Dr. Edward Racht, M.D.**, Chief Medical Officer, American Medical Response and former Medical Director of ATCEMS	• Walz, Bruce J. Foundations of EMS Systems 2nd Edition, Chapters 1-3, 5-6 & 9-10. Clifton Park, NY. Delmare Cengage Learning, 2011.
Sept. 11, 2014	**Sasha West**, Director of the LBJ School of Public Affair's Writing Center **Pedro Moreno**, University of Texas at Austin Public Affairs Librarian	• Walz, Bruce J. Foundations of EMS Systems 2nd Edition, Chapters 4, 7-8, 11 & 13. Clifton Park, NY. Delmare Cengage Learning, 2011.
Sept. 25, 2014	**Andrew Hofmeister**, ATCEMS Commander and Director of Community Health Paramedic Program **Laura Slocum**, Practice Manager of the Mobile Crisis Outreach Team at Austin Travis County Integral Care	• Hofmeister, Andrew. Commander, ATCEMS. "Community Health Paramedic Program: A comprehensive solution for those we serve." Class presentation, LBJ School of Public Affairs , Austin, TX, September 25, 2014. Available: http://www.austintexas.gov/edims/document.cfm?id=154794. • Roser, Mary Ann. "Austin-Travis County EMS Aims to Match Habitual 911 Callers to Social Services." *The Austin-American Statesman*, July 5, 2011. Available: http://www.statesman.com/news/news/local/austin-travis-county-ems-aims-

Sept. 25, 2014 *(cont.)*		to-match-habitual-91/nRcNH/. • Austin Travis County Integral Care. "Mobile Crisis Outreach Team (MCOT)." Updated 2014. Available: http://www.integralcare.org/content/mobile-crisis-outreach-team-mcot. • Ball, Andrea. "Travis mental health unit seeking to expand." *The Austin-American Statesman*, August 2, 2012. Available: http://www.statesman.com/news/news/local/travis-mental-health-crisis-unit-seeking-to-expa-1/nRNDW/.
Oct. 2, 2014	**Keith Simpson**, ATCEMS Quality and Compliance Manager **Rick Branning**, ATCEMS Billing Manager	None
Oct. 9, 2014	**Dr. T.J. Milling M.D.**, Emergency Physician at University Medical Center Brackenridge and Dell Children's Medical Center of Central Texas	None
Oct. 16, 2014	**Ernesto Rodriguez**, ATCEMS Chief and Director **Dr. Paul Hinchey M.D.**, ATCEMS Medical Director	• ATCEMS. "EMS Annual Report 2012-2013." Updated 2014. Available: http://cld.bz/y2osI6p#5/z. • Williams, David. "Is Austin's EMS System Broken?" *Journal of Emergency Medical Services*, Vol. 38:9, *1-10.* Available: http://www.jems.com/article/administration-and-leadership/austin-s-ems-system-broken. • ATCEMS. "Austin-Travis County EMS Responds to JEMS Article." *Journal of Emergency Medical Services*, Vol. 38:11. Available: http://www.jems.com/articles/print volume-38/issue-11/administration-and-leadership/austin-travis-county-ems-responds-jems-a.html.
Oct. 23, 2014	**Matt Zavadsky**, Director of Public Affairs, MedStar Mobile Healthcare **Doug Hooten**, Executive Director, MedStar Mobile Healthcare	• Zavadsky, Matt. "Trained paramedics provide ongoing support to frequent 911 callers, reducing use of ambulance and emergency department services." *Agency for Healthcare Research and Quality, U.S. Department of Health and Human Services* (2014). Available: http://www.MedStar911.org/Websites/MedStar911/files/Content/1089414/2014_AHRQ_Report_on_MedStar_Mobile_Healthcare_programs.pdf. • MedStar Mobile Healthcare. "9-1-1 Nurse Triage." Updated 2014. Available: http://www.MedStar911.org/Websites/MedStar911/files/Content/1089414/MedStar_9-1-1_Nurse_Triage_Program_Overview.pdf. • MedStar Mobile Healthcare. "Mobile Healthcare Programs – Overview." Updated 2014. Available: http://www.MedStar911.org/community-health-program
Oct. 30, 2014	**Danny Hobby**, Executive Director, Travis County Department of Emergency Services (TCDES)	None
Nov. 6, 2014	**Justin Newsom**, Lieutenant, Austin Police Department	None

Nov. 13, 2014	**Anthony Marquardt**, President, ATCEMS Association	• Gawande, Atul. "The Hot Spotters: Can we lower medical costs by giving the neediest patients better care?" *The New Yorker*, January 4, 2011. Available: http://www.new yorker.com/magazine/2011/01/24/the-hot-spotters.
Nov. 20, 2014	**Patricia Young Brown**, President and CEO, Travis County Healthcare District (Central Heatlh); Board Member, Integrated Care Collaboration (local health information exchange) **Carole Tamayo**, Director of Technology, Integrated Care Collaboration	• National Association of Emergency Medical Technicians. "Transforming EMS: MIH-CP." Uploaded 2014. https://www.youtube.com/ watch?v=iCTZI47aRss.
Dec. 4, 2014	**Jesus Garza**, President and CEO, Seton Healthcare Family, former Austin City Manager	None

In Phase Two, students identified, described, and assessed the current points of contact between ATCEMS and local healthcare networks. The goal was to understand how local hospitals, community clinics, psychiatric hospitals, and other healthcare providers currently network with ATCEMS. Students then created and presented summary reports of their Phase Two findings midway through the fall 2014 semester.

In Phase Three, students brainstormed alternative points of contact between ATCEMS and local healthcare networks using successful program models from other cities and the information gathered during Phases One and Two. The goal in creating these alternative points of contact was to provide more effective patient-centered, out-of-hospital care in Austin and Travis County. By the end of the fall 2014 semester, students developed a detailed list of 18 such strategies, grouped into five categories (see Table 2.2). From these 18 strategies, ATCEMS Chief Ernesto Rodriguez and ATCEMS Medical Director Dr. Paul Hinchey jointly selected a subset (see Table 2.3) for students to analyze further during Phase Four in the spring 2015 semester.

Table 2.2.
Complete List of Strategies Researched in Phase Three

Group	Strategy
Mobile Integrated Healthcare	• Partner with hospitals to provide after-care case management and discharge planning • Expand the existing Community Health Paramedic program • Homeless shelter preventative healthcare outreach program
Staffing	• Extended care paramedic in a chase car • 911 nurse triage • Non-emergency medical care hotline • Medical taxis
Transport to Alternate Destinations	• Urgent care centers • Community care clinics • Psychiatric ED and mental health hospitals • Primary care physicians • Sobering center

Public Education	• Appropriate use of 911 • Injury and illness prevention
Technology and Miscellaneous	• Health information exchange • Telemedicine (e.g. use of Google Glass to triage cases with doctors) • Expanded ATCIC/MCOT support of ATCEMS on mental health calls • More comprehensive mental health training for ATCEMS employees

Table 2.3.
Finalized List of Strategies Chosen by ATCEMS to Develop in Phase Four

Group	Strategy
Mobile Integrated Healthcare	• Partner with hospitals to provide after-care case management and discharge planning • Expand the existing Community Health Paramedic program • Homeless shelter preventative healthcare outreach program*
Alternative Staffing	• Extended care paramedic in a chase car • 911 nurse triage • Non-emergency medical care hotline*
Transport to Alternate Destinations	• Urgent care centers • Psychiatric emergency department and mental health hospitals • Sobering center

* Note: The two strategies with an asterisk were dropped from our study midway through Phase Four.

In Phase Four, students worked in small groups to study the feasibility and likely impact of the nine strategies chosen by Chief Rodriguez and Dr. Hinchey. Each group completed an implementation study that included a feasibility analysis and an economic analysis. The feasibility analysis identified potential barriers to implementation and ways to address them. The economic analysis included an estimate of the implementation cost, impact on ATCEMS reimbursements from payers, and a payer savings analysis. An interim report was submitted for review to Chief Rodriguez and Dr. Jose Cabanas from the OMD in March 2015. In their feedback, ATCEMS leadership suggested that two of the strategies should be dropped from the study. The dropped strategies included a homeless shelter outreach program that had sustainability concerns, and the creation of a non-emergency hotline, which would have duplicated existing hospital hotlines. The remaining seven strategies fell into three distinct areas of study: Mobile Integrated Healthcare, Alternative Staffing, and Transport to Alternate Destinations.

Student groups spent the last half of the spring semester soliciting input from ATCEMS staff and EMS experts from around the country in order to update their economic analyses for the seven strategies. Each group developed a suggested pilot program and an associated sustainability report with anticipated impacts based on our previous research and the qualitative feedback given by industry experts. Phase Four culminated in this written document and a presentation to ATCEMS administrators and officials from the City of Austin on May 7, 2015.

Chapter 3. Economic Analysis

Our team conducted a two-part economic analysis for each of the seven innovations. The first part of the analysis is conducted from the ATCEMS perspective. The analysis estimates the net direct cost of implementation, including the cost of relevant personnel, equipment, and supplies, as well as any cost offsets such as fuel and maintenance savings from fewer ambulance miles traveled. The net present value (NPV) of the implementation cost in year one, or the start-up year, is estimated, along with the NPV across a five-year time horizon. The economic analysis does not include overhead costs (e.g., utilities, administrative time, office space), nor does it include the value of the time spent by OMD developing new protocols that may be required by the innovations. In addition to the net implementation cost, the first part of the economic analysis projects changes in reimbursements to ATCEMS due to fewer responses and transports and/or to responses and transports that are expected to be reimbursed at a lower rate, such as those that end in alternate destinations. Although both implementation costs and changes to ATCEMS reimbursements affect the City of Austin's bottom line, they are presented separately for each strategy because they represent different cash flows. Specifically, while implementation costs must be covered by the ATCEMS budget or requested from the City, reimbursements are returned to the City's general fund.

The second part of the economic analysis focuses on the payer savings associated with each of the innovations. In the case of several of the innovations, in order to divert patients away from costly ambulance rides and emergency department visits, some patients will be offered an alternative form of transport or care, or both. For example, such a patient could consent to a taxi ride to an urgent care clinic. As a result, the payer would avoid having to make a payment to ATCEMS and the hospital. In such cases, patients may visit and receive bills from other care providers such as urgent care centers. The analysis estimates the average net savings to the payer. In some cases, the innovations will affect health service utilization in ways that are beyond the scope of this report to predict (e.g., expanding the CHP program will likely increase utilization of primary care physicians). In these cases, such limitations are noted.

The spreadsheet models used to perform the analyses are available to interested readers and can be modified to ask interesting "what if" questions about different scenarios, such as, "What if a strategy has more demand than originally anticipated?" or "What would be the effect of scaling up the pilot to include more medics, include more stations, or respond differently to a greater variety of call types?"

The economic analysis assumes that redirecting patients to more appropriate medical care facilities and reducing the number of ambulance responses and transports does not necessarily translate to a reduction in the total cost of providing emergency medical services. System readiness, or ATCEMS's ability to meet unscheduled demand for service, has high fixed costs. Medics will still be paid to be on duty, even if they are not actively responding to a call, and ambulances will continue to be at the ready, even when not in use.

Significant cost savings only occur when an EMS agency can lower its utilization rate enough to reduce the total number of ambulances or medics needed in the system. None of the seven

explored innovations are expected to accomplish this in a pilot phase. The same is true for hospitals; reducing the number of patients in emergency departments may improve efficiency and patient experiences, but unless the hospital is able to reduce staff, there is minimal direct cost savings to the hospital.

At the same time, freeing up resources still provides value. First and foremost, by reducing the number of ambulance responses and transports, many of these innovations will forestall having to expand system capacity as call volume increases with the population growth of the city. This is especially valuable because Austin is one of the fastest-growing cities in the U.S. Moreover, lowering the utilization rate will make more units available to respond to actual emergencies, thereby lowering the average response time to critical care calls. In addition, medics will have more time for rest and fitness activities that could improve employee health, or for engaging in new revenue-generating activities such as hospital partnerships.

Though hospital, EMS, and fire department resources are freed up for other purposes, the utilization rate of other healthcare providers will increase. However, those dollars are better spent if the care better matches the need. Patients benefit from having the right care at the right time and in the right setting. Although the analysis does not directly measure or monetize these benefits to patients, they are likely substantial in terms of time savings, out-of-pocket savings, and quality of life improvements.

Although each strategy was analyzed on a stand-alone basis, combining certain innovations could lead to cost efficiencies and increased effectiveness. For example, a nurse triage program would likely be more effective if ATCEMS also established partnerships with urgent care and community care clinics. By implementing these strategies simultaneously, nurses will have greater flexibility to meet patients' unique needs with the most appropriate care. Similarly, patients eligible for nurse triage are likely candidates for in-field treatment from extended care paramedics. If implemented, both strategies would also utilize the same software protocols and therefore share that cost. Synergies also exist between the alternate destinations for ambulance transport. Psychiatric emergency departments, clinics, and the sobering center were each analyzed as separate program strategies in order to evaluate their true individual impacts, but all three strategies can be implemented at once to maximize benefits.

Finally, the value of time spent providing and receiving training was modeled by (a) including the cost of the trainer's time directly in the implementation cost, and (b) prorating the impacts of each strategy by the amount of time the trainees spent in training during the start-up year (e.g., if a given strategy requires one month of training, then the estimated impacts during the start-up year are prorated by 91.7 percent, or 11/12).

See Appendices A, B, and C, for more details on the economic analysis of each of the seven potential strategies.

Chapter 4. Barriers to Implementation

In the course of researching the seven strategies discussed in this report, it became clear that there are certain barriers to implementation that are relevant to all innovations. The general barriers that have been identified include funding sources, legal and liability insurance issues, and support from organized labor. The purpose of this chapter is to discuss each of these barriers and assess the degree to which they could impact strategy implementation by ATCEMS.

Funding Sources

While all of the innovations presented here are intended to keep patients out of emergency departments when appropriate, CMS and many private insurers adhere to policies that only provide reimbursements for transports to hospitals. Moreover, each innovation will require funding for personnel, training, equipment, and supplies. Consequently, the successful implementation of all innovations will simultaneously increase ATCEMS operational costs and decrease reimbursements returned to the City of Austin's general fund. If reimbursement policies do not change, sustainability poses an ongoing challenge. Funding needs can be addressed through a number of avenues, including hospital partnerships, area foundations, CMS Health Care Innovation Awards, grants, and a long-run restructuring of the reimbursement model.

CMS Innovation Awards and grant opportunities are generally one-time funds to support specific programs. They can be used to establish pilot programs for the proposed strategies and provide stakeholders with the opportunity to evaluate the success of each program. If the pilot programs can demonstrate fiscal and health benefits through direct and indirect savings, ATCEMS can seek long-term funding with the potential to expand successful programs. For example, hospitals or payers experiencing cost avoidance or savings from any of these strategies may be pursued as potential investors. Building relationships with hospital networks and foundations can serve as a long-term solution to sustainability barriers. However, for these programs to be successful on a large scale, sweeping changes in the way that EMS is reimbursed for services must also occur.

Poor readmission rates and low patient satisfaction scores cause hospitals to incur increased CMS fines and diminished reputations. As a result, innovations that decrease hospital readmissions and bolster patient satisfaction may be worthwhile investments for hospital networks. In Fort Worth, four hospitals invested in MedStar's nurse triage program to improve patient satisfaction ratings and reduce penalties associated with poor scores.[43] Many low-acuity patients have to wait several hours in an emergency department before seeing a doctor and are often referred to outside providers to help with the issue. These patients are then likely to give low satisfaction ratings to the hospital. The hospitals working with MedStar believed that if the low-acuity patients were initially sent to the appropriate healthcare provider, then hospital satisfaction scores would improve and their fines would decrease. If hospitals, like those in Fort

[43] Zavadsky and Hooten, Mobile Integrated Healthcare.

Worth, are pleased with an innovation's outcomes, network leadership will likely continue to help fund the program.

Additionally, hospitals can provide assistance through their respective foundations. For example, the St. David's Foundation worked with ATCEMS to supply vehicles and equipment for the CHP Program.[44] Other private and public organizations give grants as well. In New York, the Verizon Foundation gave a grant to the North Shore-LIJ System to support their community paramedicine and telemedicine needs.[45] The Department of Health and Human Services in North Carolina has also given multiple grants for paramedic training and equipment to build promising initiatives such as an advanced paramedics program in Wake County.[46]

CMS established innovation grants in 2012 to support "new ideas to deliver better health, improved care, and lower costs" for patients.[47] Award recipients in Washington, Nevada, and Colorado all incorporated paramedics and emergency services in their resulting innovations. Many of the programs described in this report align with the goals and requirements of similar grant programs.

Finally, alternate reimbursement models may remove the sustainability concerns that currently impede the seven strategy proposals. New models may not initially cover the start-up costs of EMS programs, but they could contribute to long-term sustainability. One potential reimbursement model involves creating a system of referral fees to be paid by hospitals or insurers on a per-patient or per-visit basis for those enrolled in any programs. There are also subscription-based models paid by individuals or insurers who then gain access to additional services. MedStar uses both referral fees and subscriptions as a funding source for its Mobile Integrated Health (MIH) program.[48]

Currently, EMS is only reimbursed by CMS for each transport to an emergency department. However, some hospital reimbursement models have moved or are moving toward outcome-based payments and shared-savings models. If EMS embraces a similar approach, systems would no longer be paid per transport but instead by the number of patients paramedics safely treat in the field. This change would allow ATCEMS to ensure the sustainability of the proposed innovations and encourage all healthcare providers to work together as an integrated network. Such a substantial change to the reimbursement structure may take time but will bring hospitals, insurers, and EMS systems together to improve community health.

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[44] Reader Films, St. David's Foundation, "EMS Community Health Paramedic Program," *YouTube* video, 3:03, August 14, 2014, https://www.youtube.com/watch?v=8OFyR764YiU.

[45] Kristofer Smith, Jonathan Washko, Asantewaa Poku, and Elizabeth Quellhorst. "I Am Worried. Can You Send Someone to See My Mom?" (presentation, 26th Annual IHI National Forum on Quality Improvement in Health Care, Orlando, FL, December 9-10, 2014).

[46] John Murawski, "Wake County EMS Has One Solution to Overcrowded Emergency Rooms," *The News and Observer*, March 14, 2015.

[47] Tessa McCallion, "CMS Innovation Grant Recipients Share Secrets," *The Journal of Emergency Medical Services*, accessed March 27, 2015, http://www.jems.com/articles/2012/10/cms-innovation-grants-recipients-share-s.html.

[48] Zavadsky and Hooten, *Mobile Integrated Healthcare*. (See Appendix A of the cited source for more information on funding for other MIH programs across the country.)

Legal and Liability Concerns

There are four entities that provide direct or indirect oversight to ATCEMS: the State of Texas, the City of Austin, Travis County, and the OMD for the ATCEMS system. This section illustrates the relationship of each of the four entities to ATCEMS and the specific legal or liability concerns raised by implementing any of the individual strategies. Based on available information, including interviews with officials from each entity, none of the seven strategies present insurmountable legal or liability barriers.

State of Texas

State oversight of EMS in Texas is relatively limited. Under Texas law, compliance, regulation, licensure, and enforcement of EMS fall under the purview of the Department of State Health Services' Office of EMS/Trauma Systems Coordination.[49] However, aside from the periodic review of protocols and investigations of complaints, this office primarily serves as a source of expert information and advice for EMS organizations in Texas.

The responsibility for licensing EMS medical directors provides an opportunity to ensure that medical directors and the EMS organizations to which they delegate practice are operating according to state and federal laws. The issue of delegated practice is key in understanding how EMS systems in Texas work. According to Title 3, Section 157.001 of the Texas Occupations Code, the state gives licensed physicians the authority to delegate medical practice to persons under their supervision who are properly qualified and trained.[50] Within Texas, supervision is understood to include the provision of protocols, which guide medics in providing pre-hospital care to consenting patients.[51] Medical directors are also responsible for establishing scope of practice for the medics working within their organizations.

Therefore, from the perspective of the State of Texas, as long as the medical director properly documents changes to the medic scope of practice and revisions of protocols, there are no legal barriers to implementation concerning the seven proposed strategies.[52] Furthermore, because the State of Texas does not extend any type of liability insurance to local EMS organizations, there are no relevant liability barriers to implementation imposed by this particular entity.

City of Austin

ATCEMS is a function of the City of Austin, which means that the City is directly responsible for addressing legal or liability issues relating to ATCEMS now and in the future. However, there is no indication that implementation of these strategies would pose any new legal problems,

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[49] Joe Schmider, Texas State Director of Emergency Medical Services, Texas Department of State Health Services' Office of EMS/Trauma Systems Coordination, interview by author, April 2, 2015.

[50] Texas Occupations Code, Title 3 Health Professions, Chapter 157 Authority of Physician to Delegate Certain Medical Acts. Austin, Texas, September 1999, accessed April 16, 2015.

[51] Texas Medical Board Rules, Chapter 193, Standing Delegation Orders. Austin, Texas, February 1999, accessed April 16, 2015.

[52] Joe Schmider (Texas State Director of Emergency Medical Services, Texas Department of State Health Services' Office of EMS/Trauma Systems Coordination), interview by author, April 2, 2015.

as long as the proper authorization and documentation of changes comes from the OMD.[53] In the case of liability, it also appears that the barriers to implementation are potentially mild.

Like many large cities in Texas, the City of Austin is self-insured. This means that it purchases neither vehicular nor medical malpractice insurance from an outside provider.[54] Currently, damages incurred through the execution of ATCEMS duties can result in lawsuits against the City. According to the Texas Civil Practice and Remedies Code, Sec. 101.0215, municipalities do not have total sovereign immunity and can be held liable for property damage, personal injury, and death resulting from governmental activities.[55] This code includes both the provision of health services and the operation of emergency medical vehicle services. However, due to tort reform, there are limits on the damages that a municipality is required to pay. The municipality itself is liable, not the individual employee involved in the event that caused harm.[56]

As an additional measure of protection for City of Austin employees, the City Council passed a resolution in April 1987. The measure further provides government employees with indemnification from liability resulting from executing their duties as government employees, within certain limits.[57] Should any of the seven strategies be implemented, there is no indication at this time that they would introduce risk incommensurate with current ATCEMS activities. The key point is that the strategies, whether they involve change to scope of practice or protocols, must be properly defined and documented by the OMD.

Travis County

The legal and liability implications of changes to ATCEMS services impact Travis County in a similar, though less significant, way than in the case of the City of Austin. This is primarily due to the fact that Travis County's relationship to ATCEMS is contractual through the Interlocal Agreement Between the City of Austin and Travis County Office of Emergency Services. Though both Austin and Travis County contribute services as part of the agreement, the City of Austin holds the responsibility to provide ground transport and oversee medical supervision and compliance.[58] Like the City, the County is self-insured for vehicular insurance, but because it contracts with the City for ground transportation, the County would not be directly responsible in the case of an accident. Were Travis County to be named in a suit, it is unlikely that the proposed strategies would necessitate greater risk than under ATCEMS's existing programs.

