

10-28-2016

# Innovations in Rural Health System Development: Service Delivery Advances in Care Coordination, Emergency Care, and Telehealth

Amanda Burgess MPPM

*University of Southern Maine, Muskie School of Public Service, Maine Rural Health Research Center*

Andrew F. Coburn PhD

*University of Southern Maine, Muskie School of Public Service, Maine Rural Health Research Center*

Follow this and additional works at: [https://digitalcommons.usm.maine.edu/health\\_system\\_reform](https://digitalcommons.usm.maine.edu/health_system_reform)

---

## Recommended Citation

Burgess, A., & Coburn, A. (2016). Innovations in rural health system development: Service delivery advances in care coordination, emergency care, and telehealth. Portland, ME: University of Southern Maine, Muskie School of Public Service, Maine Rural Health Research Center.

This Report is brought to you for free and open access by the Maine Rural Health Research Center (MRHRC) at USM Digital Commons. It has been accepted for inclusion in Health System Reform by an authorized administrator of USM Digital Commons. For more information, please contact [jessica.c.hovey@maine.edu](mailto:jessica.c.hovey@maine.edu).



# Innovations in Rural Health System Development

## Service Delivery Advances in Care Coordination, Emergency Care, and Telehealth

Amanda Burgess, MPPM  
Andrew Coburn, PhD

**NOVEMBER 2016**

Muskie School of Public Service  
Maine Rural Health Research Center



**Rapid changes in health care payment and delivery systems are driving health care providers, payers, and other stakeholders to consider how the current delivery system might evolve.**

This series of briefs profiles innovative rural health system transformation models and strategies from Maine and other parts of the United States. The aim is to assist rural communities and regions to proactively envision and develop strategies for transforming rural health in the state. In preparing these briefs we consulted experts, interviewed key informants, and reviewed the professional and research literature to find robust and innovative models and strategies that could be replicated in rural Maine.

### PROMISING STRATEGIES:

- Alternative Models of Emergency Care ..... 2
- Telehealth..... 5
- Care Coordination Programs..... 8

### INTRODUCTION

This brief focuses on the provision of emergency services, the use of telehealth technology, and care coordination initiatives as examples of innovation in rural service delivery designed to ensure rural access to essential health services. The growing emphasis on value versus volume-based payment is precipitating wide-ranging changes in the organization and delivery of services throughout the health system. Although this brief focuses on care coordination, emergency care, and telehealth, others in this series profile service delivery innovations in behavioral health, workforce, governance, and financing and payment. For example:

- The behavioral health-focused brief offers examples of innovation in care coordination and integration including the co-location of primary care and behavioral health services,

and the integration of medication-assisted treatment and Health Home services.<sup>1</sup> The behavioral health-focused brief also includes examples of the innovative use of telehealth in the treatment of mental disorders, including remote psychiatric consults in rural emergency departments and Project ECHO, an initiative that uses teleconferencing to connect medical specialists with primary care providers that serve rural and/or underserved communities.

- The workforce-focused brief profiles the roles that new types health workers, such as community paramedics and community health workers, play in the service delivery system.
- The governance-focused brief profiles hospitals and health systems that are partnering with primary care and other providers to create new organizational and governance structures that better support care management and integration.
- Finally, the financing and payment-focused brief profiles innovations tied to Accountable Care Organizations (a financing and care coordination initiative authorized by the Affordable Care Act) and Accountable Communities (a Medicaid ACO model adopted by states as a state Medicaid program option), which reward the provision of high quality and efficient health care.

## PROMISING STRATEGIES

### Alternative Models of Emergency Care

#### What is emergency care?

Emergency services are health care services that evaluate and/or treat any medical condition that a layperson would believe requires immediate medical care.<sup>1</sup> Pre-hospital emergency medical support (EMS) services are provided by individuals in a variety of roles with training in basic life support (including emergency medical technicians, first responders, and emergency medical dispatchers) or advanced life support (including paramedics, who may specialize in a number of areas). Hospital-based emergency departments—traditionally staffed by triage nurses, emergency room technicians, emergency medicine physicians, nurses, and other specialized staff—treat patients without prior appointments who present with a wide range of acute health problems.

In most rural areas, EMS and hospital emergency department staff work closely together. A number of rural communities in Maine have EMS services provided by the local hospital. In other communities, EMS services are provided by municipalities and private companies.

Along with primary care services, access to emergency care is essential in all rural areas. Providing EMS services in rural areas is challenging due to the distance EMS providers must travel to reach and transport patients. The time it takes EMS responders to reach patients impacts patient outcomes—research has found that unintentional injury mortality increases with increasing rurality.<sup>2,3</sup> Rural areas also have the highest rate of emergency department visits that result in discharge compared with urban areas, suggesting that emergency departments in rural areas are used for non-acute care.<sup>4</sup>

Across the country and in one Maine community—Boothbay Harbor—rural hospital closures have forced communities to consider how they might maintain access to emergency

---

<sup>1</sup>The six Health Homes services are care management, care coordination, health promotion, transitional care/follow up, patient and family support, and referral to community and social support services.

care and other essential services. These changes have focused attention on new models for organizing and providing emergency care discussed in this brief.