Office of the Medical Director

As described throughout this section, a great deal of the authority to decide whether or how to implement EMS programs and strategies, including the seven discussed in this report, rests with the OMD. The OMD is led by a medical director, the licensed physician who delegates specific

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[53] Leslie Milvo (Risk Management Director, City of Austin), interview by author, April 2, 2015.
[54] Ibid.
[55] Texas Civil Practice and Remedies Code, Title 5 Governmental Liability, Chapter 101 Tort Claims, Austin, Texas, June 2011, accessed April 16, 2015.
[56] "What is the Texas Tort Claims Act." Texas Municipal League, February 2005, accessed April 26, 2015.
[57] Leslie Milvo (Risk Management Director, City of Austin), interview by author, April 2, 2015.
[58] City of Austin and Travis County, "Interlocal Agreement Between the City of Austin and Travis County for Emergency Medical Services," Austin, Texas, 2009, accessed April 16, 2015, 2.

medical practices to ATCEMS medics and first responders. Specifically, the medical director is classified as an off-line medical director, as defined by the Texas Medical Board Rules.[59] To enable the delegation of practice, protocols are used to provide detailed directions for medics practicing in the field.

From the perspective of the State of Texas, the City of Austin, and Travis County, the key issue in assessing legality and liability issues depends on the actions of the medical director. If the medical director chooses to support and facilitate implementation of any of the seven strategies, then proper scopes of practice and protocols must be created. Through the use of these protocols, ATCEMS medics could perform any delegated practices under the direction of protocols without increased liability for the City of Austin or Travis County. However, the impact of medical malpractice under the care of a medic has a significant impact on the medical director. Though the latitude available to EMS medical directors in Texas is in many ways conducive to innovation, it also places a great deal of responsibility on the individual in that position. Therefore, though this section demonstrates that there are no outright legal or liability barriers to implementing any of the seven strategies, the medical director must determine how much risk is reasonable or prudent to undertake.

Labor Perspective

The seven strategies proposed in this report will increase the responsibilities of paramedics and require the hiring of new staff to maximize patient and community impacts. The cooperation and input of the ATCEMS Employee Association (ATCEMSEA) will be essential throughout the planning, implementation, and review of these seven strategies. In anticipation of this possible barrier, researchers communicated with ATCEMSEA leadership during the creation of this report to get the organization's input and feedback on the proposed strategies' impact on the labor force. A labor union representative reviewed each of the seven strategies and expressed support for implementing all of them. Continued support from ATCEMSEA is expected in the future if the strategies are implemented in Austin-Travis County.

[59] Texas Medical Board Rules, Texas Administrative Code, Title 22, Part 9, Section 197.3 (Austin, Texas, February 1999).

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Chapter 5. Mobile Integrated Healthcare: Expansion of the Community Health Paramedic Program

Strategy Description

In 2009, ATCEMS founded the Community Health Paramedic Program to reduce the number of non-emergent 911 calls received in Travis County. The primary role of a CHP is to meet with frequent utilizers of emergency services and link them to existing healthcare providers in the area.[60] By addressing the root causes of high utilizers' needs, CHPs aim to free up emergency services for truly emergent situations, reduce emergency department congestion, and allocate resources to other community health issues. Previously, the CHP Program partnered with Austin-Travis County Integral Care's Mobile Crisis Outreach Team (MCOT) to respond to patients experiencing psychiatric crises. Beginning in the summer of 2014, this function was delegated to other field medics across ATCEMS, thereby enabling CHPs to focus primarily on frequent utilizers of 911 services.

Now in its sixth year, the CHP Program has grown to include seven paramedics. In any given month, there are an average of 20 patients enrolled in the program, requiring the CHP team to make up to 50 in-home visits.[61] There are approximately 240 unique patients per year in the program. The average patient receives CHP assistance for 30 days.[62] The program is not intended to replace social workers, nurses, or doctors. Rather, CHPs seek to connect community members in need with other healthcare providers such as Austin-Travis County Integral Care (ATCIC), Lone Star Circle of Care, and Bluebonnet Trails. Within ATCEMS, CHPs interact with the largest variety of community organizations.

The CHP Program receives referrals from automatic reports generated at the 911 call center, from the Austin Fire Department, and from other medics in the field. There are no set procedures for patient identification and enrollment. Patients are identified through a collaborative effort from personnel within various emergency service departments.

When interacting with patients, the paramedic addresses five main focus areas. First, he or she evaluates the patient's financial capacity with respect to healthcare. In many cases, the patient is financially marginalized and requires monetary assistance to cover personal healthcare expenditures. Most patients are eligible for Medicare, Medicaid, the Medical Access Program (MAP), or other subsidized health insurance programs.

Second, the paramedic addresses whether a patient has reliable transportation. Many patients simply need a way to get to a doctor's office. This can be arranged with the City of Austin

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[60] Austin-Travis County EMS, "Austin-Travis County EMS: Community Health Paramedic Program," AustinTexas.gov, accessed September 18, 2014, http://www.austintexas.gov/edims/document.cfm?id=154794.

[61] Andy Hofmeister, ATCEMS Commander in charge of CHP Program, email to author, March 12, 2015.

[62] Andy Hofmeister, ATCEMS Commander in charge of CHP Program, discussion with author, February 2, 2015.

through the Capital Area Rural Transit (CART) system or through a Medicaid cab. Additionally, many nonprofit agencies, like Easter Seals, provide transportation services.

Third, the paramedic attempts to establish or reestablish the patient's connection to primary care services. The paramedic often helps patients set up initial medical appointments. CHPs regularly use CommUnityCare Austin to accomplish this task. CommUnityCare offers comprehensive health services ranging from dental and behavioral disorder assistance to women's health services and primary care.[63]

Fourth, the CHP assesses the patient's mental health needs. For basic mental health needs, the CHP often connects patients to ATCIC. CHPs are also contacted to aid homeless patients. In such cases, the paramedic can connect the patient with a number of non-profit organizations such as the Austin Resource Center for the Homeless (ARCH).[64] Additionally, if the patient needs to be connected to social service professionals, the CHP can contact Austin Travis County Health & Human Services (TCHHS) where caseworkers and social workers provide assistance to all Travis County residents.[65] Finally, the CHP must ensure that the patient has reliable access to pharmacy services.

Medicaid and Medicare do not reimburse the work of CHPs, requiring ATCEMS to pursue other funding sources to maintain the program. The St. David's Foundation provided initial funding and response vehicles for the CHP Program in 2009.[66] In 2015, the CHP Program was funded through the ATCEMS operating budget and received additional support from the Medicaid 1115 Waiver.

Through proactive intervention strategies, the CHP Program has succeeded in reducing the number of non-emergent 911 calls. According to the Austin Travis County Community Care Report, ATCEMS has experienced a 62 percent reduction in non-emergent calls from program enrollees.[67] However, this reduction figure does not account for people who have left the area or for patients who would have improved regardless of program participation. Therefore, the 62 percent reduction estimate may be inflated, but the decline in 911 calls is still relevant.

As the population of Austin-Travis County continues to grow over time, community demand for CHP services will also rise. To accommodate growing demand, this strategy seeks to expand the CHP Program by adding five new CHPs. Each CHP will work four nine-hour shifts per week staggered throughout the daytime hours to provide better coverage outside of the existing 8 a.m. to 5 p.m. schedule. The additional CHPs will perform the same tasks and duties as the existing

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[63] "Behavioral Health Services," *CommUnityCare Health Centers*, accessed October 15, 2014, http://communitycaretx.org/programs/.

[64] Austin-Travis County EMS, "Austin-Travis County EMS: Community Health Paramedic Program."

[65] Ibid.

[66] Austin-Travis County EMS, "ATCEMS Commander Andrew Hofmeister Wins VFW Gold Medal Award," *AustinTexas.gov*, accessed October 2, 2014, https://austintexas.gov/blog/atcems-commander-andrew-hofmeister-wins-vfw-gold-medal-award.

[67] Community Care Collaborative, "Community Health Paramedic Navigation Program," *Central Health*, accessed February 20, 2015, http://texasregion7rhp.net/wp-content/uploads/2012/09/CCC-Community-Paramedic-Patient-Navigation-Program-Cat-2.pdf.

CHPs, and current referral structures and program procedures will remain unchanged. The expanded program will simply add staff members to allow for increased program enrollment throughout the community. Augmenting program staff will also enable the current CHP commander to decrease his field caseload so that he can devote more resources to streamlining operating procedures and developing enrollment protocol.

Comparable Programs

Over the last five years, EMS-operated community health programs like ATCEMS's CHP Program have emerged across the United States. Successful programs include the Western Eagle County Ambulance District in Eagle, Colorado, the MedStar EMS Loyalty Program in Fort Worth, Texas, the Ottawa Paramedic Service in Ottawa, Canada, the Resource Access Program in San Diego, California, and the House Call Program in Farmington, Maine. Similar to the CHP Program, MedStar enrolls patients in a series of concurrent home visits designed to address medical needs through medication assessment, lifestyle and environmental changes, and nutritional support. Since 2009, approximately 2,200 patients have completed the MedStar Program.[68] In five years, the program reduced healthcare expenditures by an estimated $3.2 million.[69] Additionally, MedStar reported a 29.4 percent reduction rate in non-emergent 911 calls from program participants.[70]

Some programs incorporate advanced technology to target high utilizers of emergency services. San Diego's Resource Access Program uses a health information technology program and a regional health information exchange to identify frequent non-emergent callers. The system identifies frequent callers by their phone numbers and generates a continuously updated list organized by week, month, or year.[71] Through grant support, Resource Access Program leadership worked with software developers to expand their technological capacities. Access to such software allows paramedics to easily identify frequent users and track patient medical history. Since the program's implementation, San Diego has reported a 38 percent decrease in interactions with frequent callers.[72]

Impacts in Natural Units

Expanding the existing CHP Program to include five additional staff members will increase existing labor and capital resources, allowing the CHP Program to reach more patients. ATCEMS will need to hire or transfer more Medic II-level employees into the program. ATCEMS could consider hiring Medic I employees to work on specific program functions such as initial assessment or patient enrollment. An increase in CHP staff will also require additional

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[68] MedStar Mobile Healthcare, "Community Health Program," *MedStar911.org*, accessed March 10, 2015, http://www.MedStar911.org/community-health-program.

[69] Ibid.

[70] Ibid.

[71] James Dunford and Anne Marie Jensen, "Data Driven Systems Help Emergency Medical Services," *Agency for Healthcare and Research Quality*, accessed April 1, 2015, https://innovations.ahrq.gov/profiles/data-driven-system-helpss-emergency-medical-services-identify-frequent-callers-and-connect.

[72] Ibid.

captain and administrative assistant time. Finally, to support the expanded staff, ATCEMS will need to invest in more equipment such as SUVs, computers, and medical supplies.

By increasing the number of CHPs, ATCEMS can also expect CHP Program outcomes to increase. It is assumed that each new CHP team member will handle a caseload of 20 patients per month, thereby reaching 240 patients per year. In any given year, the new CHPs will then reach an additional 1,200 frequent 911 callers, leading to a reduction in 911 calls, ED visits, and hospital admissions.

ATCEMS is assumed to experience a 20 percent reduction in 911 calls by CHP Program participants. This figure represents a conservative estimate of reported reduction rates. The Fort Worth MedStar Program reported a 29.4 percent reduction rate, while the ATCEMS Community Care Report reported a 62 percent reduction rate. These figures, however, do not account for patients who would improve regardless of program participation and/or patients who may leave the system (perhaps by moving or dying).

Time invested in preventing future non-emergent 911 calls will allow ATCEMS ambulances to remain available for life-threatening emergencies and may eventually reduce community need for transport services. Increases in CHP staff will also provide CHP Program Commander Andy Hofmeister with time to assess programmatic procedures and functions. Added administrative support will allow the team to create a structured referral system for patients entering the CHP Program. Additionally, the added staff will aid the CHP Program in improving its patient tracking system. CHPs will then be able to proactively identify more frequent callers than would otherwise be possible.

Implementation Costs and Effects on Reimbursement

The proposed expansion of the CHP Program does not require the implementation of any new programmatic elements. Therefore, the economic analysis is focused on current program costs, which are multiplied as needed to account for additional staff members and patient contacts. Existing budget information suggests that the net implementation cost for the expanded CHP Program will be $1,142,515 in its first year. Start-up outlays account for most of the initial cost of implementation. In its first year, ATCEMS must pay for equipment and training that will be reused or unnecessary in later years. In the years following the initial program expansion, annual implementation co sts decrease significantly to approximately $566,523 in 2017.

The cost of implementation includes staff salaries, technological updates or additions, and operational medical supplies. Key personnel involved in implementing this strategy include a division chief, commander, captain, administrative assistant, and Medic II employees. The time commitments for each staff position are accounted for using appropriate percentages. For example, the administrative assistant only requires a 50 percent time commitment to the CHP Program. Technology costs include items for each CHP such as cell phones, laptops, and computer software updates. Programmatic supplies accounted for in the economic model range from response vehicles to disposable medical equipment such as gloves and bandages.

The cost of implementation ($1,171,891 in the first year) is offset slightly by the implementation savings in vehicle costs ($29,376). This figure represents funds ATCEMS will save by reducing

responses, conserving fuel, and preserving other one-time use medical supplies. These savings continue in following years. Because the department will not need to purchase vehicles, laptops, and introductory training materials after its first year, implementation costs from 2017 to 2020 will largely consist of staff salaries and the replacement of medical supplies. However, the department will eventually need to replace start-up equipment in future years.

The CHP Program is not reimbursed by Medicare or Medicaid and is offered free of charge to enrolled patients by ATCEMS. The CHP Program does not offer any transport services to enrollees but instead aims to prevent non-emergent ambulance transports. The program is assumed to yield a 20 percent reduction in unnecessary ambulance transports, which amounts to nearly 4,800 avoided transports in the first year and 24,000 avoided transports in the first five years. As a result, an expansion of the CHP Program is expected to reduce reimbursements by $1,886,573 in 2016 and $2,096,192 in subsequent years. For more detailed information on the implementation costs and effects on reimbursement for this strategy, see Appendix A.

Payer Savings Analysis

The CHP Program provides preventative healthcare and ultimately helps payers save money by treating and identifying medical issues before they become emergent. Though the program causes a loss in ATCEMS reimbursements, the CHP Program produces an overall payer savings of $14,919,293 in the first year. Payer savings continue to increase in following years. Based on the average cost of an emergency department visit, payers save $4,186,080 in prevented emergency department admissions in the first year of implementation. The reduction in non-emergent 911 calls saves payers $98,093 in avoided calls and $1,788,480 in avoided transport reimbursements. Finally, payers can expect to save $8,846,640 in avoided hospital admission reimbursements. Overall, the healthcare system and quality of life for patients stand to be improved by an expansion of the CHP Program. For more detailed information on the payer savings associated with this strategy, see Appendix A.

Barriers to Implementation and How to Address Them

The barriers to implementation for the CHP Program are all addressed in Chapter 4. No additional barriers are caused by this strategy.

Evaluation Plan

To evaluate the effectiveness of the CHP Program, ATCEMS should schedule an annual program review focused on community needs, patient outcomes, costs, revenues, and staff satisfaction scores. First, ATCEMS will need to reevaluate and improve its mechanisms for identifying and enrolling patients in the CHP Program. ATCEMS can collect data on the changing number of non-emergent 911 calls before, during, and after patients participate in the program. The creation of data tracking systems will enable ATCEMS to improve the CHP Program over time and better serve the community.

Patient outcomes may also be evaluated annually. ATCEMS should collect data on patient health prior to program enrollment, the length of patient enrollment, and patient health following program graduation. CHPs will be responsible for tracking the cost of providing care by

recording their use of supplies and technology. Additionally, by recording the number of patients enrolled annually, CHPs will be able to estimate lost reimbursements. In the future, ATCEMS may consider charging for services or seeking support from benefiting institutions such as insurance companies and hospital networks. Finally, paramedics and supervisors involved in the CHP Program should be subject to annual performance reviews.

This strategy's economic model outlines the net cost of implementation and net change in reimbursement over five years. The model also examines the savings that the program will generate from various payer perspectives. The CHP Program parameters outline the details needed to assess the cost of implementation, reimbursements, and savings, along with the 911 call reduction rate and transport reduction rate. A list of parameters relevant to this strategy can be found in Appendix A.

Chapter 6. Mobile Integrated Healthcare: Partnerships with Hospitals for Post-Discharge Care

Strategy Description

In this strategy, paramedics will work directly with hospital staff to provide discharge case planning, management, and care. Patients identified for program participation include those who have been discharged from the hospital following treatment for one of five specified conditions and who are at risk for readmission within 30 days of discharge.

As part of its Hospital Readmission Reduction Program, CMS targets patients with one of five conditions: heart attack, heart failure, pneumonia, hip or knee replacement, and chronic obstructive pulmonary disease (COPD).[73] Beginning in October 2012, the CMS program sought to reduce excessive readmissions from this patient population by reducing Medicare payments to hospitals and by publishing online readmission statistics for every hospital that receives Medicare funds.[74]

The strategy proposed in this section of the report similarly aims to target patients with these five identified conditions and ultimately reduce their number of hospital readmissions. This goal will be accomplished by collaborating with the three local hospital systems (St. David's, Seton, and Baylor Scott & White networks) to provide patient-centered, out-of-hospital care to at-risk community members.

As a pilot program, this strategy will add two CHP-like medics to the staff who will specialize in coordinating with participating hospitals to provide discharge planning and case management for enrolled patients. Similar to the existing CHP Program, the medics will provide in-home care services. Medics in this program, however, must receive distinct training that focuses on the treatment of targeted conditions, best practices for patient care management, and readmission avoidance strategies. ATCEMS will develop the training program for this strategy in partnership with the participating hospitals. The training could potentially include education about the specific care needed for the five conditions and hospital rotations to observe the treatment and discharge of patients with these conditions. Doctors, nurses, and social workers at participating hospitals could provide the training and medical supplies needed to implement the program.

Medics hired for or transferred into the program will work four ten-hour shifts per week. Doctors, nurses, and social workers at participating hospitals will refer patients to the program. These staff members will identify patients suffering from one of the targeted conditions who are at risk for being readmitted to the hospital within 30 days of discharge. Once patients have been referred to the program, a medic will visit the patient at his or her home to explain how the

[73] "Readmission Reduction," *Centers for Medicare and Medicaid Services*, accessed April 7, 2015, http://www.medicare.gov/hospitalcompare/readmission-reduction-program.html.
[74] Ibid.

program will operate. The medic will then request that the patient sign a form denoting whether he or she accepts or declines program admission.

If a patient chooses to participate in the program, medics may pursue one of two approaches to enrollee care plans. The first option is a uniform model, in which each patient receives the same basic care plan. MedStar Mobile Healthcare utilizes this form of patient care plans. The second approach is a customized care plan, in which case managers and doctors pick from a menu of care options to create an individualized plan for each patient. St. David's Healthcare utilizes this form of patient care plans. More information about these plan options will be provided in the next section of the report.

Upon enrollment, program participants will receive five scheduled visits from a medic in the 30-day period following their discharge from the hospital. The care management provided in these visits will depend upon the care plan model chosen by ATCEMS. However, both models will emphasize safely keeping patients out of the hospital. Additional unscheduled visits may also take place based on patient needs.

In this pilot program, two medics will each see a total of 15 patients per month for 12 months, or 180 patients per medic in a year. The referring hospital will pay a fee for each enrolled patient in the program, but the fee amount will depend upon the care plan model selected by ATCEMS. To conduct an economic analysis, this report used MedStar's model and assumed that a flat fee of $800 would be paid by hospitals for each enrolled patient.

Comparable Programs

Several other EMS providers have successfully implemented variations of this strategy in their own service areas. One of the most well-known providers is MedStar in Fort Worth, Texas. MedStar's Readmission Avoidance Program began in 2010 after a group of local cardiologists approached MedStar. The physicians hoped to reduce hospital readmissions by adapting MedStar's pre-existing mobile healthcare programs into an initiative designed to keep cardiac patients out of the hospital. The program now covers all five of the conditions monitored by CMS. Doctors and case managers at participating hospitals refer patients to the program.

The Readmission Avoidance Program offers a uniform 30-day enrollment during which all patients receive the same level of care management through scheduled and unscheduled in-home visits. Patients are also provided with a special phone number that they can use instead of 911 if they have a pressing issue. Although MedStar's program is funded from several different sources, such as a Medicaid 1115 Waiver and hospital transport fees, participating hospitals pay a flat $800 fee for every enrollee whom they have referred to the program.[75] In the program's fifth year, MedStar reported a 72 percent reduction in readmissions among participants judged to present a high risk of readmission based on their medical histories.[76]

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[75] Matt Zavadsky, Director of Public Affairs, MedStar Mobile HealthCare, phone interview by author, February 26, 2015.

[76] MedStar Mobile Healthcare, "Mobile Healthcare Programs Overview," *MedStar911.org*, accessed February 11, 2015, http://www.MedStar911.org/community-health-program.

In the Austin area, St. David's Healthcare runs its own readmission avoidance program in partnership with American Medical Response (AMR), a private EMS provider. The program began approximately four years ago and, until very recently, focused exclusively on patients who had undergone open-heart surgery at the Heart Hospital of Austin. The program began as a way to move patients out of the hospital faster and to prevent readmission. In the last few months, the program has been opened to all hospitals in the St. David's network, though the rollout has been slow. Unlike MedStar's readmission avoidance program, the St. David's program is tailored to each patient who is referred to AMR. Once a patient is referred, AMR meets with the patient's case management team (usually a doctor and social worker); the team then selects a care plan for the patient from a menu of options. AMR subsequently charges the St. David's network an amount based on the individualized care plan.

Many patients enrolled in the St. David's program receive a single visit from an AMR medic who checks the home for potential hazards to the patient such as loose rugs or other obstructions that could cause falls. Other patients receive at least seven contacts, which can range from home visits by medics to phone check-ins. Depending on their care plan, some patients receive constant monitoring by AMR staff through remote sensors and monitors. However, this program remains limited. AMR cannot respond to emergency calls from patients within Austin-Travis County due to franchise restrictions. As a result, if an enrolled patient calls 911, AMR remains unaware and cannot potentially keep the patient out of the hospital by providing care management at the patient's home. Though St. David's Healthcare did not provide data on the program's effectiveness, a representative did state that no patient enrolled in the program has been readmitted to the hospital as a result of his or her original medical condition.[77]

In addition to these two providers, several other EMS systems have implemented readmission avoidance programs. In Reno, Nevada, the Regional Emergency Medical Services Authority (REMSA) operates a readmission avoidance program as part of its paramedicine initiative. REMSA leadership noted that, since 2013, enrollment has increased to 323 patients. [78] In the absence of the program, REMSA expected to experience 71 hospital readmissions from the target population; since implementation, the system has avoided 28 readmissions.[79] In Colorado, the Eagle County Paramedic Service has also successfully implemented a readmission avoidance program and has reported a 76.3 percent reduction in readmissions among participants.[80] In Texas, Fayette County EMS recently started its own readmission avoidance program. While the program is too new to generate meaningful numerical data, Fayette County EMS Director Sharon Muzny has reported anecdotal accounts of highly positive patient health and satisfaction outcomes.

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[77] Brett Steffen, Director of Outreach, One Call, and EMS Relations, St. David's HealthCare, discussion with author, February 6, 2015.

[78] Regional Emergency Medical Services Authority, "REMSA's Community Health Programs Presentation," October 15, 2014.

[79] Ibid.

[80] Zavadsky and Hooten, Mobile Integrated Healthcare.

Impacts in Natural Units

The primary impact of this strategy will be reduced hospital readmissions for those enrolled in the program. The estimated impact of this strategy in Austin-Travis County will depend upon the underlying base risk level of the population enrolled in the program. If the population enrolled in this program is at a very high risk for readmission based on patient medical history, as seen in MedStar's program, then the benefits will be higher. Conversely, if less is known about the risk level of the population or if the program is system-wide rather than targeted to a high-risk group, then the enrolled population presents less initial risk for readmission. Therefore, the estimated benefits will be lesser.

As a result, two economic analyses have been conducted to show the impact to ATCEMS at each of the two risk levels. To estimate the program's impact, these analyses assume that ATCEMS will experience the same level of success in its program as the two comparable agencies observed. As seen in Table 6.1, there will be a considerable difference in impact depending upon the base risk level of the population enrolled in the program. If the enrolled population has a high risk of readmission, then an impact of approximately 259 avoided readmissions to the hospital can be expected. If the enrolled population has a lower risk of readmission, then an impact of approximately 31 avoided readmissions to the hospital can be expected.

Table 6.1
Impact of Hospital Readmission Avoidance Program

Risk Level	Number of Patients Enrolled	Readmission Rate without Program	Number of Readmissions without Program	Readmission Rate with Program	Number of Readmissions with Program	Readmis-sions Avoided
High	360	100%	360	28%	100.8	259.2
No Information	360	22%	79.2	13.3%	47.88	31.32

Sources: MedStar Mobile Healthcare, "Mobile Healthcare Programs Overview," MedStar EMS, http://www.MedStar911.org/community-health-program; and Regional Emergency Medical Services Authority, "REMSA's Community Health Programs Presentation," October 15, 2014.

In addition to these specific outcomes, the program will have a number of impacts on ATCEMS, enrolled patients, and participating hospitals that could not be quantified in this report. For ATCEMS, a successful Readmission Avoidance Program could serve as a catalyst for additional programs and partnerships, as seen in Fort Worth. After its initial readmission program success, MedStar began running programs in partnership with home health and hospice groups. This could provide additional funding sources for ATCEMS. For patients, the program could improve individual quality of life by helping enrollees manage their conditions in their homes rather than at a hospital. Finally, the hospitals will also reap benefits from this program. As previously mentioned, CMS has begun penalizing hospitals with high readmission rates for the five targeted conditions. This program seeks to keep readmission numbers low. Thus, the participating hospitals will avoid the fines for high readmission rates and the damage to their reputations that results from published high readmission rates.

Implementation Costs and Effects on Reimbursement

ATCEMS will face high start-up costs because this strategy requires the creation of a new program. For analysis purposes, the research group estimated the net cost to implement the strategy in its first year and the net present value (NPV) of the implementation costs in the five years following implementation. The readmission reduction strategy has two potential target populations to analyze—the high-risk group and the no target risk level group. ATCEMS will experience different costs depending upon which group is enrolled in the program. If the high-risk population is targeted, then the estimated net cost to implement in the first year will be $409,423, and the NPV of the five-year net implementation cost will be $1,014,007. If the no target risk population is enrolled, then the first-year cost will be slightly higher at $411,439, and the NPV of the five-year net cost to implement will be $1,023,091.

The net implementation costs capture a number of purchases that ATCEMS will have to make to begin the program. These purchases are the same across both target population groups. The major ATCEMS expenses will include the labor cost of the two additional Medic II employees, who will each receive an average salary of $61,152. Other major start-up costs for ATCEMS include the purchase of the necessary vehicles, associated technological gear, and additional medical equipment. Some of the costs to ATCEMS will be ongoing, such as salaries for the medics, while others will be one-time costs, such as vehicle purchases. A full list of the cost parameters relevant to this strategy can be found in Appendix A.

In addition to implementation costs, ATCEMS will also face changes in reimbursements, as one of the main purposes of the program is to avoid ambulance transports to the hospital. The impact on ATCEMS will again depend upon the risk level of the enrolled population. If a high-risk population is enrolled in the program, then the first-year net increase in reimbursement will be $176,754; the NPV of the five-year net increase will be $921,207. If the no target risk population is enrolled, then the net increase to the ATCEMS reimbursement will be significantly larger. In the first year, there will be a reimbursement increase of $261,898, and the NPV of the five-year net increase will be $1,304,970. For more detailed information on the implementation costs and effects on reimbursement for this strategy, see Appendix A.

Payer Savings Analysis

Because this strategy has two potential target populations, the savings for payers (primarily insurers) will differ depending upon the population ATCEMS chooses to target. The calculation of these savings utilizes several parameters concerning reimbursements for emergency department visits, hospital admissions, and ambulance transports.

The largest payer savings for both target populations will result from the reduced number of hospital readmissions. If a high-risk population is enrolled in the program, then the total savings for payers from avoided hospital readmissions amounts to $3,025,551 in the first year of implementation. If the no target risk population is enrolled, then this number falls to $365,587 in the first year of implementation.

The second largest payer savings will result from the reduced number of patient visits to the emergency department. If a high-risk population is enrolled in the program, then the payer

savings resulting from reduced emergency department visits will amount to $238,607 in the first year. If the no target risk population is enrolled, then this number falls to $28,832 in the first year.

The final source of payer savings comes from avoided ATCEMS transports. If a high-risk population is enrolled in the program, then the payer savings from avoided transports will amount to $96,846 in the first year. If the no target risk population is enrolled, then that number drops to $11,702 in the first year. This comes to a grand total of $3,361,004 in payer savings in the first year with a high-risk population and $406,121 in payer savings when no risk level is targeted. For more detailed information on the payer savings associated with this strategy, see Appendix A.

Barriers to Implementation and How to Address Them

In addition to the barriers mentioned and outlined in Chapter 4, two other barriers uniquely apply to this strategy. Further, it should be noted that this strategy is expected to have less of a problem with sustainability than the other strategies detailed in this report. The strategy envisions that participating hospitals will pay ATCEMS for program enrollees. This will considerably offset both the implementation costs and the loss of reimbursements from emergency department transports associated with the discharge planning strategy.

The first of the unique barriers involves a preexisting program operated by St. David's Healthcare. St. David's Healthcare is already executing a form of this readmission avoidance program in partnership with AMR, as detailed earlier in this report. St. David's leadership has expressed two concerns about working with ATCEMS in such a program. First, the patients identified by hospital staff for program enrollment could lie outside of ATCEMS's catchment area. Thus, those who live beyond Travis County limits are left without care after discharge. The St. David's network (and other hospitals, if they to agree to participate) would still be at risk for high readmission rates from those patients left unattended. Second, St. David's leadership feared that partnering with ATCEMS would create an unfavorable impression among community members and other hospitals because ATCEMS holds a monopoly on 911 calls. This program could create the suspicion that St. David's facilities are receiving kickbacks when ATCEMS paramedics take patients to this system of hospitals.

To implement the program using ATCEMS personnel, St. David's representatives must be allayed of their present fears. To avoid the appearance of kickbacks, all area hospitals must equally participate in the post-discharge care program. Evidence must also be produced to demonstrate that this program will significantly reduce the readmission rates of enrolled patients.

ATCEMS is the only agency that responds to 911 calls in Austin-Travis County. If the St. David's network continues in its partnership with AMR, the network will be unable to avoid readmissions if any enrolled patients call 911. ATCEMS will not be aware that the patient is working with AMR to avoid readmission and thus will not have the information or incentive necessary to divert the person from the hospital. By partnering with ATCEMS, St. David's could avoid this problem and likely develop a more effective program that diverts patients more reliably from the hospital during the 30-day post-discharge period.

To solve the network's catchment area concern, ATCEMS could contract with other EMS agencies to provide services to patients who live beyond Travis County borders. When St. David's leaders were contacted, representatives expressed interest in a program that was able to address both of their original concerns and provide a comprehensive post-discharge care program.[81]

The second unique barrier arises because this strategy would involve paramedics providing scheduled care management for patients with chronic conditions in their homes. Home healthcare providers and other similar entities have traditionally dominated this field of healthcare. If ATCEMS were to implement this strategy, other providers could view it as an attempt to compete with existing businesses. This could lead to push-back from these providers and the organizations that represent their employees, such as nurses unions.

Other EMS services have faced this problem. For example, in Everett, Washington, nurses unions, home health groups, and other allied health providers pushed back against EMS efforts to provide community care.[82] In Austin-Travis County, it may be difficult for ATCEMS to convince other providers that paramedics are not attempting to encroach upon existing businesses but rather that they are filling a gap in patient care. Other EMS agencies, such as MedStar and Fayette County EMS, have avoided this issue by communicating directly with allied health providers early in the implementation process. As a result, home health groups, hospice workers, and other allied health providers have been active supporters of the Fort Worth and Fayette County programs. MedStar has even gone on to develop joint programs with hospice and home health providers. Communicating the program's mission and limitations will be an essential part of assuaging the concerns of allied health providers.

Evaluation Plan

In order to accurately evaluate the overall effectiveness of this strategy, ATCEMS will need to implement an evaluation plan. Such a plan should monitor several outcomes, including patient safety, patient health and satisfaction, program costs, and the number of readmissions avoided as a result of program participation. The metrics generated within this evaluation plan can then be used to demonstrate the effectiveness of the program to the Austin City Council, potential partners, and other interested parties.

The metrics concerning patient outcomes and levels of satisfaction can be gathered through several means. Surveys and follow-up visits with the patients can be conducted with enrolled patients after the 30-day period ends to assess participants' current conditions and satisfaction levels. These methods can likely be adapted from existing follow-up strategies already in use by ATCEMS to track patient satisfaction with ambulance transports and the CHP Program. Further, methods to track the cost to implement this strategy can also be adapted from expenditure tracking systems already in place within ATCEMS.

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[81] Brett Steffen, Director of Outreach, One Call, and EMS Relations, St. David's HealthCare, in-person discussion with author, February 6, 2015.

[82] Shaughn Maxwell, Captain, Snohomish County Fire District 1, e-mail to author, October 3, 2014.

The final metric, the number of readmissions avoided as a result of the program, will be more challenging to measure. This value will largely depend upon the readmission risk level of the population targeted for the program. ATCEMS will need to determine how many patients in the enrolled population would have been readmitted to the hospital within 30 days of discharge in the absence of the program and then compare that value to the number of patients enrolled in the program that were readmitted to the hospital. By completing these evaluations, ATCEMS will be able to prove the effectiveness of the program to the Austin City Council and partnering hospitals.

Chapter 7. Alternative Staffing: Nurse Triage

Strategy Description

The nurse triage strategy seeks to address the high volume of low-acuity callers who utilize emergency services and connect them with resources that are more appropriate for their medical needs. In the proposed nurse triage program for ATCEMS, calls that come in to CTECC through 911 that fall into certain low-acuity categories, such as abdominal pain, falls, common cold, allergic reaction, and headache, will be diverted to a nurse for secondary triage. The nurse will utilize triage software protocols, such as the Priority Solutions Integrated Access Management (PSIAM) system/Low Code Program, which uses symptom-based questions to assess caller need.[83] The nurse will use the assessment to direct the caller to the appropriate care.

If the patient needs immediate emergency care, the nurse will refer to dispatch for an ambulance. If the patient needs care within four hours, the nurse may schedule transportation to the emergency department through a contracted taxi service for those with no personal means of transport. If the patient needs care within the next 24 to 72 hours, the nurse can make an appointment for the patient at a participating community or urgent care clinic, as well as schedule transportation to the appointment. If the patient only requires self or home care, the patient is marked for follow-up within 24 hours.

The pilot program will begin with one nurse working 11 a.m. to 7 p.m. Monday through Friday. These hours reflect the peak call times for low-acuity calls eligible for nurse triage, as observed by MedStar Mobile Healthcare in Fort Worth. MedStar found that its core of low-acuity callers—those who utilize 911 as a safety net and have no means of transportation, and are often homeless—began calling around noon. A second peak in the early evening came from working parents and caregivers who either picked up their children from school to find they were sick or who came home to find their elderly relative had fallen during the day.[84] These hours of operation also complement the hours of community clinics, allowing the nurse to schedule follow-up appointments. The hours extend past clinics' closing times to provide support to those needing assistance in the evenings.

Comparable Programs

MedStar Mobile Healthcare has successfully implemented a nurse triage program that links callers with the appropriate resources for their medical issues. MedStar utilizes the Emergency Communications Nurse System (ECNS) for secondary triage, complementing the nurse's training with computer-based algorithms that provide decision support. Specifically, MedStar employs the Advanced Medical Priority Dispatch System® by Priority Dispatch®, an

[83] Greg Scott, Jennie McQueen, Conrad Fivaz, Isabel Gardett, Matt Zavadsky, Neal Richmond, Jeff Clawson, and Chris Olola, "The Distribution of 911 Triaged Call Incident Types within the Emergency Communication Nurse System," *Annals of Emergency Dispatch & Response* (2014): 9-16.

[84] Zavadsky phone interview.

internationally developed and tested protocol.[85] The calls received through 911 are categorized according to acuity and, for those eligible, given a hand-off to the nurse line. Depending on the caller's need, the nurse may decide between a variety of response options: emergency department visit by ambulance transport (higher acuity); emergency department visit by non-emergency vehicle (lower acuity, by taxi); urgent care center or primary care provider visit by the patient's own transport or non-emergency vehicle transport; or self-care at home. The nurse can also connect callers with dentists, poison control, mental health services, and the public health department, among other alternatives.[86]

According to a patient satisfaction survey completed in 2013, 93.4 percent of respondents said that talking with the nurse helped them. On a Likert scale from 1 to 5, in which 5 is "most satisfied," the survey found average scores of 4.6 for satisfaction with the nurse's recommendations, 4.7 for satisfaction with the nurse, and 4.8 for satisfaction with the nurse's understanding of the caller's issue. From 2012 and 2013, the program resulted in 408 avoided transports to the emergency department, resulting in a total charge avoidance of $1,049,376 and payment avoidance of $487,560. Per caller, this amounts to a charge avoidance of $2,572 and payment avoidance of $1,195.[87]

Louisville Metro EMS (LMEMS) is another example of a successful nurse triage model. Launched in 2010, LMEMS's program directs low-acuity calls to nurses who use medical algorithms to identify the appropriate care solution. The PSIAM system was integrated with the 911 call processing system already in place. At its start, students from the local university's nurse practitioner master's degree program manned the system. By 2013, students were replaced by a full-time nurse. Early satisfaction surveys reported that 90 percent of callers were satisfied with their experience, and community care providers began approaching LMEMS requesting to be listed in the nurse's referral network. As of 2013, the nurse line handled 3,000 calls, five times the volume of its first year, and 85 percent of callers were transported to care by a non-LMEMS resource.[88]

A 2014 study published in the Annals of Emergency Dispatch and Response examined the distribution of 911 calls eligible for nurse triage, as well as the distribution of call type as determined by the emergency communications nurse (ECN).[89] ECNs are registered nurses with specialized training in advanced telephone triage. Upon analyzing MedStar and Louisville, the study found the overall distribution presented in Table 7.1.

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[85] Ibid.

[86] MedStar Mobile Healthcare, "911 Nurse Triage Program Overview," *MedStar911.org*, Accessed April 6, 2015, http://www.medstar911.org/Websites/medstar911/files/Content/1089414/MedStar_9-1-1_Nurse_Triage_Program_Overview.pdf.

[87] Ibid.

[88] Neal Richmond and Kristen Miller, "The Front Door to Care: EMS in Louisville Grows Beyond Simple 911 Response," *Integrated Healthcare Delivery*, accessed April 6, 2015. http://emsworld.epubxp.com/i/386989-oct-2014/18.

[89] Scott et al., "The Distribution of 911 Triaged Call Incident Types."

Table 7.1
Distribution of 911 Calls Eligible for Nurse Triage

Overall Percent Distribution of ProQA Chief Complaints in ECNS (N=6,727)			
Sick Person	44.49	Choking	0.83
Falls	20.29	Convulsions	0.45
Abdominal Pain	10.71	Eye Problems	0.31
Back Pain	7.18	Unconscious/Fainting	0.31
Traumatic Injuries	5.04	Heat/Cold Exposure	0.31
Diabetic Problems	2.79	Animal Bites	0.18
Hemorrhage	2.75	Chest Pain	0.16
Headache	1.55	Psychiatric	0.13
Allergies	1.37	Burns	0.12
Pregnancy	1.09	Overdose/Poisoning	0.03

Source: Greg Scott, Jennie McQueen, Conrad Fivaz, Isabel Gardett, Matt Zavadsky, Neal Richmond, Jeff Clawson, and Chris Olola, "The Distribution of 911 Triaged Call Incident Types within the Emergency Communication Nurse System," *Annals of Emergency Dispatch & Response* (2014): 9-16.

Houston EMS also operated a nurse triage program, but the initiative ended after one year. The agency's medical director, Dr. David Persse, reported that medics felt it took too long for callers to complete the nurse assessment and that both the nurses and the algorithm were too conservative. This resulted in a low number of diversions, which did not warrant the additional cost of operating the line. The system also suffered a setback with the death of a young man, whose aunt called 911 and was transferred to the nurse line where the assessment took several minutes to complete before an ambulance was dispatched. Though the nurse assessment was not the cause of the young man's death—he died five days later in the hospital—his death was a significant setback and undermined the otherwise strong reviews the program had received.

Though Houston EMS ultimately discontinued its program, it did find that adding the contracted taxi service was crucial to reducing the number of ambulance transports, as nearly half of the patients referred to nurse triage did not have their own means of transportation.[90]

Impacts in Natural Units

The primary estimated impacts to ATCEMS stem from the diversion of low-acuity callers from emergency services, freeing up resources for higher-acuity callers. Reduced ambulance responses and transports will increase unit availability to respond to critical calls more quickly. Additionally, this will result in decreased wait times in the emergency department, as low acuity-callers are diverted to more appropriate care. Thus, the health of both low-acuity and higher-acuity callers in the community may be enhanced by the use of a nurse triage program.

Estimates for the diversion rate of calls to the nurse triage line for ATCEMS are based on MedStar's experience. MedStar found that within operating hours Monday through Friday (9

[90] David Persse, EMS Physician Director, City of Houston, e-mail to author, March 3, 2015.

a.m. to 5 p.m.), the agency could capture 52 percent of all calls; 7 percent of these were eligible for diversion to nurse triage. Of those calls, MedStar found that 60 percent of patients still required an ambulance transport to the hospital.[91] Of those who were not sent an ambulance, approximately 50 percent used their own transportation to meet their medical needs. The other 50 percent were sent a taxi to go either to the hospital, to a doctor's office, or to an urgent care clinic.

Before sending a taxi, MedStar works with the caller to identify any transportation alternative, such as transport by a family member, friend, or neighbor. MedStar will ultimately send a taxi if no other transport is available. The taxi company will then send MedStar the bill for service, which is the responsibility of the independent payer, called a "pass-through bill." Compared to the $390 in ambulance transport cost, MedStar found that community partners were more than willing to support callers to get to the appropriate care destinations for their needs rather than utilize the emergency system.[92]

This analysis assumes that 52 percent of all calls will occur when the ATCEMS nurse triage line is staffed Monday through Friday 11 a.m. to 7 p.m. and that 7 percent of these calls will be eligible for diversion to nurse triage, 60 percent of those patients diverted to nurse triage will still receive an ambulance transport to the hospital, and 50 percent of those who do not get an ambulance will be sent a taxi. Though the model assumes these diversion rates, small adjustments show significantly different outcomes for ATCEMS and its payers. For example, if 50 percent of those diverted to nurse triage do not receive an ambulance (as opposed to 40 percent) there will then be an avoidance of 460 emergency department transports at a one-year savings to payers of $212,641.

As noted above, the nurse triage line has the potential to reduce the number of inappropriate ambulance transports and the number of ambulance responses that do not result in a transport to an emergency department. To estimate the impact of the nurse triage line in Austin-Travis County, it is important to note that currently, approximately 98.5 percent of all calls received by ATCEMS result in an ambulance response, and 60 percent of all calls received by ATCEMS result in an ambulance transport to the emergency department. Therefore, if the nurse triage line has the same success rate at avoiding ambulance transports to the hospital in Austin-Travis County as it has in MedStar's catchment area (i.e., 40 percent), then there will be no avoided emergency department transports attributable to the nurse triage line in Austin-Travis County. However, the nurse triage line will still avoid ambulance responses that would not have resulted in an ambulance transport in 38.5 percent (i.e., 98.5 percent less 60 percent) of calls handled by the nurse triage line.

In 2013, ATCEMS received 126,495 calls through 911, responded to 124,017 of them, and provided an ambulance transport to the emergency department to 75,382 of those.[93] Using MedStar's rates, 65,777 calls (52 percent) would occur during the recommended hours of operation for the nurse triage line, and 4,604 (7 percent) of these calls would receive a hand-off

[91] Zavadsky phone interview.

[92] Ibid.

[93] City of Austin, Austin-Travis County Emergency Medical Services 2012-2013 Annual Report.

to the nurse line. Of those calls diverted to the nurse line, 1,842 (40 percent) patients would not get an ambulance response. However, since 40 percent of ATCEMS callers currently avoid an emergency department transport under the current set of assumptions, there will be no additional ambulance transports avoided with the nurse triage line. Rather, the only impact would be 1,768 (98.5 percent less 60 percent) fewer ambulance responses. However, it is useful to note that were ATCEMS willing to increase its diversion rate, it would result in a higher rate of non-response and, in turn, decrease transports to the ED. This could be achieved by expanding the reasons for which a low-acuity caller would not be sent an ambulance.

Implementation Costs and Effects on Reimbursement

Implementing the nurse triage line will necessitate several upfront costs for additional personnel, equipment, software, and space. Recurring costs for the additional employee include the nurse's salary and benefits and his or her supervisor's time estimated as a percentage of the employee's salary. To implement the nurse triage line, one and a half nurses would need to be hired in order to account for sick and personal leave and ensure that the line is consistently covered.

Additional costs include training and quality assurance. Training for the call-takers will be necessary to instruct them on how to do a hand-off to the nurse. This training will require a half-day of work time. Nurses' training will require seven days, which will be provided by the creator of the software; a fee for training will be included in the software's cost.[94] Roughly 3 percent of calls currently receive review for quality assurance, but 100 percent of certain higher-acuity call types receive this review. Quality assurance supervision, or time spent reviewing the nurses' calls, will take approximately 5 percent of a supervisor's time. It is assumed that at the nurse triage program's onset, 100 percent of calls will receive quality assurance oversight, but this will decrease to call-taker standards over time.

The most significant upfront costs include software, such as the triage case management and alternate destinations software packages, which the nurse will need to implement the triage protocols and connect callers with community and urgent care centers. This software also carries recurring costs for licensing and updates that are necessary for its continued use. Other proposed strategies, including transporting patients to urgent care centers and community clinics, utilize the same software, so efficiencies can be found if multiple strategies are chosen for implementation. Appendix B contains a list of parameters relevant for assessing this strategy.

The total first year cost for implementation would be $297,328. This reflects the substantial upfront costs required to establish the nurse triage line. This cost would decrease over the years of its operation—by 2018, the cost would be $167,657. The five-year net cost to implement is $778,837. ATCEMS would also experience a decrease in reimbursement due to fewer ambulance "response only" trips amounting to $59,066 in the first year and $259,627 over five years. These figures are calculated by multiplying the number of avoided "response only" trips by their average reimbursement ($34.06).[95]

[94] James Shamard and Dave Williams, ATCEMS, e-mail to author, April 10, 2015.

[95] Rick Branning, Customer Care Program Manager, ATCEMS, e-mail to author, March 2015.

Currently, the nurse triage strategy does not assume any reduction in transports. This is because ATCEMS already does not provide transport to 40 percent of the callers to whom medics respond. As a result, the predicted 40 percent diversion rate from a nurse triage initiative in effect captures that diversion amount. The primary savings of the nurse triage program stem from a reduction in responses, not transports.

For ATCEMS, the nurse line will also result in a small cost offset. It will generate some savings from fewer miles traveled by ambulances due to the diversion of low-acuity callers from emergency transport. However, the nurse line will not divert enough callers to warrant decreasing fixed costs such as the number of ambulances or medics on staff. For more detailed information on the implementation costs and effects on reimbursement for this strategy, see Appendix B.

Payer Savings Analysis

In this analysis, payers are defined as those responsible for reimbursing ATCEMS services, including insurance carriers and self-pay individuals. The savings to payers are calculated by multiplying the number of diverted responses by their cost. The model estimates that in the first year of the nurse triage program, payers will save $59,066, with a cumulative five-year savings of $259,627. ATCEMS, in turn, will experience a reduction in its reimbursements by the same amount.

As noted, the model's financial calculations are based on call diversion rates experienced by MedStar. However, changing these assumptions even slightly results in large financial impacts both for ATCEMS and its payers. For example, were ATCEMS to divert 9 percent instead of 7 percent of all calls to nurse triage, the one-year cost to implement the program would go down slightly to $294,415, while the payer savings would increase to $75,943 in the program's first year. It is also quite possible that triage nurses will divert more than 40 percent of callers away from transport. This would also significantly change the outputs. In the case of a 60 percent diversion rate, five-year payer savings would dramatically increase to $1,609,708. Changes to diversion rates depend on whether ATCEMS is willing to make certain choices about how to further decrease their responses such as a refusal to send an ambulance for certain low-acuity needs or the waiving of the automatic-response to those calling from public areas, as is done in Fort Worth. However, any savings garnered would ultimately benefit payers through the decreased reimbursements they would be required to pay. There is potential for these savings to be sufficient enough to encourage payers to support the program, depending on the degree to which low-acuity diversions would increase patient satisfaction.

The model also conservatively assumes that 100 percent of callers who are not sent an ambulance will go to the hospital either by taxi or their own transport. If 100 percent go to the hospital, the hospital and its payers will not experience any change in visits or reimbursements. But, in the case that a higher percentage of those diverted do not go to the emergency department and instead go to a community or urgent care clinic, the savings will be greater. Multiple payers will feel these savings. Insurance providers will reimburse lower cost visits, self-pay individuals will find the lower-acuity, more affordable care they need, and hospitals' own uncompensated care costs will decline. This decline will stem in large part from the diversion of low-acuity

callers who use EMS as their safety net to clinics that provide care that is more appropriate for their needs.

Barriers to Implementation and How to Address Them

The success of a nurse triage program is in diverting low-acuity calls to more appropriate healthcare venues before transport. However, patients who call 911 often expect an ambulance to arrive on-scene and, frequently, a subsequent transport to an emergency department. One potential barrier for the successful implementation of the nurse triage program is that it could lead patients to believe they are not getting the public service to which they are entitled. This intangible barrier is not severe, however, as similar programs have not experienced resistance of this kind.

For example, MedStar found that patients were not aware that there was an alternative to emergency care. These patients appreciated having different options. In the cases when the caller requests an ambulance but their needs do not require one, MedStar has protocols in place to support and educate the caller on his or her alternatives. According to MedStar's "three request" protocol, on the caller's first request, the nurse will see if the issue can be addressed through non-emergent care. For example, if the stated concern is a simple bandage change, then the nurse can walk the caller through how to do this task at home. If the caller makes a second request, MedStar employees will offer to send a mobile healthcare paramedic to do in-home care. MedStar reports that callers are often pleased with this option, as they receive the care they want but avoid the time spent in the emergency department. Finally, if a caller makes a third request for an ambulance, MedStar will dispatch an ambulance, regardless of whether or not the nurse deems the caller's needs low-acuity.[96] Public education and marketing could effectively communicate that the nurse triage line is an effort by ATCEMS to offer the most appropriate care for callers' needs and is supported by tested protocols. Education must also stress that callers may still request an ambulance at any time.[97]

A potential second barrier to implementation is the increased risk of errors due to patients being assessed over the telephone. However, this barrier is also a low-level concern for two reasons. First, MedStar indicated that the organization did not face increased liability costs due to the conservative nature of their protocols. Second, patients agree to the alternate disposition and therefore are not forced to receive care they do not want.[98] The call types eligible for nurse triage were designated based on hundreds of thousands of calls that came through emergency communications systems in the U.K. and Australia and are agreed upon by the International Academies of Emergency Dispatch (IAED), the clinical governing board for emergency dispatch globally. Although IAED makes the determination of which calls are eligible for secondary nurse triage, it is within the jurisdiction of individual EMS medical directors to determine which call types on the pre-approved list will be supported in their own systems.[99]

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[96] Zavadsky phone interview.

[97] Zavadsky, Director of Public Affairs, MedStar Mobile Healthcare, e-mail to author, February 13, 2015.

[98] Ibid.

[99] Zavadsky phone interview.

Houston EMS representatives also reported no additional liability in regard to the potential for increased risks when using a taxi for medical transport. The taxi companies felt comfortable transporting patients who had already been triaged by medical personnel.[100]

Ultimately, the primary obstacle to implementing a nurse triage program is financial, due to a reduced number of billable responses and transports and the program's extra costs. One possible solution is that ATCEMS could conduct the program in partnership with area hospital systems and obtain funding from other stakeholders. The MedStar nurse triage program is overseen by a steering committee of stakeholders including representatives from Baylor Medical Center, JPS Health Network, Texas Health Resources, and the Fort Worth Fire Department, among others.[101] MedStar also receives financial support from three area hospitals that pay $25,000 into the program; a fourth hospital pays on a per-patient basis.[102]

Hospitals are incentivized to contribute to similar diversion programs because "a reduction in the readmission rate will be a financial benefit for a hospital currently receiving a financial penalty" for its low patient satisfaction scores.[103] In MedStar's case, hospitals were attracted to a care solution for low-acuity callers who often do not need emergency care but who come to the emergency department anyway, only to wait long hours and eventually be referred to a non-emergency care provider who is more appropriate for their needs.[104] These kinds of patient experiences result in low patient satisfaction scores for hospitals, which are then penalized by CMS.

An additional potential source of funding support comes from Medicaid 1115 Waivers, which are often pursued by states for funding innovative healthcare delivery initiatives.[105] The 1115 Waivers are initially approved for five years with the potential for an additional three-year renewal. Other Austin-Travis County programs, including the CHP Program, have successfully obtained the funding source. However, the changing political and economic conditions of the state, including but not limited to administration change, its potential expansion of Medicaid, and various performance factors of its pre-existing Delivery System Reform Incentive Payment (DSRIP) programs, make the reliability of 1115 Waiver funding difficult to predict.[106]

Evaluation Plan

The success of the nurse triage program is first and foremost contingent on callers' clinical outcomes. MedStar evaluated their program according to several metrics. These include the number and percentage of patients who died within 24 hours from a cause related to the reason

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[100] David Persse, EMS Physician Director, City of Houston, e-mail to author, March 3, 2015.

[101] "MedStar Launches 9-1-1 Nurse Triage Program," *Journal of Emergency Medical Services*, May 17, 2012. Accessed April 8, 2015. http://www.jems.com/articles/2012/05/MedStar-launches-9-1-1-nurse-triage-syst.html.

[102] Zavadsky e-mail.

[103] Zavadsky and Hooten, "Funding Models for Mobile Integrated Healthcare," in *Mobile Integrated Healthcare*.

[104] Ibid., 121.

[105] "Five Key Questions and Answers about Section 1115 Medicaid Demonstration Waivers," *Kaiser Commission on Key Facts*, accessed February 25, 2015, https://kaiserfamilyfoundation.files.wordpress.com/2013/01/8196.pdf.

[106] "1115 Waivers and the Future of Medicaid," *American Bar Association*, accessed February 25, 2015, http://www.americanbar.org/publications/aba_health_esource/2014-2015/january/1115.html.

for the ECNS contact call; re-called 911 and got an ambulance response within 24 hours for a related complaint; were triaged as low-acuity, went to the hospital on their own, and were admitted to critical care unit; and finally, those who followed recommendations and reported a worsening conditioning on a 24-hour call back to check on patient status.

Evaluation should also include patient satisfaction scores. MedStar evaluated callers' level of satisfaction around the following topics: 911 call-taking, the nurse, whether the nurse understood the caller's issue, the nurse's recommendation, and the transport arranged.[107] Additionally, evaluation is necessary on both operational costs and program impacts. Measuring the costs and how those costs are offset both for ATCEMS and the payer community is essential in estimating the true worth of the nurse triage line.

[107] Zavadsky and Hooten, "Funding Models for Mobile Integrated Healthcare."

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Chapter 8. Alternative Staffing: Extended Care Paramedics

Strategy Description

Extended care paramedics (ECPs) provide in-field treatment to patients with low-acuity conditions that do not require emergency department care. The goal is to provide care in the field to reduce unnecessary patient transports and admissions to local hospitals.

In the pilot program, eight paramedics will receive ECP training and go on to work two medics per shift, each responding to calls independently. They will be dispatched to locations in a chase car through a request from on-scene medics or at the time of the initial call at the call center. Once the ECPs arrive on scene, they will assess the patient and determine if he or she requires transport to the hospital or if treatment may be given in the field.

ECPs will receive specialized training to prepare them to care for a patient on the scene. Although the training will not be clinically advanced, it will be substantially different from the typical medic training at the ATCEMS training academy.

Other configurations of this model, such as an ambulance response alongside all ECP responses and having ECPs drive *Sprinters* that would have the capability for patient transport, were considered but determined to be significantly more expensive to operate.

Although the proposed option would not give an ECP the ability to transport, in the rare case that a patient deteriorates rapidly, the ECP would be able to stabilize the patient before an ambulance could arrive and transport the patient to the emergency department.

Comparable Programs

Versions of the ECP model have been implemented in many cities around the world, and vary widely across programs. The following are summaries of three different extended care models, each with unique characteristics that have helped to shape this proposed ECP program. Although not all elements of the following models are included in the ATCEMS model, it is important to consider the context of each program.

Wake County, North Carolina

Wake County EMS in North Carolina implemented an Advanced Practice Paramedic (APP) model in 2009. Their model was created to reduce the occurrence of preventable medical crises for patients with known conditions who require frequent EMS transport, increase the general well-being of patients with mental health issues, and decrease both the time and money spent on patient stays in the emergency department.[108] The main concern of Wake County leadership was that, while ambulance staff had training to deal with basic emergencies, they had little guidance

[108] "Advanced Practice Paramedics," *Wake County Government*, last modified October 1, 2012, http://www.wakegov.com/ems/about/staff/Pages/advancedpracticeparamedics.aspx.

as to how to handle non-emergency situations that often required placing a patient in a facility other than an emergency department. The agency had a significant amount of ambulances tied up for long periods of time in situations that their crews were not adequately equipped to handle.[109] The ultimate goal of the APP initiative was to decrease overall EMS costs by reducing the demand for frequent ambulance transport from low-acuity patients.[110]

The Wake County APP Program began with five APP units in the field, which required hiring 14 APP employees. APPs were on call 24 hours per day, working two shifts with five APPs during the day and two at night.[111] They have since expanded to 17 APPs but continue to work the same shift schedule.[112] Each APP has received a 5 percent salary increase to their existing paramedic pay since the program's implementation.

Wake County EMS has seen positive results from the APP Program. APP units respond to, on average, 53 out of the 165 total system responses per day.[113] Additionally, they reported diverting 167 patients from hospitals in the first six months of the program, which freed up 2,400 bed hours in local emergency departments.[114]

Wake County APPs have many duties that are beyond the scope of the proposed ATCEMS ECP strategy (some of these duties are already carried out by ATCEMS CHPs). Some of their challenges include having a limited but highly specialized staff and addressing the constant need for direct and positive interagency relationships.[115]

Australia

Australia is at the forefront of the ECP emergency care model and has implemented this model in many localities throughout the continent. The ECP model in New South Wales (NSW) is a relatively new program in their emergency care system and has been designed to be consistent with other ECP models utilized throughout Australia. The ECP role was created in 2014 to facilitate the transition from an EMS model based on "taking the patient to care" to one that is "taking care to the patient."[116] The goal of this ECP initiative is to improve the quality of care for patients who may be better treated outside of the emergency department.[117]

ECPs are trained through a combination of direct contact time and self-initiated learning within a hospital and local medical school. Their training prepares them to conduct comprehensive

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[109] "Advanced Practice Paramedic Program," *Wake County Government*, https://icma.org/Documents/Document/Document/302000.

[110] Ibid.

[111] Ibid.

[112] "Advanced Practice Paramedics."

[113] Advanced Practice Paramedic Program."

[114] "Advanced Practice Paramedics."

[115] Advanced Practice Paramedic Program."

[116] "Paramedics," *Ambulance Service of New South Wales*, accessed April 12, 2015, http://www.ambulance.nsw.gov.au/about-us/Paramedics.html.

[117] "NSW Ambulance Service Introduces Extended Care Paramedics," *Medicare Local*, June 19, 2014, accessed April 12, 2015, http://www.swsml.com.au/site/index.cfm?module=NEWS&PageMode=indiv&page_id=499339.

medical exams and create patient management plans that include risk assessment. They work with local healthcare providers in surrounding cities to find the most effective way to address patient needs. Their options for patient treatment include in-field treatment or referral to a general practitioner, health clinic, or alternative community health service.

Since implementing the program, the NSW Ambulance Service reported that 40 percent of the patients referred to ECPs are not transported to an emergency department, in comparison to only 15 percent treated by traditional ambulance care. Additionally, of the group of patients diverted from the emergency department, an average of 36 percent need no further follow-up medical care. Furthermore, they report that diversion rates differ across localities ranging as high as 50 to 70 percent in some locations.[118]

Mesa, Arizona

In 2006, the Mesa Fire Department Emergency Medical Support Program piloted a non-transporting fire response system.[119] The program was initiated after leadership officials recognized that 40 percent of Mesa's 911 calls did not result in a transport to the emergency department.[120] The agency uses Transitional Response Vehicles (TRVs) staffed by a firefighter and a captain paramedic to attend to low-acuity calls that are prescreened at the call center.[121] The new program was initiated in response to a city mandate to reduce response times and medical call volumes.[122] Their priority is to treat patients in the field, avoid unnecessary emergency department visits, and transport psychiatric patients to the most appropriate facility as soon as possible.

Before implementing this system, the Mesa Fire Department staffed each emergency vehicle with four highly trained medics, leaving fewer vehicle crews available for more severe calls.[123] The agency created the new program so that firefighters would be available for the more serious situations while the non-emergent, low-acuity calls would be addressed more appropriately outside of emergency departments.[124] The Mesa model has received positive media attention and has been replicated in many other cities around the country. Mesa reportedly saved thousands of dollars and hundreds of staffing hours as a result of the program.[125]

The Mesa model has helped the emergency services team reduce response times, call volumes, and costs. However, since the TRVs do not use lights and sirens, their response times have

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[118] Ibid.

[119] Gay Nelson, "Mesa Aims to Expand Emergency Health Services," *The Arizona Republic*, September 1, 2013, accessed March 30, 2015, http://www.azcentral.com/community/mesa/articles/20110603mesa-transitional-response-vehicles.html.

[120] Ed Ballam, "Arizona Chief Examines Changes in Fire-Based EMS," *Firehouse.com News*, February 20, 2014, accessed March 30, 2015, http://www.firehouse.com/news/11315508/ariz-fire-chief-examines-changes-in-fire-based-ems-at-firehouse-world-in-san-diego.

[121] Ibid.

[122] Nelson, "Mesa Aims to Expand."

[123] Ballam, ""Arizona Chief Examines Changes."

[124] Nelson, "Mesa Aims to Expand."

[125] Ballam, "Arizona Chief Examines Changes."

increased slightly. With just four TRVs in service, they were able to respond to 1,942 non-emergent calls in four months.[126]

Impacts in Natural Units

In the proposed pilot program, ECPs will be available 24 hours per day. In the first year of the program, two ECPs will work together on each shift with two shifts running per day. It is estimated that each ECP will be able to treat seven patients per shift for a total of 28 patients seen by ECPs per day, or 10,220 patients per year. However, in rare cases, it is possible that a patient seen by an ECP will still require transport to an emergency department. This model assumes that of the 10,220 patients treated by an ECP, 80 percent will be dispatched from the call center and 20 percent will be called in from field medics. Of the 80 percent dispatched from the call center, this report estimates that 10 percent of patients will require further transport to an emergency department. Therefore, 72 percent of calls dispatched from the call center will result in avoided emergency department transports. Additionally, an estimated 100 percent of the calls requested by the field medics will result in avoided transports. These estimates indicate that 92 percent of all ECP responses will result in avoided ambulance transports, compared to 40 percent of current ambulance responses that do not require an ambulance transport.

In addition to over 5,000 avoided emergency department visits, it is likely that paramedics who advance as ECPs will benefit from increased job satisfaction. In other locations where a similar model has been implemented, paramedics who were placed on an alternative career track reported higher job satisfaction. Although this is not a metric that is measured in this report, it is worth noting that this was a consistent effect found in the research.

Additionally, patients seen by an ECP will benefit from decreased wait times for treatment and an overall improvement in their experience within the emergency healthcare system. Of the patients who will be treated by an ECP in the field, 100 percent of them will not have to wait for treatment at an emergency department. Although it is not quantitatively measured in this report, it is likely that patients who avoid a hospital visit will save not only time but also the associated medical costs, lost wages, and childcare costs (when applicable) that are associated with emergency department care. This impact should reduce overall per capita healthcare costs and increase patient satisfaction in the long run.

Implementation Costs and Effects on Reimbursement

The total cost to implement the ECP program in its first year is $1,349,662. The subsequent annual cost of running the ECP program is roughly $350,000 less than the initial implementation cost, due to the preliminary costs associated with ECP training and vehicle procurement. These initial costs will not recur on an annual basis unless additional ECPs and vehicles are added to the program. The total implementation cost includes staff salaries, training, technology, and supplies, but such costs will be offset by vehicle savings. The costs listed are associated with operating the ECP strategy and therefore must be paid for by the City of Austin, regardless of the reimbursements received.

[126] Nelson, "Mesa Aims to Expand."

Because the ECP program will reduce the number of emergency department visits by improving patient treatment in the field, the program will also impact reimbursements to ATCEMS. In the first year of implementation, the net decrease in reimbursement to ATCEMS is an estimated $1,197,971. In the program's first year, ECPs spend two months training; thus, they will see and treat fewer patients. After the first year of implementation, ECPs will work year-round, which increases the impacts and the losses in reimbursements, which are estimated at an additional $200,000. These losses are a result of a much lower reimbursement rate for ECPs providing in-field treatment compared to the reimbursement given for ambulance transport. This model estimates a $264 difference in reimbursements per patient.

If the ECP initiative is implemented, ATCEMS and the City of Austin will lose revenue due to a decrease in transports to area emergency departments. It is important to note that the reimbursements to the City resulting from ECP in-field care are allotted to a different fund than the fund used to pay for the ECP program. Therefore, the funds cannot be adjusted to reduce the apparent loss. Nevertheless, while the ECP strategy results in a net financial loss to reimbursements, overall patient care and satisfaction are likely substantially increased. For more detailed information on the implementation costs and effects on reimbursement for this strategy, see Appendix B.

Payer Savings Analysis

Although there is still a cost for ECP treatment in the field, it is significantly lower than costs associated with ambulance transports and treatment in an emergency department. As a result, the proposed ECP program produces savings to patients and insurance companies. In the first year of the ECP program, payers will save an estimated $1,878,637 as a result of avoided ambulance transports. Additionally, lower care costs associated with in-field patient treatment will result in an additional $3,716,433 in payer savings. Overall payer savings from the ECP model total to an estimated $5,595,070 in the program's first year and an additional $1 million in the years following. For more detailed information on the payer savings associated with an ECP program, see Appendix B.

Barriers to Implementation and How to Address Them

Funding is one of the most severe challenges to the implementation of the ECP strategy. Although ATCEMS will continue to be reimbursed for treating patients in the field, those reimbursements will be less than the reimbursements for ambulance transports to an emergency department, resulting in a net loss in reimbursements over the life of the program.

One possible solution to this barrier involves identifying area hospital networks that may be interested in providing financial support to the program. Both ATCEMS and area hospitals will experience a reduction in reimbursements due to fewer patient transports to emergency departments, but their overall effectiveness in patient treatment and outcomes will increase. This will result in higher patient satisfaction and greater efficiency that may reduce per capita healthcare costs in the long run.

Another option is to seek additional funding from the payers, who will save an estimated $27.5 million over the first five years of the program. Insurance companies may also be willing to

increase the reimbursement rate of ECP treatment in the field from $150 to an amount that will help ATCEMS sustain the ECP initiative in the long run. This will then offset implementation costs of $1.4 million and reimbursement losses of $2 million.

A third solution requires ATCEMS to apply for 1115 Waiver funding to provide temporary financial support. However, this option is only short term, and it is recommended that ATCEMS find a more sustainable method to bolster program funding.

The patient's perception of the emergency care system presents another potential barrier to the feasibility of the ECP strategy. Once an ambulance and medic are in the field, patients may have a higher expectation for transport to a hospital, even though ECPs will be equipped for in-field treatment and patient transport is likely to be unnecessary. There is always the potential that a patient will insist on an ambulance transport, even if the ECP deems it medically unnecessary.

Possible solutions include obtaining immediate patient consent to receive alternative treatment. This may limit the amount of time spent treating a patient in the field if they are ultimately going to insist on transport to an emergency department. Additionally, this solution will move the burden of liability from the ECP onto the patient and help to facilitate more transparency and understanding between the patient and the ECP. Another way to alleviate this concern is to focus on customer satisfaction and communication, which will make patients more comfortable with the in-field ECP treatment. When this program is implemented, it is likely that many patients who receive ECP care will not be aware that this is a new treatment alternative provided by ATCEMS. Clear, consistent, and professional disclosures will be crucial aspects of successful ECP patient treatment.

Evaluation Plan

The evaluation plan for an ECP program should extend beyond conventional program measurement in order to help ATCEMS assess the potential value of the proposed initiative. The data collection process should not only include an assessment of productivity; an evaluation should also incorporate patient satisfaction measures that are managed independently and reviewed by an external agency.

The evaluation for an ECP program should expand upon the already existing ATCEMS patient satisfaction survey to assess the value that the ECP position brings to both patients and the larger community. Specifically, the survey should include questions that target patient outcomes, patient health improvement, the patient care experience, patient financial considerations, and overall patient satisfaction with the ECP provider.[127]

Additionally, the evaluation metrics should track the following information: the time ECPs spend with patients in the field, the number of patients ECPs treat per shift, the number of ECP visits that result in transport to an emergency department, the number of ECP visits that result in CHP referrals or alternate destinations, the money and time that are spent treating frequent users, and the equipment costs associated with ECP treatments. ATCEMS will also need to track the number of patients who are ultimately transported to the hospital, despite receiving in-field ECP

[127] Zavadsky and Hooten, "Data Tracking and Performance Measures," in *Mobile Integrated Healthcare*, 97.

treatment. ATCEMS may find a way to follow up with these patients to determine if there were any adverse health outcomes as a result of delayed transport to the emergency department. These measures will help ATCEMS determine the success of an ECP program and the enhancement in patient health outcomes.[128] These data points should be compared to baseline data points that have already been collected.

[128] Ibid., 98.

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Chapter 9. Alternative Destinations: Urgent Care and Community Clinics

Strategy Description

In this strategy, paramedics will avoid unnecessary emergency department admissions by transporting patients with non-emergent medical needs to alternate local healthcare providers. Paramedics will be able to assess a patient in the field and determine the patient's needs using software protocols set in place by the OMD. If the needs of the patients are deemed non-emergent, the paramedic can transport the patient to a local urgent care center or community clinic. All paramedics will undergo training to ensure that they transport patients to the appropriate destination. PSIAM software can be used to safely triage patients with non-emergent needs.[129] This software is available to Medical Priority Dispatch System and ProQA users, which includes ATCEMS. Paramedics will also have additional software on each ambulance that provides a directory of clinics in the area, the types of insurance accepted at each clinic, and current patient inflow to determine approximate wait times at each facility.

ATCEMS can pilot this program on a small scale by initially training paramedics in one station and partnering with one community clinic and one urgent care clinic located near that station. Implementing this strategy on a small scale will allow ATCEMS to build strong relationships with local clinics and secure safe and effective plans to transport patients to alternate destinations. It is recommended that ATCEMS implement this pilot with the paramedics of Medic Station 4, a centrally located station in East Austin. The eight paramedics that work in this station do not rotate to other stations, which will allow for training to be more targeted and specialized to their service area.[130]

ATCEMS can begin transporting non-emergent patients to the Rosewood Zaragosa Health Center, a clinic associated with CommUnityCare Health Centers located near Medic Station 4, and the MedSpring Urgent Care Center located near the University of Texas campus. CommUnityCare and MedSpring Urgent Care will be valuable partnerships because they have multiple locations throughout Austin that are easily accessible. CommUnityCare currently has nineteen clinics in the Austin area and their clinics accept most insurance providers, including Medicare, Medicaid, and MAP through Central Health.131 In addition, CommUnityCare has two locations that are open until 8 p.m. and on most holidays.132 MedSpring Urgent Care has nine locations in the Austin area and also accepts most insurance providers, including Medicare and Medicaid.133 MedSpring urgent care clinics are open from 9 a.m. to 9 p.m. daily.134 If these

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[129] Kristen Miller, Chief of Staff, Louisville Metro EMS, phone interview by author, March 9, 2015.

[130] James Shamard, Chief of Staff, ATCEMS, interview by author, April 13, 2015.

[131] "CommUnityCare Health Center," *CommUnityCare Health Centers*, accessed February 15, 2015, http://communitycaretx.org/ 2015.

[132] Ibid., 11.

[133] "Urgent Care Services," *MedSpring Urgent Care*, accessed February 21, 2015, http://medspring.com/texas/austin-urgent-care 2015.

pilot programs prove to be successful, partnering with MedSpring and CommUnityCare clinics will allow ATCEMS to expand this alternate destination strategy seamlessly to other medic stations throughout Austin.

Comparable Programs

EMS providers in other municipalities around the U.S. have already started to transport non-emergent patients to locations other than the emergency department. In 2012, REMSA in Reno, Nevada, started an Alternative Pathways of Care program where paramedics in the field can transport patients to urgent care centers, clinics and medical groups, community triage centers, or mental health hospitals.[135] REMSA currently has partnerships with 15 non-emergency department facilities that can receive ambulance transports.

REMSA conducted a two-year evaluation of their program and reported an estimated $2 million in savings in average charges and $700,000 in savings in average payments.[136] Between January 2013 and December 2014, 786 patients were transported to alternate destinations.[137] REMSA's alternate destination program transports 81 percent of eligible patients to community triage centers, which makes the number of patients transported to urgent care centers and other clinics low. Through patient and provider surveys, REMSA received positive feedback and determined this strategy to be a "safe, reliable way for patients to receive the right care at lower cost."[138] REMSA had a 4.4 percent repatriation rate, meaning 4.4 percent of patients who were transferred to alternate destinations ultimately had to go to the emergency department.[139]

Portland-Vancouver Metro Area EMS in Oregon has an EMS Low Acuity Triage program. This program began in 2013 as a pilot program in two counties but is expected to eventually expand to all counties served by Portland-Vancouver EMS. Portland-Vancouver EMS estimated that about 16,000 yearly calls are low acuity and can be served without emergency department transport.[140] Paramedics use triage protocols determined by a Protocol Development Committee to determine if patients can be transported to an urgent care center, a clinic appointment, physician consult, or receive home care.[141] The estimated training and implementation for paramedics in this program is three months.[142] Although a full evaluation of this program is not yet available, Portland-Vancouver EMS has estimated payer savings based on the difference in

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[134] Ibid., 25.

[135] "REMSA's Community Heath Programs," presentation, International Roundtable on Community Paramedicine, September 14, 2014, 13, http://ircp.info/Portals/11/Meetings/2014/10E4%20-%20Staffan-Innovation%20Award.pdf.

[136] Ibid., 25.

[137] Brenda Staffan, "Community Health Programs Overview," *REMSA*, January 22, 2015, 2.

[138] "REMSA's Community Heath Programs," 24-25.

[139] Ibid., 24.

[140] "Community Healthcare Program: Portland-Vancouver Metro Area EMS Providers," *Community Healthcare Summit,* 2014, https://www.naemt.org/files/communityparamedicinegrid/Portland_OR_white_paper.pdf.

[141] Ibid., 11.

[142] Ibid., 16.

cost of an emergency department transport, which is $1,038 per patient, and low-acuity BLS triage, which is $584 per patient.[143] Their results show a $454 cost reduction per patient.[144]

Grady EMS in Atlanta, Georgia, implemented a similar alternate destination program in 2010. In the Atlanta program, the call-taker assesses the patient over the phone, and the paramedic assesses the patient in the field to determine if the patient is eligible for alternative transport. To test the program's effect on patient safety, Grady EMS began this program in stages. Initially, the program was voluntary; patient consent was necessary before paramedics could transport to a Grady ambulatory clinic. An evaluation of the program's first phase showed that 89 percent of patients transported to a Grady outpatient clinic received proper care at the clinic.[145] Although 10 percent of the patients transported to an outpatient clinic were later sent to the emergency department, only 2 percent were admitted.[146] Today, paramedics have been given the training necessary to make the decision for alternate transport in the field after discussing patient symptoms with the EMS medical director or two other paramedic colleagues.[147] The CEO of the Grady Health System noted that transporting patients to outpatient clinics has reduced system costs, but data on the exact savings to the Grady system could not be obtained.

Impacts in Natural Units

The main impact of this strategy will be the reduced number of unnecessary transports to emergency departments. During the pilot phase with only eight paramedics participating, the number of diverted transports can be calculated by the number of non-emergent transports a pair of paramedics complete per shift multiplied by the number of shifts a paramedic pair has in one year. Although the number of transports per shift varies, Medic Station 4 has a high volume of calls. It can be estimated that, on average, a paramedic pair will transport six patients in one 12-hour shift. Using data from existing EMS triage programs and academic studies, it was estimated that about 10 percent of these transports could be safely transported to an urgent care center or a community clinic. For example, a paper published by the Departments of Health and Human Services (DHHS) and the National Highway Traffic Safety Administration (NHTSA) analyzed the impact of EMS alternate transports for Medicare patients and found that approximately 15 percent of Medicare patients transported to the emergency department could have been treated in an alternate setting.[148]

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[143] Ibid., 11.

[144] Ibid., Appendix B.

[145] Kristy Gonzalez Morganti, Abbey Alpert, Gregg Morgolis, Jeffrey Wasserman, and Arthur L. Kellermann, "The State of Innovative Emergency Medical Service Programs in the United States," *Prehospital Emergency Care* 18, no. 1 (January 2014): 76, doi: 10.3109/10903127.2013.831508.

[146] Ibid., 80.

[147] Ibid., 76.

[148] "Innovation Opportunities for Emergency Medical Services: A Draft White Paper from the National Highway and Safety Administration, Office of the Assistant Secretary for Preparedness and Response, and Health Resources and Services Administration," *EMS.gov*, July 15, 2013, accessed April 6, 2015, http://ems.gov.pdf/2013/EMS_Innovation_White_Paper-draft.pdf.

Louisville Metro EMS in Louisville, Kentucky, has a 911 nurse triage program that diverts approximately 13 percent of their 911 calls to lower-acuity healthcare settings.[149] These types of calls could be diverted by alternate transport protocols. Portland-Vancouver EMS estimates that approximately 24,000 of the 175,000 calls they receive each year are low-acuity (or "Omega") calls. Portland-Vancouver EMS also estimates that 16,000 of these calls, or 9 percent of all calls, could be candidates for being transported to alternate, less-emergent facilities. This prediction is not based on call type only but also on the time of day and hours of operation at alternate destination sites.[150]

This report assumes that each paramedic pair will work the equivalent of two 12-hour shifts a week during times that the alternate destination sites are open, resulting in approximately 100 "covered" shifts per year (2 shifts/wk x 50 wks/year). Moreover, based on the 10 percent assumption, an average of 0.6 out of six transports every shift are assumed to be eligible for alternate transport. Therefore, it is estimated that the four pairs of paramedics will collectively divert 240 transports (4 pairs x 100 shifts/pair x 0.6 diversions/shift) annually.

Implementation Costs and Effects on Reimbursement

ATCEMS will face start-up costs if this strategy is implemented. ATCEMS will have to purchase triage case management software, which will be a one-time cost of $64,295. This software will have the medical director's protocols set in place for paramedics to use when determining whether an alternate transport is appropriate. The software requires yearly updates estimated at $29,400 per year after the first two years. The software has a high initial cost, especially for a pilot program. However, if the strategy is effective and is implemented throughout other stations and clinics in Austin-Travis County, the triage software can be used in all ambulances at no additional cost.

The cost to train paramedics is also included in the implementation costs. Each paramedic will require an estimated 48 hours of training; it will cost ATCEMS $1,468 to pay a trainer $30.58 an hour for 48 hours. The six days paramedics spend in training is accounted for by the six fewer shifts they will work in that year, resulting in fewer transports in the first year. This will not affect implementation costs but will affect reimbursements.

There is also the possibility that patients will be misdiagnosed and transported to an urgent care center or community clinic when they should have been transported to an emergency department. This could result in increased transport costs if ATCEMS transports to a clinic first and then has to transport that patient again to the emergency department. From the 240 diverted patients per year, it is estimated that 7 percent will be misdiagnosed. The 7 percent calculation is an average based on the repatriation rate of the Grady EMS pilot program (10 percent)[151] and the REMSA program (4.4 percent).[152] It is assumed the extra trip to the emergency department will cover ten

[149] Kristen Miller, Chief of Staff, Louisville Metro EMS, phone interview by author, March 9, 2015.
[150] "Community Healthcare Program," 6.
[151] Gonzalez Morganti, et al., "The State of Innovative EMS."
[152] "REMSA's Community Heath Programs," 25

miles and will cost ATCEMS a total of $160 in added fuel costs. The net cost for implementation of the first year of the pilot program is $65,923 and for five years is $135,959.

There are additional implementation costs that need to be considered if ATCEMS expands this strategy past the pilot program to multiple urgent care centers and community clinics in Austin. ATCEMS will need to purchase additional software to build a directory of clinics with information on accepted insurance and wait times at the clinics. This software will cost $15,825. It will also take one month per year of an ATCEMS employee's time to populate the directory software with detailed information about clinics in the area. There will be added costs to train paramedics in the new alternate destination protocols. These additional costs are outlined in the model but were not included in the implementation cost calculations for the pilot.

Implementation costs are high for this strategy due to the expensive technology that is needed for operation. However, as the program grows, these fixed implementation costs will reach a wider population and divert more patients to healthcare providers that are lower cost and lower acuity, resulting in higher payer savings and a lower relative cost per transport in the long run.

This strategy will decrease ATCEMS reimbursements. For the first year of the program's implementation, ATCEMS should expect to see a $39,809 decrease in reimbursements. The five-year cumulative decrease in reimbursements will be $176,509. The lost reimbursement is due to the lower average reimbursement ATCEMS will receive for a transport to a local clinic compared to the reimbursement for a transport to an emergency department. These reimbursements are calculated based on the projected 240 patients per year who will be transported to an urgent care center or community clinic. It is also assumed that payers can safely argue that ATCEMS should not be reimbursed twice for misdiagnosed patients. This represents a significant loss to ATCEMS. Alternate funding streams should be considered to mitigate both implementation costs and reimbursement losses. For more detailed information on the implementation costs and effects on reimbursement for this strategy, see Appendix C.

Payer Savings Analysis

This strategy is projected to have a positive impact for payers. The average reimbursement received by emergency departments for an emergency department visit is $969 per patient, and the average reimbursement for an urgent care or community clinic is assumed to be $178 per patient, a difference of $791 per patient. The total annual savings in medical care for all 223.2 projected diverted patients is $168,354. This is the number of patients who will be transported with no expected misdiagnosis.

Payers will also save money in the cost of ambulance transports. The average reimbursement for a BLS transport of low-acuity patients to the emergency department is $306 per patient while the average ambulance reimbursement for transport to a clinic is approximately $135. The savings in transports is $171 per patient and $39,809 annually. All 240 patients are used in this calculation because even if they are misdiagnosed, they will be initially transported to a local clinic. In total, the 240 patients who are projected to be eligible for alternate destination transport (including misdiagnosed patients) will save payers $208,163 in the first year of implementation and $214,601 per year thereafter.

This strategy produces a significant cost savings for payers because payers will be required to pay lower transportation fees and lower medical fees. If patients can receive the necessary medical treatment at a community clinic or urgent care center, payers will benefit from the cost savings of avoiding more costly emergency department care. For more detailed information on the payer savings associated with this strategy, see Appendix C.

Barriers to Implementation and How to Address Them

In addition to the barriers discussed in Chapter 4, the following four issues are barriers that are specific to this strategy. The first of these barriers is that community clinics may be resistant to accepting patients by ambulance transport because community clinics typically accept patients by appointment. This barrier could prove to be challenging if community clinics need financial incentives to accept unscheduled patients. If CMS reimbursement practices do change, this barrier could be mitigated by CMS and other insurance companies reimbursing community clinics at higher rates than regular physician visits but at lower rates than emergency department visits. This would give community clinics an incentive to accept unscheduled patients by increasing their revenue streams while saving CMS and other insurance providers money from avoided emergency department visits. A report published by DHHS and NHTSA proposed this solution to mitigate foreseeable pushback.[153]

A second barrier to this strategy's sustainability is that some urgent care centers and community clinics may not accept patients without insurance or certain types of insurance. This barrier can be severe if paramedics do not have knowledge in advance of accepted insurance information before transporting patients to certain clinics. This barrier should be mitigated with the directory of services in the software protocols that paramedics can use to determine where to take patients.

A third barrier relates to task time analysis. This strategy will not be sustainable if it takes more time for paramedics to identify an appropriate destination and transport the patient to that destination than it does to transport a patient to an emergency department. In addition, clinics must have the capacity to accept patients by emergency transport, and the strategy cannot disturb clinic workflows. This barrier will be particularly prominent during the beginning stages of implementation, as paramedics and clinics learn how to rapidly and effectively discharge and accept new patients. This barrier can be mitigated with the directory of services software. It will also be important to include representatives from urgent care and community clinics when any decisions are made regarding the implementation of this strategy.

The final barrier that needs to be addressed is related to the sharing of patient electronic medical records. ATCEMS paramedics must be able to transmit the ePCR (electronic patient care record) to the clinician at the alternate destination. This may be difficult because there is no uniform system of electronic patient records. ATCEMS must ensure that the participating urgent care and community clinics are able to accept the ePCR in the same way as hospitals. A temporary solution would be to use paper records until the electronic transfer of records is possible. ATCEMS will have to work with community care clinics and urgent care centers to ensure that electronic transfer is possible.

[153] "Innovation Opportunities for Emergency Medical Services."

Evaluation Plan

An evaluation plan of this strategy will be necessary to determine its successes, failures, and areas for improvement. The ATCEMS evaluation plan should include measures of efficiency, patient satisfaction, and health outcomes. The goal of this strategy is to avoid unnecessary emergency department trips, provide patients with appropriate care, and reduce overall healthcare costs. These goals can be measured by patient satisfaction scores and by payer savings. ATCEMS should keep track of every patient who is transported to an urgent care center or community clinic. Paramedics should record the patient's observed health concerns, insurance, and the length of time it took to drop the patient off at the clinic. Paramedics should follow up with patients within one week of transport with a "post-transport" survey. The survey should ask patients how long they waited to be treated, the cost of treatment, if they were satisfied with the treatment, and if they had to re-seek medical attention or go to the emergency department within 48 hours.

Evaluation of the triage system between ATCEMS and local providers is also important. This includes surveying the paramedics participating in this pilot program as well as the clinics accepting patients. Paramedics should be surveyed regarding software protocols, training quality, and overall satisfaction with alternate destination programs. The participating urgent care centers and community clinics should be surveyed regarding disruption to clinic flow, the timeliness of paramedics handing off patients to clinic doctors, and whether the clinics were equipped to treat each patient's medical needs.

Finally, ATCEMS should track all actual costs and impacts of this strategy, including all implementation costs and reimbursement changes. Paramedics should track how many transports they have per shift, how many were eligible for alternate transport, and how many were transported to an urgent care center or community clinic. Measuring the actual costs and impacts will allow ATCEMS and the City of Austin to determine if the strategy is sustainable.

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Chapter 10. Alternative Destinations: Seton Psychiatric Emergency Department and Local Mental Health Hospitals

Strategy Description

This strategy would allow ATCEMS paramedics to transport patients with non-emergent health needs who are experiencing mental health crises to local mental health hospitals and the Seton Psychiatric Emergency Department (SPED) at University Medical Center Brackenridge Hospital. Some individuals use 911 for mental health needs on a regular basis. The services of both emergency departments and ATCEMS would be better utilized if these patients could be quickly diverted to community mental health providers. To safely implement this strategy, ATCEMS paramedics will need additional training in mental health crisis interventions. The main difference between this strategy and current ATCEMS policy is that, under this strategy, paramedics would be able to transport patients directly to these alternate mental health destinations instead of arriving on the scene and having to wait for MCOT to arrive and triage the patient's needs.

ATCEMS should consider a pilot program at Medic Station 4 that partners with SPED and Austin Lakes Hospital (ALH). Medic Station 4 is close to both facilities and serves a large proportion of mental health patients, which would give paramedics a large volume and variety of mental health calls to test out the new protocols. SPED and ALH both have more available beds on average than other emergency mental health providers in the area and are conveniently located near major population centers, which may help reduce transportation costs while ATCEMS collects initial data on the program's effectiveness. The model simulating this strategy uses Medic Station 4's staffing levels and call volumes to calculate costs and benefits.

Comparable Programs

Several EMS systems across the country have implemented similar strategies as part of an alternate destinations program. For example, REMSA received a CMS Innovation Award that was partially used to create an alternate destination strategy that partnered with mental health hospitals. From December 2012 to June 2014, the program diverted a total of 574 patients away from emergency departments to alternate destinations; 55 (9.5 percent) of these patients were taken to psychiatric hospitals.[154]

Wake County EMS has also incorporated mental health hospitals and substance abuse facilities into an alternate destination program. The EMS agency utilized extended care paramedics to administer the mental health protocols. Out of the 1,084 patients screened in the Wake County EMS program in 2011, 156 patients refused diversion, 204 patients were successfully diverted, and two patients were diverted and later transported to an emergency department.[155] In 2012,

[154] "REMSA's Community Heath Programs."

[155] Jefferson Williams, "Alternate Destinations for EMS Patients," presentation, February 25, 2013, http://www.naemsp.org/Documents/2013%20Annual%20Meeting%20Handouts/HANDOUT%202013%20ATMD%20Williams%20Alternative%20Destinations-%20Final.pdf.

Wake County had screened 1.5 percent of all 911 calls and diverted 0.3 percent to alternate destinations.[156]

Wake County EMS has reported that their alternate destinations programs saved the North Carolina Medicaid system $350,000 in avoided healthcare costs, but these figures are difficult to verify without a breakdown of the actual cost difference between emergency departments and mental health hospitals.[157] Wake County EMS states that the savings were mainly realized through time and resources that were freed up at local emergency departments. The average length of stay for a mental health patient at an emergency department is 14 hours, compared to an average stay of three hours at a substance abuse facility or mental health hospital. Faster treatment may lead to an improvement in health for the patients experiencing a mental health crisis. In order to realize cost savings for hospitals, the reduction in emergency department utilization would need to be significant enough to cut staffing.

Impacts in Natural Units

The main impact of adding mental health hospitals and the SPED as alternate destinations is the anticipated reduction in emergency department admissions. Using data from the Wake County and Reno programs, the subset of patients who would be affected by this strategy can be estimated as 1.5 to 9.5 percent of the patients who are referred for screening and identified as low-acuity using the alternate destination protocols. According to research conducted by DHHS and the NHTSA, approximately 15 percent of EMS patients could be treated at an alternate destination.[158] Using the range from the Wake and Reno examples, this indicates that 0.3 to 1.4 percent of the total EMS patient population would benefit from this strategy. This strategy will also greatly benefit patient health by intervening in mental health crises earlier and giving patients the medical and psychiatric care they require more quickly. Unfortunately, there are too many variables associated with patient health and patient experience to quantify these benefits and include in this report's economic model.

Wake County experienced 11 repatriations (i.e., patients who later required transportation from a mental health hospital to an emergency department) for a total of 4.5 percent of patients incorrectly transported. However, there were no wrong transports due to a false screening, and none of the patients were transported to the emergency department with what ended up being emergency medical needs. If the policy is piloted at Medic Station 4, we can estimate the number of alternate transports each year by multiplying the 0.3 to 1.4 percent rates from Wake County and Reno by the 5,270 calls that the station received in FY2014. This creates a range of 15.8 to 73.8 total alternate transports annually. If the error rate for Wake County holds true for ATCEMS as well, the number of diversions that are successful will range from 15.1 to 70.4 transports. This report assumes that paramedics will require 80 hours of training each, mostly in mental health crisis intervention and symptom identification techniques. A list of parameters relevant to this strategy can be found in Appendix C.

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[156] Ibid.

[157] Ibid.

[158] "Innovation Opportunities for Emergency Medical Services."

Implementation Costs and Effects on Reimbursement

To implement this strategy, ATCEMS will incur additional costs in training and fuel. The training costs are calculated assuming 80 hours of training for each of the eight paramedics at Medic Station 4. Training is assumed to last for ten eight-hour shifts, for a total one-time training cost of $2,446. The additional fuel costs are estimated assuming that 0.85 percent of all calls (the average of the diversion rates in Reno and Wake counties) to Medic Station 4 will result in a transport to either the SPED or a mental health hospital. The model also assumes that each psychiatric diversion will result in ten extra miles of travel; each additional mile incurs a cost of $0.98. The assumption of ten extra miles was made because there are many more emergency departments than psychiatric facilities in Austin-Travis County, and it would accordingly take longer, on average, for paramedics to transport to the SPED or a psychiatric hospital. The additional mileage will cost an estimated $427 in the first year of the program and $439 in each year thereafter. Overall, the one-year net present value cost of implementing this strategy is $2,895, and the five-year net present value implementation cost is $4,314.

ATCEMS will also experience a loss in reimbursement for each transport to an alternate destination unless another funding source is secured. The average loss in reimbursement in the model ($171) is calculated by taking the difference between the average reimbursement for transport to an emergency department ($306) and the average reimbursement for transport to a mental health hospital ($135). By multiplying $171 by the average number of alternate transports, the model estimates that ATCEMS will have $7,450 in net lost reimbursements in the first year and $32,964 over five years. For more detailed information on the implementation costs and effects on reimbursement for this alternate destination strategy, see Appendix C.

Payer Savings Analysis

The payer savings analysis for this strategy shows that insurers can expect to save $969 for each psychiatric patient who is diverted from the emergency department. In addition, the report assumes a reimbursement of $135 per transport to a psychiatric hospital or psychiatric emergency department, which is identical to the reimbursement assumed for transports to a community health center. This produces a payer savings of $171 for each transport, based on an average reimbursement of $306 per ambulance transport to an emergency department. By multiplying the savings per diversion by the number of diversions per year, a total payer savings of $47,556 is estimated in the strategy's first year. This savings to payers may give them an incentive to support this strategy, which would help defray some of the implementation costs and lost reimbursements to ATCEMS. For more detailed information on the payer savings associated with this strategy, see Appendix C.

Barriers to Implementation and How to Address Them

There are two additional barriers to implementation that are unique to the psychiatric alternate destination strategy. The first barrier involves determining the role that MCOT will play in implementing this strategy and whether or not MCOT employees should play a role in the formation of protocols or the transportation of patients. ATCEMS paramedics currently have the ability to call MCOT workers in the field. MCOT staff can then transport a patient to the

facilities described in this strategy, among other options. MCOT professionals can also determine if a patient does not need emergency psychiatric care and transport them home or schedule appointments for them with healthcare providers. ATCEMS leadership should consider including MCOT Manager Laura Slocum in discussions about how this strategy could best align with MCOT's current collaborative role with ATCEMS. MCOT staff may also be valuable sources of information and guidance during the training and pilot phases of this strategy.

The SPED also does not currently allow ATCEMS to transport directly to its facility, due to the availability of Seton's emergency department in the same building and the desire to avoid liability. However, the Austin Police Department (APD) is currently allowed to transport individuals suffering from a mental health crisis directly to the SPED. ATCEMS may discuss potential transportation policy changes with Seton before implementation so that patients have several options for transport.

Evaluation Plan

In order to determine the effectiveness of this strategy, ATCEMS should monitor a number of indicators. First, the number of repatriations each month from an alternate destination to the emergency department is a good measure of the effectiveness of the diversion program's protocols and training. Second, patient outcomes can measure if the alternate destination has served as a more appropriate environment for treatment. One component of that may be the amount of time each patient spends in the alternate destination compared to the average amount of time spent in a medical emergency department. A third measure to monitor involves the change in the average wait time at the medical emergency department after the strategy is implemented. Reducing wait time at a psychiatric facility could lead to greater patient satisfaction scores for patients seeking mental health treatment. Patients diverted from the medical emergency department will receive more appropriate care and can also reduce hospital congestion and wait times for other patients seeking treatment in an emergency department.

Additionally, savings to public and private payers will be an important metric if ATCEMS decides to partner with one or more stakeholders to help fund the strategy. ATCEMS should also monitor the net costs of implementation and lost reimbursements to determine if these costs are more or less sustainable than the estimates or the experiences in Wake County and Reno.

Chapter 11. Alternative Destinations: Sobering Center

Strategy Description

In this strategy, paramedics will avoid unnecessary emergency department admissions by transporting patients without emergent medical issues who are intoxicated to a sobering center. This strategy could save valuable resources within the healthcare system and facilitate patient-centered, out-of-hospital care. The Austin City Council and Travis County Commissioners Court have both approved a proposal to build a sobering center locally, but several challenges have arisen during the final planning stages. For example, a source of funding is still needed; it is estimated that the operating costs for Austin's sobering center will be approximately $750,000 annually.[159] In addition, Austin-Travis County officials have still been unable to work with citizens to find a suitable location for the sobering center.

ATCEMS would need to adopt new protocols for paramedics to be able to transport intoxicated patients to a sobering center. Ruling out any possible medical concerns will be a crucial part of these protocols. This task can be particularly challenging because the effects of alcohol can often mirror the symptoms of serious health issues or medical traumas. New diversion protocols must have clear guidelines to help paramedics determine whether a sobering center is a medically appropriate destination. ATCEMS would have to partner with the sobering center to allow paramedics to admit patients directly to the center. This strategy operates under the assumption that the sobering center will be built in Austin by the time the strategy is implemented.

ATCEMS should begin with a pilot program to determine whether a sobering center is a safe, efficient, and effective alternate destination for the transportation of intoxicated patients. A pilot program could focus on 13 paramedics at Medic Station 6 located in East Austin. This station has the highest volume of alcohol-related transports due to its proximity to downtown Austin and would provide ATCEMS with a testing ground for many different situations and types of patients.

Comparable Programs

The City of San Antonio Restoration Center has been operating since 2008 and is run through a partnership between the local mental health authority, the Center for Health Care Services, and a local homeless shelter. Clients are referred to the center by police officers and paramedics in an effort to reduce visits to the emergency department. In 2009, the Restoration Center had a monthly average of 313 patients using the facility's sobering services, resulting in over 3,700 patients served in the first year of operation.[160] Reports on the Restoration Center's program

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[159] *Austin American-Statesman* Editorial Board, "Send Drunken Offenders to Sobriety Center Instead of Jail," *The Austin American-Statesman,* March 14, 2014, http://www.mystatesman.com/news/news/opinion/send-drunken-offenders-to-sobriety-center-instead-/nd9yG/.

[160] Iowa Department of Human Services, "Keeping the Mentally Ill and Serial Inebriates Out of Jail, Off the Street, and Out of the Hospital by Providing Access to Treatment and Support Services," DHS.Iowa.gov, accessed March 18, 2015, https://dhs.iowa.gov/sites/default/files/RecapBexarCounty_12-02-10CJCC_Mtg_09-16-2011.pdf.

show that San Antonio has saved approximately $26 million in avoided emergency department, jail, and court costs since the program began in 2008.[161]

The San Francisco Sobering Center (SFSC) is operated and funded by both the City of San Francisco and San Francisco County.[162] Paramedics, police officers, or psychiatric outreach teams typically bring patients to SFSC. The SFSC estimates that individuals with chronic public intoxication constitute over 20 percent of all emergency department visits in San Francisco while homeless individuals who are intoxicated account for nearly one-third of all ambulance transports. The SFSC program is focused on reducing EMS transports and emergency department visits by keeping intoxicated individuals off the streets and in a safe, therapeutic environment that is less resource-intensive than an emergency department. If a client requires additional medical attention after being admitted to the sobering center, paramedics are called to transport the client to the emergency department.

Impacts in Natural Units

The estimated impacts of this strategy are based on statistics gathered by SFSC and then adapted to fit specific ATCEMS circumstances. The population served by ATCEMS is about 25 percent larger than the population served by the San Francisco EMS Agency. Consequently, statistics from SFSC have been increased by 25 percent to more accurately estimate the impact that a sobering center in Austin might have.[163] The SFSC receives 3,000 clients per year, 40 percent of whom are admitted by paramedic transport.[164] System wide, it is estimated that ATCEMS would transport approximately 1,500 patients per year to a sobering center instead of an emergency department. In addition, SFSC reports a repatriation rate (i.e., clients required additional medical attention and were transported to an emergency department by paramedics) of 4 percent.[165] Using that same 4 percent repatriation rate system wide, ATCEMS would expect to have approximately 60 patients per year who require further medical attention after being transported to the sobering center. Because Medic Station 6 responds to approximately 5.4 percent of all ATCEMS calls, the pilot program is estimated to divert 81 patients annually from an emergency department to the sobering center and result in 3.2 repatriations per year.

Implementation Costs and Effects on Reimbursement

The following implementation costs and changes in reimbursement are based on a pilot program that will train 13 paramedics out of Medic Station 6. The implementation costs associated with transporting patients to a sobering center instead of an emergency department include the extra vehicle miles traveled (VMT) and additional paramedic training. While there are many emergency departments in Austin-Travis County to which paramedics may transport patients,

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[161] Chris Moran, "City Approves $4.3 million for Sobering Center," *The Houston Chronicle*, May 16, 2012, http://www.chron.com/news/houston-texas/article/City-approves-4-3-million-for-sobering-center-3564123.php.

[162] Shannon Smith-Bernardin and Michelle Schneidermann, "San Francisco Sobering Center," *San Francisco Medicine* 84, no. 8 (2011): 28, http://issuu.com/sfmedsociety/docs/october_2011_sfm/1?e=3533752/5069838.

[163] "USA: California," *City Population*, last modified 2013, http://www.citypopulation.de/USA-California.html.

[164] Smith-Bernardin and Schneidermann, "San Francisco Sobering Center."

[165] Ibid.

there will only be one sobering center destination. This will result in paramedics typically transporting patients over longer distances; each additional mile costs ATCEMS $0.98 in added fuel and maintenance costs. The total annual cost for the extra VMT is estimated to be $987 in the first year of implementation. This value rises slightly to $992 in subsequent years of operation.

Paramedics must also be trained in new protocols to safely divert patients to the sobering center. Approximately 16 hours of training over two days will be required to implement the strategy. In order to train all 13 paramedics at Medic Station 6, there will be a one-time cost of $489 in the pilot program's first year. Taking both additional VMT and training costs into account, the net present value of the implementation costs in the program's first year is $1,517 and after five years, $4,937.

Allowing ATCEMS to transport patients to a sobering center will reduce reimbursements because payers such as Medicare will not reimburse ATCEMS if a patient is taken to a destination other than an emergency department. Moreover, if a patient is misdiagnosed and must be transported from the sobering center to an emergency department, the model assumes that transport is not reimbursable. The net present value of the decrease in reimbursements to ATCEMS after one year of implementation is $13,801 and after five years is $60,006.

Payer Savings Analysis

Payer savings include the amount of funds saved from both not going to an emergency department and not reimbursing ATCEMS for transports. The first year of implementation would result in $62,970 savings in emergency department reimbursements and $13,801 savings in ambulance reimbursements for payers. In each year following initial strategy implementation, the patients transported to the sobering center would save payers $63,316 in emergency department reimbursements and $13,877 in ambulance charges. This totals to $333,803 in payer savings during the five years after the program is initiated. For more detailed information on the payer savings associated with this strategy, see Appendix C.

Barriers to Implementation and How to Address Them

Financing alternative destination transports is not feasible under the current insurance reimbursement structure. This is the most severe barrier to implementation because the strategy depends on reimbursement from outside payers such as Medicaid, Medicare, and private insurers. This strategy is unlikely to be sustainable unless payers begin reimbursing for transports to locations other than emergency departments. A possible solution to this barrier is to pursue other funding sources. For example, community partners, such as local hospital networks or the Medical Access Program, could provide financial support until CMS changes its rules to allow for reimbursements when patients are taken to alternate destinations. There are increasing discussions both nationally and locally to have the CMS rules changed through legislative action.

A second barrier to implementation involves medical liabilities that may arise from transporting patients to a sobering center. With the new diversion protocols, paramedics run the risk of misdiagnosing a patient and sending them to the sobering center without detecting the patient's underlying emergent medical needs. Intoxication by means of alcohol, marijuana, or other

substances can cover up other medical problems that may require attention and could confound the screening process. However, this barrier is a low-level concern. The medical director will have complete control over all the protocols. Furthermore, successful programs in other cities have used highly risk-averse protocols. ATCEMS administrators have also expressed trust that their paramedics will continue to use their professional training, experience, and knowledge to provide quality patient care.

In order to avoid this barrier, the OMD should consider conducting a clinical review of all transports to alternate destinations to ensure protocols are being utilized correctly. Any protocols that are added or updated will need to be evidence-based and conservative to align with current ATCEMS protocols. Most other cities have implemented similar programs slowly and guardedly. ATCEMS paramedics should also err on the side of caution and transport patients to the emergency department when any doubt in a patient's diagnosis exists.

Finally, there may be jurisdictional conflicts when a patient is also under consideration for intake at the local jail for a crime committed while intoxicated. This barrier is also a low-level concern. ATCEMS and APD have a strong working relationship. Several members of APD contacted by this research team expressed interest in having options other than incarceration for individuals who are excessively intoxicated. ATCEMS and APD must work together to determine program protocols and make sure that all parts of the public safety division are supportive of strategy implementation.

Evaluation Plan

In evaluating the effectiveness of this strategy, administrators should monitor patient satisfaction scores, patient health outcomes upon discharge from the sobering center, and the impacts on the number and frequency of ATCEMS transports and jail intakes. If patients are not satisfied with the quality of treatment provided at the sobering center, they may be more likely to request transport to an emergency department. As a result, this strategy will be ineffective. Patient health can be monitored through vital signs and an analysis of intoxication symptoms (e.g., vomiting, nausea, impaired mental state) while patients are at the sobering center and after discharge. Both ATCEMS and sobering center staff should track the frequency of patients’ re-entry into the system.

Appendix A. Parameters and Economic Impact Models for Mobile Integrated Healthcare Strategies

This appendix contains parameter lists and models for the two mobile integrated healthcare strategies:

1. Expansion of Community Health Paramedic Program; and
2. Partnerships with Hospitals for Post-Discharge Care.

1. Parameters for Mobile Integrated Healthcare: Expansion of CHP Program

Parameter	Unit Value	Unit	Source
Division Chief	$108,430.00	1	ATCEMS payscale
Commander	$87,819.00	1	ATCEMS payscale
Captain (Field, 48 hours)	$68,490.00	1	ATCEMS payscale
Administrative Assistant	$35,000.00	1	James Shamard
Paramedic II (Field, 48 hours)	$61,152.00	5	ATCEMS payscale
Duty for Division Chief	11%	-	James Shamard
Duty for Commander	33%	-	James Shamard
Duty for Captain	100%	-	James Shamard
Duty for Administrative Assistant	50%	-	James Shamard
Duty for Paramedics	100%	-	James Shamard
Benefit	32%	-	James Shamard
Salary Increase Rate	1.5%	-	James Shamard
Training Certification Fee	$1,000.00	5	James Shamard
Trainer (1 month = 4 weeks = 160 hours)	$4,892.80	1	James Shamard
Cell Phone	$372.00	5	James Shamard
Laptop	$2,000.00	5	Assumption
Hardware Use Time (Year)	5	-	Economic life assumption
Software Use Time (Year)	10	-	Economic life assumption
Vehicle Use Time (Year)	10	-	Economic life assumption
Ford Explorer (fully outfitted)	$82,545.00	5	James Shamard
Fuel	$1,022.00	5	James Shamard
Maintenance	$1,887.00	5	James Shamard
Medical Equipment (One-Time Cost)	$29,392.00	5	James Shamard
Patients	100	12	Assumption based on MedStar and St. David's data
CHP Visits	4	1200	CHP budget
Medical Equipment (On-Going Cost)	$1.00	4800	CHP budget
Medical Equipment Cost Increase Rate	3%	-	Economic assumption
Avg. Reimbursement for 9-1-1 Calls with "Response Only"	$34.06	3200	James Shamard
Avg. Reimbursement for ED Visits	$969.00	4800	North Shore-LIJ
Avg. Reimbursement for CHP Visits	$0.00	4800	Andres Hofmeister
Avg. Ambulance Reimbursement for ED Visits	$414.00	4800	James Shamard
Avg. Reimbursement for Hospital Readmissions	$12,287.00	800	North Shore-LIJ

1. Model for Mobile Integrated Healthcare: Expansion of CHP Program

Strategy
Add 5 CHPs, each working 10-hour shifts, to focus on high-utilizers. Their work hours will be staggered, so that a few CHPs begin very early in the morning and a few begin either very late in the morning or early in the afternoon.
Assumption
1. Parameters without particular comment are calculated annually. 2. Parameters related to an increase rate or reduction rate are assumed to be constant year to year. 3. In Staffing, all employees have the same benefit percentage and salary increase rate. 4. In Staffing, trainer costs are calculated based on the assumption that a trainer will be paid $30.58 per hour. Each CHP requires 160 hours of training. 5. In Supplies, fuel cost for each vehicle is $5.11 per day, and each vehicle will be in service 200 days per year. 6. In Supplies, maintenance is the cost of each vehicle. 7. In Supplies, # of patients is calculated based on the assumption that each CHP will see 20 patients per month. # of CHP visits is calculated based on the assumption that each patient will receive an avg. of 4 visits. 8. In Supplies, the medical equipment cost is a one-time start-up cost, while the on-going medical equipment cost is $1.00/contact. 9. Discount rate is assumed as 5%, as widely used in health care. 10. Under the Impacts section, "# ED Transports without the Program (in terms of enrollees)" is calculated based on the assumption that each enrollee averages 20 ED transports per year without the program. 11. Under the Impacts section, "Reduction in 9-1-1 Repeat Calls with Response" is calculated based on the assumption that ATCEMS provides transports to 60% of its total responses. 12. Under the Impacts section, "Reduction in 9-1-1 Calls with 'Response Only'" refers to ATCEMS responses without transporting patients to ED. 13. Under the Impacts section, "First Year Adjustment Due to Training" accounts for the fewer hours medics will be working in the field due to training requirements during their first year. 14. In the Economic Model section, the annual analysis is calculated at the end of each year.

Input				
Strategy	**Category**	**Parameters**	**Units**	**$ Per Unit**
Cost to Implement	Staffing	Division Chief	1	$108,430
		Commander	1	$87,819
		Captain (Field, 48 hours)	1	$68,490
		Administrative Assistant	1	$35,000
		Paramedic II (Field, 48 hours)	5	$61,152
		Duty for Division Chief	-	11%
		Duty for Commander	-	33%
		Duty for Captain	-	100%
		Duty for Administrative Assistant	-	50%
		Duty for Paramedics	-	100%
		Benefit	-	32%
		Salary Increase Rate	-	1.5%
		Training Certification Fee	5	$1,000
		Trainer (1 month = 4 weeks = 160 hours)	1	$4,892.80
	Technology	Cell Phone	5	$372
		Laptop	5	$2,000
		Software Annual Service Fee	0	$0
		Hardware Use Time (Year)	-	5
		Software Use Time (Year)	-	10

	Supplies	Vehicle Use Time (Year)	-	10
		Ford Explorer (fully outfitted)	5	$82,545
		Fuel	5	$1,022
		Maintenance	5	$1,887
		Medical Equipment (One-Time Cost)	5	$29,392
		Patients	12	100
		CHP Visits	1200	4
		Medical Equipment (On-Going Cost)	4800	$1.00
		Medical Equipment Cost Increase Rate	-	3%
	Others	Discount Rate	-	5%
Impacts	Related Numbers	# of ED Transports without the Program (in terms of enrollees)	1200	20
		Reduction in Transports to ED	24000	20%
		Reduction in 9-1-1 Repeat Calls with Response	8000	-
		Reduction in 9-1-1 Calls with "Response Only"	3200	-
		Reduction in Hospital Readmissions	800	-
		First Year Adjustment Due to Training	-	90%
	Vehicle	Fewer Calls with "Response Only"	3200	5
		Fewer VMT-Calls with "Response Only"	16000	$0.51
		Fewer Transports to ED	4800	10
		Fewer VMT-Transports to ED	48000	$0.51
		Total Fewer VMT	$64,000	$0.51
	Hospital Readmission	Fewer Hospital Readmissions	800	$12,287
	ATCEMS Reimbursement	ED Transport Reimbursements	4800	$414
		CHP Visit Reimbursements	4800	$0
		9-1-1 Calls with "Response Only" Reimbursement	3200	$34.06
Payer Analysis	9-1-1 Calls	Avg. Reimbursement for 9-1-1 Calls with "Response Only"	3200	$34.06
	Visits	Avg. Reimbursement for ED Visits	4800	$969
		Avg. Reimbursement for CHP Visits	4800	$0
	Transports	Avg. Ambulance Reimbursement for ED Visits	4800	$414
	Hospital Admissions	Avg. Reimbursement for Hospital Readmissions	800	$12,287

Economic Model							
Stake-holder	**Category**	**Sub-Category**	**2016**	**2017**	**2018**	**2019**	**2020**
ATCEMS	Cost to Implement	Staffing	$581,000.79	$579,674.61	$588,369.73	$597,195.28	$606,153.21
		Technology	$11,860.00	$0.00	$0.00	$0.00	$0.00
		Supplies	$579,030.00	$19,489.00	$19,637.32	$19,790.09	$19,947.44
		Total	$1,171,890.79	$599,163.61	$608,007.05	$616,985.37	$626,100.65
	Cost Offsets from Implement	Vehicle Savings	$29,376.00	$32,640.00	$32,640.00	$32,640.00	$32,640.00
		Total	$29,376.00	$32,640.00	$32,640.00	$32,640.00	$32,640.00
	Net Cost to Implement	Costs After Savings	$1,142,514.79	$566,523.61	$575,367.05	$584,345.37	$593,460.65
	Lost Reimbur-sement	9-1-1 Calls with "Response Only" Reim-bursement	$98,092.80	$108,992.00	$108,992.00	$108,992.00	$108,992.00
		ED Transport Reimbur-sements	$1,788,480.00	$1,987,200.00	$1,987,200.00	$1,987,200.00	$1,987,200.00
		Total	$1,886,572.80	$2,096,192.00	$2,096,192.00	$2,096,192.00	$2,096,192.00
	Gained Reimbur-sement	CHP Visit Reimbur-sements	$0.00	$0.00	$0.00	$0.00	$0.00
		Total	$0.00	$0.00	$0.00	$0.00	$0.00
	Net Change in Reimbur-sement	Total Net Change in Reimbur-sement	-$1,886,572.80	-$2,096,192.00	-$2,096,192.00	-$2,096,192.00	-$2,096,192.00
Payer Analysis	9-1-1 Call Savings		$98,092.80	$108,992.00	$108,992.00	$108,992.00	$108,992.00
	Visit Savings		$4,186,080.00	$4,651,200.00	$4,651,200.00	$4,651,200.00	$4,651,200.00
	Transport Savings		$1,788,480.00	$1,987,200.00	$1,987,200.00	$1,987,200.00	$1,987,200.00
	Hospital Admission Savings		$8,846,640.00	$9,829,600.00	$9,829,600.00	$9,829,600.00	$9,829,600.00
	Total Savings		$14,919,292.80	$16,576,992.00	$16,576,992.00	$16,576,992.00	$16,576,992.00

5-Year NPV	
Net Cost to Implement	$3,044,720.96
Payer Savings	$70,190,938.99
ATCEMS Bottom Line	
1-Year Net Cost to Implement	$1,142,514.79
5-Year Net Cost to Implement	$3,044,720.96
1-Year Net Change in Reimbursement	-$1,886,572.80
5-Year Net Change in Reimbursement	-$8,875,777.03

2. Parameters for Mobile Integrated Healthcare: Partnerships with Hospitals for Post-Discharge Care

Parameter	Unit Value	Total Units	Source
Division Chief	$108,430.00	1	ATCEMS payscale
Commander	$87,819.00	1	ATCEMS payscale
Captain (Field, 48 hours)	$68,490.00	1	ATCEMS payscale
Medic II (Field, 48 hours)	$61,152.00	2	ATCEMS payscale
Duty for Division Chief	-	-	James Shamard
Duty for Commander	10%	-	James Shamard
Duty for Captain	-	-	James Shamard
Duty for Medic II	100%	-	James Shamard
Benefit	32%	-	James Shamard
Salary Increase Rate	1.50%	-	James Shamard
Trainer (10 days=80 hours)	$2,446.40	1	James Shamard
Cell phone	$372	2	James Shamard
Laptop	$2,000.00	2	Assumption
Hardware Use Time (Year)	year	5	Economic life assumption
Software Use Time (Year)	year	10	Economic life assumption
Vehicle Use Time (year)	year	10	Economic life assumption
Ford Explorer with assoc. tech gear	$82,545.00	2	James Shamard
Fuel	$1,022.00	2	James Shamard
Vehicle-Miles Travelled (VMT)	$0.98	-	James Shamard
Vehicle Maintenance	$1,887.00	2	James Shamard
Medical Equipment	$29,392.00	2	James Shamard
Patients	30	12	Assumption based on MedStar and St. David's data
Program Visits	5	360	Assumption based on MedStar and St. David's data
Medical equipment (Ongoing)	$1.00	1800	CHP budget
Medical Equipment Cost Increase Rate	3%	-	Economic assumption
Average Reimbursement for Emergency Department Visit	$969.00	-	North Shore-LIJ
Average Reimbursement for Ambulance Transport to Emergency Department	$414.00	-	James Shamard
Average Reimbursement for Hospital Admission	$12,287.00	-	North Shore-LIJ

2. Model for Mobile Integrated Healthcare: Partnerships with Hospitals for Post-Discharge Care

Strategy
This strategy will add two CHP-like Medic IIs who will coordinate with area hospitals (e.g., social workers and doctors) on discharge planning for patients. Patients deemed "at risk" for readmission because they have one of five conditions targeted by CMS will be identified for program participation. The program will entail five visits to the patient's home during the 30 days after hospital discharge.
Assumptions
1. Parameters without particular comment are calculated annually. 2. Parameters related to an increase rate or reduction rate are assumed to be constant year to year. 3. In Staffing, all employees have the same benefit percentage and salary increase rate. 4. In Staffing, the trainer cost is calculated based on the assumption that the trainer will be paid $30.58 per hour. Each medic will require 80 hours of training. 5. In Supplies, the fuel cost for each vehicle is $5.11 per day, and each vehicle will be in service 200 days per year. 6. In Supplies, maintenance is the cost of servicing each vehicle. 7. In Supplies, the medical equipment cost is a one-time start-up cost, while the on-going medical equipment cost is $1.00/contact. 8. In Supplies, the number of patients is calculated by multiplying 15 patients per Medic II per month. 9. Discount rate is assumed as 5%, as widely used in health care. 10. Under the Impacts section, "First Year Adjustment Due to Training" accounts for the fewer hours medics will be working in the field due to training requirements during their first year. 11. Under the Impacts section, it is assumed that 95% of patients readmitted to the hospital will be brought there by ATCEMS. 12. In the Economic Model section, the annual analysis is calculated at the end of each year.

Inputs					
Strategy	**Level**	**Category**	**Parameters**	**Units**	**$ per unit**
Cost to Implement	**Both Levels**	Staffing	Division Chief	1	$108,430.00
			Commander	1	$87,819.00
			Captain (Field, 48 hours)	1	$68,490.00
			Medic II (Field, 48 hours)	2	$61,152.00
			Duty for Division Chief	-	0%
			Duty for Commander	-	10%
			Duty for Captain	-	0%
			Duty for Medic IIs	-	100%
			Benefit	-	32%
			Salary Increase Rate	-	1.5%
			Trainer (10 days = 80 hours)	1	$2,446.40
		Technology	Cell Phone	2	$372.00
			Laptop	2	$2,000.00
			Software Annual Service Fee	0	$0.00
			Hardware Use Time (Year)	-	5
			Software Use Time (Year)	-	10
		Supplies	Vehicle Use Time (Year)	-	10
			Ford Explorer with assoc. tech gear	2	$82,545.00
			Fuel	2	$1,022.00
			Maintenance	2	$1,887.00
			Medical Equipment (One-Time Cost)	2	$29,392.00

			Patients	12	30
			Program Visits	360	5
			Medical Equipment (On-Going Cost)	1800	$1.00
			Medical Equipment Cost Increase Rate	-	3%
		Others	Discount Rate	-	5%
Impacts	**Target: High Risk Level**	Hospital Readmission	Readmission Rate without Program	360	100%
			Readmission Rate with Program	360	28%
			Readmissions Avoided	259	$12,287.00
		Vehicle	Percent Readmissions - EMS	-	95%
			Fewer ED Transports	246	10.00
			Fewer VMT	2462	$0.98
		ATCEMS Reimbur-sements	Annual Income from Hospitals	360	$800.00
			Income Increase Rate	-	5%
			Reimbursement for Program Visits	1800	$0.00
			Reimbursement for ED Transports	246	$414.00
		Others	First Year Adjustment Due to Training	-	95.00%
	No Target Risk Level	Hospital Readmission	Readmission Rate without Program	360	22%
			Readmission Rate with Program	360	13.3%
			Readmissions Avoided	31	$12,287.00
		Vehicle	Percent Readmissions - EMS	-	95%
			Fewer ED Transports	30	10.00
			Fewer VMT	298	$0.98
		ATCEMS Reimbur-sements	Annual Income from Hospitals	360	$800.00
			Income Increase Rate	-	5%
			Reimbursement for Program Visits	1800	$0.00
			Reimbursement for ED Transports	30	$414.00
		Others	First Year Adjustment Due to Training	-	95.00%
Payer Analysis	**Target: High Risk Level**	Visit Savings	Avg. Reimbursement for ED Visits	259	$969.00
			Avg. Reimbursement for Program Visits	1800	$0.00
		Transport Savings	Avg. Ambulance Reimbursement for ED Transports	246	$414.00
		Hospital Admission Savings	Avg. Reimbursement for Hospital Readmissions	259	$12,287.00
	No Target Risk Level	Visit Savings	Avg. Reimbursement for ED Visits	31	$969.00
			Avg. Reimbursement for Program Visits	1800	$0.00
		Transport Savings	Avg. Ambulance Reimbursement for ED Transports	30	$414.00
		Hospital Admission Savings	Avg. Reimbursement for Hospital Readmissions	31	$12,287.00

Economic Model								
Stake-holder	**Level**	**Analysis Category**	**Sub-Category**	**2016**	**2017**	**2018**	**2019**	**2020**
ATCEMS	**Target: High Risk Level**	Cost to Implement	Staffing	$175,479.79	$175,628.89	$178,263.32	$180,937.27	$183,651.33
			Technology	$4,744.00	$0.00	$0.00	$0.00	$0.00
			Supplies	$231,492.00	$7,672.00	$7,727.62	$7,784.91	$7,843.92
			Total	$411,715.79	$183,300.89	$185,990.94	$188,722.18	$191,495.25
		Cost Offsets	Vehicle	$2,292.49	$2,413.15	$2,413.15	$2,413.15	$2,413.15

		from Implement	Savings					
			Total	$2,292.49	$2,413.15	$2,413.15	$2,413.15	$2,413.15
		Net Cost to Implement	Total Costs After Savings	$409,423.29	$180,887.74	$183,577.79	$186,309.03	$189,082.09
		Lost Reimbur-sement	ED Trans-ports Reim-bursement	$96,846.19	$101,943.36	$101,943.36	$101,943.36	$101,943.36
			Total	$96,846.19	$101,943.36	$101,943.36	$101,943.36	$101,943.36
		Gained Reimbur-sement	Program Visits Reim-bursement	$0.00	$0.00	$0.00	$0.00	$0.00
			Income from Hospitals	$273,600.00	$302,400.00	$317,520.00	$333,396.00	$350,065.80
			Total	$273,600.00	$302,400.00	$317,520.00	$333,396.00	$350,065.80
		Net Increase in Reimbur-sement	Total Net Increase in Reimbur-sement	$176,753.81	$200,456.64	$215,576.64	$231,452.64	$248,122.44
	No Target Risk Level	Cost to Implement	Staffing	$175,479.79	$175,628.89	$178,263.32	$180,937.27	$183,651.33
			Technology	$4,744.00	$0.00	$0.00	$0.00	$0.00
			Supplies	$231,492.00	$7,672.00	$7,727.62	$7,784.91	$7,843.92
			Total	$411,715.79	$183,300.89	$185,990.94	$188,722.18	$191,495.25
		Cost Offsets from Implement	Vehicle Savings	$277.01	$291.59	$291.59	$291.59	$291.59
			Total	$277.01	$291.59	$291.59	$291.59	$291.59
		Net Cost to Implement	Total Costs After Savings	$411,438.78	$183,009.30	$185,699.35	$188,430.59	$191,203.66
		Lost Reimbur-sement	ED Trans-ports Reim-bursement	$11,702.25	$12,318.16	$12,318.16	$12,318.16	$12,318.16
			Total	$11,702.25	$12,318.16	$12,318.16	$12,318.16	$12,318.16
		Gained Reimbur-sement	Program Visits Reim-bursement	$0.00	$0.00	$0.00	$0.00	$0.00
			Income from Hospitals	$273,600.00	$302,400.00	$317,520.00	$333,396.00	$350,065.80
			Total	$273,600.00	$302,400.00	$317,520.00	$333,396.00	$350,065.80
		Net Increase in Reimbur-sement	Total Net Increase in Reimbur-sement	$261,897.75	$290,081.84	$305,201.84	$321,077.84	$337,747.64
Payer Analysis	**Target: High Risk Level**	Visit Savings		$238,606.56	$251,164.80	$251,164.80	$251,164.80	$251,164.80
		Transport Savings		$96,846.19	$101,943.36	$101,943.36	$101,943.36	$101,943.36
		Hospital Admission Savings		$3,025,550.88	$3,184,790.40	$3,184,790.40	$3,184,790.40	$3,184,790.40
		Total Savings		$3,361,003.63	$3,537,898.56	$3,537,898.56	$3,537,898.56	$3,537,898.56
	No Target Risk Level	Visit Savings		$28,831.63	$30,349.08	$30,349.08	$30,349.08	$30,349.08
		Transport Savings		$11,702.25	$12,318.16	$12,318.16	$12,318.16	$12,318.16
		Hospital Admission Savings		$365,587.40	$384,828.84	$384,828.84	$384,828.84	$384,828.84
		Total Savings		$406,121.27	$427,496.08	$427,496.08	$427,496.08	$427,496.08

5-Year NPV		
Target: High Risk Level	Net Cost to Implement	$1,014,006.52
	Payer Savings	$15,148,777.92
No Target Risk Level	Net Cost to Implement	$1,023,090.75
	Payer Savings	$1,830,477.33
ATCEMS Bottom Line		
Target: High Risk Level	1-Year Net Cost to Implement	$409,423.29
	5-Year Net Cost to Implement	$1,014,006.52
	1-Year Net Increase in Reimbursement	$176,753.81
	5-Year Net Increase in Reimbursement	$921,207.33
No Target Risk Level	1-Year Net Cost to Implement	$411,438.78
	5-Year Net Cost to Implement	$1,023,090.75
	1-Year Net Increase in Reimbursement	$261,897.75
	5-Year Net Increase in Reimbursement	$1,304,969.70

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Appendix B. Parameters and Economic Impact Models for Alternative Staffing Strategies

This appendix contains parameter lists and models for the two alternative staffing strategies:

1. Nurse triage; and
2. Extended Care Paramedics.

1. Parameters for Alternative Staffing: Nurse Triage

Parameter	Unit Value	Total Units	Source
Space Console	$54,707	1	James Shamard
Chair	$700	1	James Shamard
Computer	$1,200	1	James Shamard
Other Office Equipment	$7,800	1	James Shamard
CAD Software	$15,112	1	James Shamard
Alternative Destinations Software	$15,825	1	Regola Quote
Triage Case Management Software	$64,295	1	Priority Solutions Quote
Licensing and Updates	$29,400	1	Priority Solutions Quote
Software Lifecycle (years)	3	--	Economic Life Assumption
Nurses	$67,517	1.5	James Shamard
Salary Increase Rate	1.5%	--	City of Austin Website
Supervision	$230,630	0.02	James Shamard/ Todd Olmstead
QA Supervision	$68,490	0.1	James Shamard/ Todd Olmstead
Taxi Ride	$10.66	--	Cost for Houston EMS Under Contract
Average Reimbursement to ED	$969	--	MEPS/AHRQ
Average Reimbursement to Comm/Urgent Care	$178	--	MedSpring Urgent Care
Average Ambulance Trip Cost to ED	$306	--	Rick Branning

1. Model for Alternative Staffing: Nurse Triage

Strategy
Calls that come into CTECC through 911 that fall into certain low-acuity categories such as "abdominal pain," "sick person," "allergic reaction," "headache," and "pediatric fever" are diverted to a nurse for secondary triage. The pilot program will begin with one nurse working 11am-7pm Monday-Friday.
Assumptions
1. Parameters without particular comment are calculated annually. 2. Assume 0.5 days are set aside for training call takers (4 hours). 3. Assume 7 days are set aside for training nurses for 8 hours each day, totaling 56 hours. 4. Nurses training fee is incorporated into the Triage Case Management Software cost. 5. In Staffing, all employees have the same benefit percentage and salary increase rate. 6. In the Economic Model section, the annual analysis is calculated at the end of each year. 7. Discount rate is assumed as 5%, as widely used in health care.

Inputs				
	Category	**Input Item**	**Units**	**$ per unit**
Cost to Implement	Physical Space	Space Console	1	$54,707
		Chair	1	$700
		Computer	1	$1,200
		Other Office Equipment	1	$7,800
	Training	Callers training time	4	-
		Callers training cost	52	$30.58
		Nurse training time	56	-
	Software	CAD Software	1	$15,112
		Alternative destinations software	1	$15,825
		Triage Case Management Software	1	$64,295
		Licensing and Updates	1	$29,400
		Software lifecycle in years	-	3
	Staffing	Nurses	1.5	$67,517
		Fringe rate		32%
		Salary increase rate	-	1.5%
		Supervision	0.02	$230,630
		QA Supervision	0.05	$68,490
Impacts	Ambulance Responses	Total Calls	126,495	-
		Percent of calls in Nurse Triage operating hours	52%	-
		Percent of calls diverted to Nurse Triage	7%	-
		Current ATCEMS response rate	98.4%	-
		Current ATCEMS rate of no transport	40%	-
		Nurse Triage rate of no response	40%	-
		ED transports avoided	0	-
		ATCEMS responses avoided	1768	-
		Percent of avoided transports who go to ED on their own	100%	
	Transportation	Percent of transports taken by taxi	50%	
		Taxi rides	0	$10.66
		Fewer ED transports miles traveled	0	12
		Fewer ED responses miles traveled	1768	6
		Fewer ambulance transport cost	10609	$0.98
	Others	Discount rate	-	5%

Payer Analysis	ED	Avg reimbursement to ED	0	$969.00
		Avg reimbursement to UCC		$178.00
	Ambulance	Avg ambulance trip cost to ED	0	$306.00
		Avg ambulance trip with Nurse Triage		$0.00
		Avg ambulance trip without ED transports	1768	$34.06

Economic Model							
Stake-holder	**Analysis Category**	**Sub-Category**	**2016**	**2017**	**2018**	**2019**	**2020**
ATCEMS	Cost to Implement	Physical Space	$64,407	-	-	-	-
		Training	$6,361				
		Software (one-time)	$95,232	-	-	-	-
		Software (update)	-	-	$29,400	-	-
		Staffing	$141,525	$146,457	$148,654	$150,884	$153,147
		Transportation	$0	$0	$0	$0	$0
	Cost Offset from Implement	Vehicle	$10,197	$10,396	$10,396	$10,396	$10,396
	Net Cost to Implement	Total Costs After Savings	$297,328	$136,061	$167,657	$140,487	$142,751
	Lost Reimbursement	ED Transports Reimbursement	$59,066	$60,221	$60,221	$60,221	$60,221
		Total	$59,066	$60,221	$60,221	$60,221	$60,221
	Gained Reimbursement	-	$0	$0	$0	$0	$0
		Total	$0	$0	$0	$0	$0
	Net Change in Reimbursement	Total Net Change in Reimbursement	-$59,066	-$60,221	-$60,221	-$60,221	-$60,221
Payer Analysis	ED Savings		$0	$0	$0	$0	$0
	Ambulance Savings		$59,066	$60,221	$60,221	$60,221	$60,221
	Total Savings		$59,066	$60,221	$60,221	$60,221	$60,221

5-Year NPV	
Net Cost to Implement	$778,837
Payer Savings	$259,627
ATCEMS Bottom Line	
1-Year Net Cost to Implement	$297,328
5-Year Net Cost to Implement	$778,837
1-Year Net Change in Reimbursement	-$59,066
5-Year Net Change in Reimbursement	-$259,627

2. Parameters for Alternative Staffing: Extended Care Paramedics

Parameter	Unit Value	Total Units	Source
Division Chief	$108,430	1	ATCEMS Payscale
Commander	$87,819	1	ATCEMS Payscale
Captain (Field, 48 hours)	$68,490	1	ATCEMS Payscale
Administrative Assistant	$35,000	1	ATCEMS Payscale
ECP	$61,152	8	James Shamard
Duty for Division Chief	11%	-	James Shamard
Duty for Commander	33%	-	James Shamard
Duty for Captain	100%	-	James Shamard
Duty for Administrative Assistant	50%	-	James Shamard
Duty for ECPs	100%	-	Assumption
Benefit	32%	-	James Shamard
Salary Increase Rate	1.50%	-	City of Austin
Training	$78,284.80	1	8 paramedics x 320 hours x $30.58
CAD software	$15,112	3	James Shamard
Cell phones	$372	8	James Shamard
Mobile WiFi Hotspot	$840	2	James Shamard
Portable Laptop/iPad	$2,000	2	Assumption
ECP Durable Equipment	$54,614.03	3	James Shamard
Vehicle (Tahoe)	$84,790	3	James Shamard
Fuel	$1,865.15	3	James Shamard
Maintenance	$1,887	3	James Shamard
Medical Equipment (ongoing)	$19.68	10,220	Assumption
Medical Equipment Cost Increase Rate	3%	-	Economic assumption
Discount Rate	5%	-	Economic Assumption
Avg Hospital Reimbursement for ED visit	$969.00	5314	North Shore-LIJ
Avg ATCEMS Reimbursement for ECP treatment	$150.00	5314	Assumption
Avg Ambulance Reimbursement for transport to ED	$414.00	5314	James Shamard

2. Model for Alternative Staffing: Extended Care Paramedics

Strategy
Extended Care Paramedics will provide in-field treatment when emergency room admittance is not necessary. Two ECPs per shift will travel to locations individually in a chase car and can either be requested by on-scene medics or through the call center at the initial dispatch. Once the ECP arrives on scene, they will treat the patient in the field or call an ambulance if transport is needed. If the ECP is called in by medics in the field, then ambulance medics wait to confirm 'no transport' and then are able to leave. If transport is needed, the ambulance transports to the hospital and the ECP leaves the scene.
Assumptions
1. Parameters without particular comment are calculated annually. 2. Parameters related to an increase rate or reduction rate are assumed to be constant year to year. 3. In Staffing, all employees have the same benefit percentage and salary increase rate. 4. In Staffing, trainer costs are calculated based on the assumption that a trainer will be paid $30.58 per hour. Each ECP requires 320 hours of training. 5. In Supplies, ECP Durable Equipment includes EMS jump bags and are considered a fixed cost. 6. In Supplies, fuel and maintenance costs are annual costs calculated by vehicle. 7. In Related Numbers, # of ECP responses is based on the assumption of 7 patients per ECP per shift, 2 shifts per day, 2 ECP per shift, so that is 365*2*7*2 = 10,220 per year. 8. Assume that of all ECP dispatches, 80% will come from the call center and 20% result from field requests. Of all ECP responses that come out of the call center, 90% will be treated in the field and 10% will be transported. Of all ECP responses that result from field requests, assume that 100% will be treated in the field. 9. Discount rate is assumed as 5%, as widely used in health care. 10. Under Impacts section, "First Year Adjustment Due to Training" accounts for less working time due to training. 182.5 shifts per ECP every year and 320 training hours equal to 320/12=26.67 shifts per ECP. 11. In Economic Model, annual analysis are calculated by the end of each year.

Inputs				
Strategy	**Category**	**Parameters**	**Units**	**$ per unit**
Cost to Implement	Staffing	Division Chief	1	$108,430.00
		Commander	1	$87,819.00
		Captain (Field, 48 hours)	1	$68,490.00
		Administrative Asst	1	$35,000.00
		ECP	8	$61,152.00
		Duty for Division Chief	-	11%
		Duty for Commander	-	33%
		Duty for Captain	-	100%
		Duty for Administrative Asst	-	0%
		Duty for Parametics	-	100%
		Benefit	-	32%
		Salary Increase Rate	-	1.5%
		Trainer (2months =8 weeks = 320 hours)	1	$9,785.60
	Technology	CAD Software	3	$15,112.00
		Cell Phones	2	$372.00
		Mobile WiFi Hotspot	2	$840.00
		Portable Laptop or ipad	2	$2,000.00
	Supplies	ECP Durable Equipment (One Time)	2	$29,392.00
		Vehicle (Tahoe)	3	$84,790.00

		Fuel	3	$1,865.15
		Maintenance	3	$1,887.00
		Medical Equipment(On Going)	10220	$19.68
		Medical Equipment Cost Increase Rate	-	3%
	Others	Discount Rate	-	5%
Impacts	Related Numbers	# of ECP Responses Per Day(2-12hour shifts)	2	14
		# of ECP Responses Per Year	365	28
		Curernt rate of responses from CTECC	-	80.00%
		Current rate of responses from in-field	-	20.00%
		Rate of responses treated by ECP (for responses from CETCC)	-	90.00%
		Rate of responses treated by ECP (for responses from in-field)	-	100.00%
		Base rate of responses w/o a transport	-	40.00%
		Rate of avoided ED Transports in terms of ATCEMS (Ambulance)	10220	52%
		Rate of avoided ED Visits in terms of patients	10220	52%
		Rate of avoided Ambulance Travels from Call Center	10220	20%
		First Year Adjustment Due to Training	-	85.39%
	Vehicle	Fewer Transports to ED (Ambulance)	5314	10
		Fewer VMT - ED Transports	53144	$0.51
		Fewer Travels from Call Center	2044	5
		Fewer VMT - Due to Travel from Call Center	10220	$0.51
		Total Fewer VMT	63364	$0.51
	ATCEMS Reimbur-sement	ED Transport Reimbursements (Ambulance)	5314	$414.00
		ECP Treatment Reimbursements	5314	$150.00
Payer Analysis	Visits	Avg Hospital Reimburesement for ED visit	5314	$969.00
		Avg ATCEMS Reimburesement for ECP treatment	5314	$150.00
	Transports	Avg Ambulance Reimbursement for transports to ED	5314	$414.00

Economic Model							
Stake-holder	**Year**	**Category**	**2016**	**2017**	**2018**	**2019**	**2020**
ATCEMS	Cost to Implement	Staffing	$799,955.51	$802,022.46	$814,052.80	$826,263.59	$838,657.54
		Technology	$51,760.00	$0.00	$0.00	$0.00	$0.00
		Supplies	$525,540.05	$218,419.94	$224,634.84	$231,036.19	$237,629.59
		Total	$1,377,255.56	$1,020,442.40	$1,038,687.64	$1,057,299.78	$1,076,287.13
	Cost Offsets from Implement	Vehicle Savings	$27,593.13	$32,315.64	$32,315.64	$32,315.64	$32,315.64
		Total	$27,593.13	$32,315.64	$32,315.64	$32,315.64	$32,315.64
	Net Cost to Implement	Costs after Savings	$1,349,662.43	$988,126.76	$1,006,372.00	$1,024,984.14	$1,043,971.49
	Lost Reimbur-sement	ED Transport Reimbur-sements	$1,878,636.61	$2,200,161.60	$2,200,161.60	$2,200,161.60	$2,200,161.60
		Total	$1,878,636.61	$2,200,161.60	$2,200,161.60	$2,200,161.60	$2,200,161.60
	Gained Reimbur-sement	APP Treatment Reimbur-	$680,665.44	$797,160.00	$797,160.00	$797,160.00	$797,160.00

		sements					
		Total	$680,665.44	$797,160.00	$797,160.00	$797,160.00	$797,160.00
	Net Change in Reimbu-sement	Total Net Change in Reimbur-sement	-$1,197,971.17	-$1,403,001.60	-$1,403,001.60	-$1,403,001.60	-$1,403,001.60
Payer Analysis	Visit Savings		$3,716,433.30	$4,352,493.60	$4,352,493.60	$4,352,493.60	$4,352,493.60
	Transport Savings		$1,878,636.61	$2,200,161.60	$2,200,161.60	$2,200,161.60	$2,200,161.60
	Total Savings		$5,595,069.92	$6,552,655.20	$6,552,655.20	$6,552,655.20	$6,552,655.20

5-Year NPV	
Net Cost to Implement	$4,712,230.84
Payer Savings	$27,457,581.84
ATCEMS Bottom Line	
1-Year Net Cost to Implement	$1,349,662.43
5-Year Net Cost to Implement	$4,712,230.84
1-Year Net Change in Reimbursement	-$1,197,971.17
5-Year Net Change in Reimbursement	-$5,878,995.62

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Appendix C. Parameters and Economic Impact Models for Alternative Destinations Strategies

This appendix contains parameter lists and models for the three alternative destination strategies:

1. Urgent Care and Community Clinics;
2. Psychiatric Emergency Department and Local Mental Health Hospitals; and
3. Sobering Center.

1. Parameters for Alternative Destination: Urgent Care and Community Clinics

Parameter	Unit Cost	Unit	Source
Triage Case Management Software	$64,295	1 software unit	Priority Solutions Quote
Alternative Destinations Software	$15,825	1 software unit	Regola Quote
Average Reimbursement for Urgent Care or Community Clinic	$178.00	1 visit	Assumption
Trainer Cost	$30.58	1 hour	ATCEMS payscale
Population of Triage Directory- Personnel Cost	$5,000	1 month	ATCEMS payscale
Average ATCEMS reimbursement for ED transport	$306.00	1 trip	Rick Branning
Average ED Reimbursement	$969.00	1 visit	Centers for Disease Control and Prevention
Triage case management software licensing and updates	$29,400	1 yearly update	Priority Solutions Quote
Average ATCEMS reimbursement for clinic transport	$135.00	1 trip	Rick Branning

1. Model for Alternative Destination: Urgent Care and Community Clinics

Strategy
ATCEMS paramedics will have the opportunity to transport patients without emergency medical needs to a local urgent care center or community clinic. Paramedics will follow strict protocols set in place by the Office of the Medical Director to make this determination face-to-face with the patient. Low-acuity patients will be able to receive the appropriate medical care at lower costs. The pilot program will focus on Medic Station 4, the Rosewood Zaragosa Health Center, and the MedSpring Urgent Care Center located near the University of Texas campus.
Assumptions
1. Parameters without particular comment are calculated annually. 2. Assume 6 days are set aside for training at 8 hours each day, totaling 48 hours per employee. 3. Assume 10% of transports are diverted to urgent care/community clinics. 4. Assume 7% of patients transported to a local clinic will have been misdiagnosed and need to be repatriated. 5. Discount rate is assumed as 5%, as widely used in health care. 6. In the Economic Model section, the annual analysis is calculated at the end of each year. 7. The triage case software will be updated annually after the second year.

Inputs				
Strategy	**Category**	**Input Item**	**Units**	**$ per unit**
Cost to Implement	Personnel	Training time (hours)	48	
		Number of paramedics getting trained	8	$30.58
		Trainer cost	1	$1,467.84
		Employee time to populate triage directory	0	$60,000.00
	Software	Triage case management software	1	$64,295.00
		Triage directory software	0	$15,825.00
		Software update	1	$29,400.00
		Software lifecycle	-	1
Impacts	Vehicle	Number of transports per shift	6	-
		Number of shifts per year	100	-
		Percentage of diversion rate	10%	-
		Diverted patients per paramedic per year	30	0
		Total miles saved for diverted patients	0	$0.98
	Misdiagnosis	Repatriation rate		7%
		Misdiagnosed transports	16.8	10
		Misdiagnosed transport cost	168	$0.98
	Others	Discount rate		5%
Payer Analysis	Medical Care	Avg reimbursement to ED	223.2	$969.00
		Avg reimbursement to clinic		$178.00
	Ambulance	Avg ambulance trip reimbursement to ED	240	$306.00
		Avg ambulance trip reimbursement to clinic		$135.00

Economic Model							
Stake-holder	**Analysis Category**	**Sub-Category**	**2016**	**2017**	**2018**	**2019**	**2020**
ATCEMS	Cost to Implement	Personnel	$1,467.84	-	-	-	-
		Triage directory populating	$0	$0	$0	$0	$0
		Software (one-time)	$64,295	-	-	-	-
		Software (update)	-	-	$29,400	$29,400	$29,400
		Misdiagnosed Transports	$160	$165	$165	$165	$165
	Cost Offset from Implement	Vehicle	$0	$0	$0	$0	$0
	Net Cost to Implement	Total costs after savings	$65,923	$165	$29,565	$29,565	$29,565
	Lost Reimbur-sement	ED transports reimbursement	$39,809	$41,040	$41,040	$41,040	$41,040
		Total	$39,809	$41,040	$41,040	$41,040	$41,040
	Gained Reimbur-sement	-	$0	$0	$0	$0	$0
		Total	$0	$0	$0	$0	$0
	Net Change in Reimbur-sement	Total net change in reimbursement	-$39,809	-$41,040	-$41,040	-$41,040	-$41,040
Payer Analysis	Medical care savings		$168,354	$173,561	$173,561	$173,561	$173,561
	Ambulance savings		$39,809	$41,040	$41,040	$41,040	$41,040
	Total Savings		$208,163	$214,601	$214,601	$214,601	$214,601

5-Year NPV	
Net Cost to Implement	$135,959
Payer Savings	$922,978
ATCEMS Bottom Line	
1-Year Net Cost to Implement	$65,923
5-Year Net Cost to Implement	$135,959
1-Year Net Change in Reimbursement	-$39,809
5-Year Net Change in Reimbursement	-$176,509

2. Parameters for Alternative Destination: Psychiatric Emergency Department and Local Mental Health Hospitals

Parameter	Unit Value	Unit	Source
Fuel	$0.98	1 VMT	James Shamard
Trainer Wages	$2,446.40	1 Two-week Training Program	Keith Simpson
Avg. ATCEMS ED Transport Reimbursement	$306.00	1 ED Transport	Keith Simpson
Avg. Medical ED Reimbursement	$969.00	1 ED Visit	James Shamard
Avg. Reimbursement for Mental Health Hospital Transport	$135.00	1 Transport	Rick Branning

2. Model for Alternative Destination: Psychiatric Emergency Department and Local Mental Health Hospitals

Strategy
ATCEMS paramedics will have the opportunity to transport patients with primary mental health needs to the Seton Psychiatric Emergency Department (SPED) and local mental health hospitals. Paramedics will follow strict protocols set in place by the Office of the Medical Director to make this determination face-to-face with the patient. Mental health patients will be able to receive more appropriate care at a lower cost to both the patient and the healthcare system. The pilot program will focus on Medic Station 4, the SPED, and Austin Lakes Hospital.
Assumptions
1. Parameters without particular comment are calculated annually. 2. Assume 10 days are set aside for training at 8 hours each day, totaling 80 hours. 3. Assume that without this strategy, the target patient population would be transferred to a mental health alternate destination after being admitted to a medical ED. Therefore, the cost of treatment in the mental health alternate destination is excluded from the economic analysis. 4. Discount rate is assumed as 5%, as widely used in health care. 5. In the Economic Model section, the annual analysis is calculated at the end of each year.

Inputs				
Strategy	**Category**	**Parameters**	**Units**	**$ per unit**
Cost to Implement	Training	Training time (hours)	80	-
		Number of paramedics getting trained	8	$30.58
		Trainer cost	1	$2,446.40
Impacts	Vehicle	Percentage of diverted transports	0.85%	-
		Total number of EMS calls	5270	-
		Extra miles per trip	10	-
		Extra transportation to psych facility	45	$0.98
	Misdiagnosis	Repatriation rate		5%
		Misdiagnosed transports	2.24	$0.98
	Others	Discount rate	-	5%
Payer Analysis	ED	Avg reimbursement to ED	43	$969.00
		Avg reimbursement to Psych		$0.00
	Ambulance	Avg ambulance trip reimbursement to ED	45	$306.00
		Avg ambulance trip reimbursement to Psych		$135.00

Economic Model							
Stake-holder	**Analysis Category**	**Sub-Category**	**2016**	**2017**	**2018**	**2019**	**2020**
ATCEMS	Cost to Implement	Training	$2,446	-	-	-	-
		Vehicle	$427	$439	$439	$439	$439
		Misdiagnosed Transports	$21	$22	$22	$22	$22
	Cost Offset from Implement	-	$0	$0	$0	$0	$0
	Net Cost to Implement	Total costs after savings	$2,895	$461	$461	$461	$461
	Lost Reimbursement	ED transports reimbursement	$7,450	$7,660	$7,660	$7,660	$7,660
		Total	$7,450	$7,660	$7,660	$7,660	$7,660
	Gained Reimbursement	-	$0	$0	$0	$0	$0
		Total	$0	$0	$0	$0	$0
	Net Change in Reimbursement	Total net change in reimbursement	-$7,450	-$7,660	-$7,660	-$7,660	-$7,660
Payer Analysis	ED savings		$40,106	$41,236	$41,236	$41,236	$41,236
	Ambulance savings		$7,450	$7,660	$7,660	$7,660	$7,660
	Total Savings		$47,556	$48,896	$48,896	$48,896	$48,896

5-Year NPV	
Net Cost to Implement	$4,314
Payer Savings	$210,418
ATCEMS Bottom Line	
1-Year Net Cost to Implement	$2,895
5-Year Net Cost to Implement	$4,314
1-Year Net Change in Reimbursement	-$7,450
5-Year Net Change in Reimbursement	-$32,964

3. Parameters for Alternative Destination: Sobering Center

Parameter	Unit Value	Unit	Source
Average extra mileage to Sobering Center	13.00		James Shamard
Extra transportation cost (per mile)	$0.98		James Shamard
Pilot percentage	-	5.41%	James Shamard
Training time (hours)	-	16	James Shamard
Trainer training cost	$30.58	1	ATCEMS payscale
Avg reimbursement to ED	$969.00		Centers for Disease Control and Prevention
Avg reimbursement to sobering center	$150.00		Assumption
Avg ambulance trip reimbursement to ED	$306.00		Rick Branning
Avg ambulance trip reimbursement to sober center	$135.00		Rick Branning

Strategy
ATCEMS paramedics will be able to transport patients who are intoxicated and without emergent medical needs to a sobering center. Paramedics will follow strict protocols set in place by the Office of the Medical Director to make a face-to-face determination whether a patient needs emergency medical care. Individuals will be able to sober up safely at a much lower cost to both themselves and the healthcare system. The pilot program will focus on Medic Station 6.
Assumption
1. Parameters without particular comment are calculated annually. 2. Assume 2 days will be set aside for training at 8 hours each day, totaling 16 hours. 3. System wide, assume there would be 1,500 transports to sobering center each year, and 60 (4%) misdiagnosed transports each year. 4. Assume the pilot program responds to 5.41% of all ATCEMS calls. 5. In the Economic Model section, the annual analysis is calculated at the end of each year. 6. Discount rate is assumed as 5%, as widely used in health care. 7. Assume ATCEMS will not be reimbursed twice for misdiagnosed transports.

Input				
Strategy	**Category**	**Input Item**	**Units**	**$ per unit**
Cost to Implement	Vehicle	Average extra mileage to Sobering Center	1500	13
		Extra transportation cost	18720	$0.98
		Pilot percentage	5.41%	-
	Training	Training time (hours)	16	-
		Trainer training cost	1	$30.58
Impacts	Misdiagnosis	Misdiagnosed transports	60	$0.98
	Others	Discount rate	-	5%
Payer Analysis	ED	Avg reimbursement to ED	1440	$969.00
		Avg reimbursement to sobering center		$150.00
	Ambulance	Avg ambulance trip reimbursement to ED	1500	$306.00
		Avg ambulance trip reimbursement to sober center		$135.00

Economic Model							
Stake-holder	**Analysis Category**	**Sub-Category**	**2016**	**2017**	**2018**	**2019**	**2020**
ATCEMS	Cost to Implement	Vehicle	$987	$992	$992	$992	$992
		Training	$489	-	-	-	-
		Misdiagnosed Transports	$41	$41	$41	$41	$41
	Cost Offset from Implement	-	-	-	-	-	-
	Net Cost to Implement	Total costs after savings	$1,517	$1,034	$1,034	$1,034	$1,034
	Lost Reimbur-sement	ED transports reimbursement	$13,801	$13,877	$13,877	$13,877	$13,877
		Total	$13,801	$13,877	$13,877	$13,877	$13,877
	Gained Reimbur-sement	-	$0	$0	$0	$0	$0
		Total	$0	$0	$0	$0	$0
	Net Change in Reimbur-sement	Total net change in reimbursement	-$13,801	-$13,877	-$13,877	-$13,877	-$13,877
Payer Analysis	ED savings		$62,970	$63,316	$63,316	$63,316	$63,316
	Ambulance savings		$13,801	$13,877	$13,877	$13,877	$13,877
	Total Savings		$76,770	$77,193	$77,193	$77,193	$77,193

5-Year NPV	
Net Cost to Implement	$4,937
Payer Savings	$333,803
ATCEMS Bottom Line	
1-Year Net Cost to Implement	$1,517
5-Year Net Cost to Implement	$4,937
1-Year Net Change in Reimbursement	-$13,801
5-Year Net Change in Reimbursement	-$60,006

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Appendix D. Additional Resources

Below is a list of selected informative articles and videos that will provide an introduction to innovations in the EMS industry for individuals who are not familiar with this area of study. While each municipality has a unique set of needs and resources that will shape the structure of its EMS system, the strategies discussed in the body of this report share many similarities with the innovations in other EMS systems described below.

Introduction. These initial links will provide introductory information on integrated community healthcare and comprehensive lists of resources for implementing programs. The first link provides a general introduction to mobile integrated healthcare and has a large collection of resources and white papers related to different types of innovations in the EMS industry. The second link is a great collection of articles and research studies from around the world that is updated daily and covers a wide spectrum of topics in the field of integrate healthcare. The third link is a proposed evaluation tool for community paramedic programs published by the U.S. Department of Health and Human Services. The fourth link is a collection of podcasts and radio programs that are very engaging and cover all topics related to mobile integrated healthcare.

1. http://mihpresources.com
2. http://www.emsworld.com/integrated-healthcare
3. http://hrsa.gov/ruralhealth/pdf/paramedicevaltool.pdf
4. http://www.mediccast.com/blog/tag/mobile-integrated-healthcare/

Wake County Resources. Wake County EMS in North Carolina started an Advanced Practice Paramedic (APP) program in January 2009. The Wake County APPs have a similar role to the ECP innovation described in Chapter 8, but the Wake County APP program also incorporates some of the features of ATCEMS' Community Health Paramedic (CHP) program that we proposed expanding in Chapter 5. The Wake County APPs also focus on getting frequent callers and the chronically ill out of the emergency room by providing preventative case management and post-discharge follow-up appointments, with similar goals as the strategies described in Chapters 6 and 9. Wake County APPs also help transport mental health patients to alternative destinations (Chapter 10). While not identical to any one of the strategies proposed in the body of this report, the Wake County program is a good example of how the structure of these innovations are adaptable and the different goals complimentary. The first link contains information regarding the Wake County APP program and the second link is an informative video describing the on-the-ground experiences of paramedics and patients that are involved with the Wake County APP program.

1. http://www.wakegov.com/ems/about/staff/Pages/advancedpracticeparamedics.aspx
2. http://wake.granicus.com/MediaPlayer.php?publish_id=221

ATCEMS Community Health Paramedic Program. The Community Health Paramedic program of ATCEMS that this report proposes expanding in Chapter 5 began in 2009 and has already seen positive results, particularly in terms of improving patient health. The case management aspect of the CHP program aligns with Chapter 6 and CHPs may also follow up with patients who are transported to community clinics or sobriety centers that have ongoing medical or

psychosocial needs (Chapters 9 and 11). The first link is a short, informative video describing the ATCEMS CHP program as it is currently structured. The second link is a video that describes community paramedicine more generally.

1. https://www.youtube.com/watch?v=MyyNyQGEl-I
2. https://www.youtube.com/watch?v=Uuypdcl07Ac

Mobile Crisis Outreach Team. ATCEMS currently coordinates with the Mobile Crisis Outreach Team (MCOT) of Austin Travis County Integral Care when responding to 911 calls that need psychiatric intervention. The MCOT team has been an integral part of the success of the CHP program described in Chapter 5 and will likely have an expanded role if the psychiatric diversion strategy in Chapter 10 is adopted by ATCEMS. Below is a short, informative video describing how ATCEMS paramedics currently utilize MCOT staff on psychiatric 911 calls.

1. https://www.youtube.com/watch?v=P2vvnjopGL4

Louisville Nurse Triage System. The Louisville EMS system recently implemented a nurse triage system that uses licensed and trained medical staff to safely respond to non-emergent 911 calls with less intensive (and less expensive) resources than the traditional ambulance response. The Louisville nurse triage system is similar to the innovation described in Chapter 7 and is still in its early stages but has seen initial success in diverting patients from the emergency room. The nurse triage system would also improve the overall effectiveness of the innovations described in Chapters 5 and 8-11. Below is a short report that discusses Louisville's nurse triage system.

1. http://www.emsworld.com/article/11656680/louisville-ems-alternative-care-programs

Sobering Centers. Sobering centers similar to the one described in Chapter 11 have been established in both Houston and San Antonio. The construction of a sobering center in Travis County has already been approved but the location of the center has yet to be finalized. The first link is a collection of reports and evaluations on a sobering center that was set up in San Francisco to divert patients from the emergency room whose primary needs were related to substance abuse. The second link is a video from Austin news station KXAN describing developments in Travis County's plan to build a sobering center.

1. http://www.hospitalcouncil.net/report/san-francisco-sobering-center
2. http://kxan.com/2014/03/10/officials-say-public-intox-arrests-waste-time/

Community Paramedicine. This report published by the National Conference of State Legislatures—"Beyond 911: State and Community Strategies for Expanding the Primary Care Role for First Responders"—provides a good introduction to community paramedicine and the philosophy and research that underlies all of the proposed strategies in Chapters 5-11. This paper focuses on the challenges and opportunities associated with setting up innovative EMS systems and describes the goals of EMS innovation to be: "to improve individual and community health, reduce unnecessary hospitalizations and ED visits, and reduce healthcare costs."

1. http://www.ncsl.org/research/health/expanding-the-primary-care-role-of-first-responder.aspx

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