### KEY FACTS about emergency care in Maine:

- A statewide study of emergency department use in Maine using data from 2006 found that Maine's emergency department use was about 30% higher than the national average.<sup>5</sup>
- The highest emergency department use rates were among Mainers under one year of age and those 75 years of age or over.<sup>5</sup> The emergency department use rate among Mainers 75 years of age or over was 37.4 percent higher than in the nation overall.<sup>5</sup>

## PROMISING STRATEGIES AND MODELS

*The emergency care models discussed here offer different mixes of staffing and services to provide emergency care in rural areas.*

**EXAMPLE:** The closure of rural hospitals jeopardizes access to emergency services in rural communities. One proposed strategy for providing emergency services in the absence of a hospital is the creation of **Freestanding Emergency Departments (FEDs)**—health care facilities that provide emergency care and are physically separate from an acute care hospital. In addition to increasing access, FEDs help address the challenges of emergency department overcrowding, door-to-doctor time, and extended lengths of stay. However, FEDs come with challenges including care that is more expensive than urgent care, consumer confusion regarding appropriate use, and potential for duplication of personnel and equipment.

The Center for Medicare and Medicaid Services first recognized FEDs in 2004, and breaks down FEDs into two categories: (1) a stand-alone hospital specializing in emergency services or (2) a provider-based department of the main hospital. Licensure of FEDs varies from state to state, but FEDs are typically open 24 hours a day, seven days a week and provide the same services as a conventional emergency department in a hospital, although they may not have the capacity to handle some trauma cases. FEDs do not have inpatient beds and generally have transfer arrangements with area hospitals for patients that need additional care. FEDs are typically owned and run by hospitals and are operated as an outpatient department of the hospital, but FEDs can also be owned by physicians, the government, other business interests, or a partnership of organizations.

Research on the effectiveness and financial viability of FEDs is mixed. FEDs are associated with modest improvements in time-specific EMS system metrics.<sup>6</sup> An analysis of the effect of opening FEDs within a health care system found that opening two FEDs decreased volume and admission rates for the hospital-based emergency department in the system, and increased the overall emergency department volume for the system.<sup>7</sup> The estimated annual cost to operate an FED ranges from \$5.5 million for low volume models to \$12.5 million for high volume models, with average cost per patient declining as patient volume increases.<sup>8</sup>

FEDs are typically located in growing suburban areas 15-20 miles from hospitals and there is currently no rural-specific federal designation for FEDs. At the federal level, Senator Chuck Grassley of Iowa has introduced the Rural Emergency Acute Care Hospital Act, a bill that proposes to have Medicare recognize independent Rural FEDs (RFEDs) as a new facility type

and enhance reimbursement for services to 110 percent of reasonable cost.<sup>9</sup> Although passage of this bill is uncertain, there is considerable interest among federal policymakers in the FED model. At the state level, in 2014 Georgia's Department of Community Health approved new rules allowing Critical Access Hospitals to eliminate their inpatient services and reopen as an RFED. However, no organizations have applied for the new designation.

In Maine, the Thayer Center for Health in Waterville was the first FED established in the state. The facility transitioned from an acute care hospital to an FED when the site's inpatient services were relocated to MaineGeneral Medical Center in Augusta.

**EXAMPLE: Collaborative Emergency Centers (CECs)** offer a versatile model of emergency care that increases access to inter-professional primary care. CECs were first opened in the Canadian province of Nova Scotia in response to long wait times for primary care appointments and frequent and unexpected temporary emergency department closures due to staffing shortages.

The central features of CECs are (1) provision of primary care, (2) capacity to provide urgent care, and (3) established protocols for handling emergency care needs. CECs are located near or within a rural hospital or health care facility and are open 24 hours a day, seven days a week. CECs increase access to same day and next day primary care appointments by providing extended hours (typically 8am to 8pm) every day of the week. Although staffing models in CECs vary depending on the assets of the community where they are located, they generally are staffed overnight (8 pm to 8 am) by a nurse and a paramedic, with an offsite physician available by phone for oversight and consultation. The CEC model fully utilizes the expertise of nurses and paramedics who are trained to deal with the minor, less urgent injuries (based on the Canadian Triage and Acuity Scale) that make up a bulk of emergency department visits. By reducing the role of physicians in overnight emergency care, CECs aim to reduce physician burnout and attract physicians to rural areas of Nova Scotia.

During a CEC's overnight shift the paramedic is located on-site and the nurse on duty must be somewhere within the larger facility. Every client contact requires three-way conversation between the paramedic, nurse, and the remote on-call emergency physician. Every patient care decision is based on collective assessment, clinical judgment, and decision making. Patients are transferred to the closest, most appropriate facility if further care is deemed necessary. For more information visit: <http://novascotia.ca/dhw/primaryhealthcare/CEC.asp>

**EXAMPLE: Microhospitals** offer comprehensive emergency services, but unlike FEDs include a small number of inpatient beds, typically fewer than a dozen. They may also have surgical suites, labor and delivery services, primary care, and specialists on site or nearby. The facilities are typically small in scale (15,000 to 50,000 square feet) and affiliated with a larger health care system. Microhospitals have largely been developed in urban and suburban areas in Arizona, Colorado, Nevada, and Texas. Although some argue that microhospitals are a viable option for rural areas because they are cheaper to build than traditional acute care hospitals, there are conflicting opinions about the ongoing viability of microhospitals in rural areas.<sup>10,11</sup>

### Considerations for Application in Maine

- Significant work would need to be done at the state level regarding the licensing and regulation of some of the emergency care models profiled in this brief.

- New emergency care models emphasize integration of emergency and urgent care with primary care and other services to ensure that residents have access to a coordinated, high quality health system.
- The financial viability of these models depends on location, expected service volume, and other factors and is an essential focus of the planning process.

## PROMISING STRATEGIES

### Telehealth

#### What is telehealth?

Telehealth encompasses a number of methods for disease diagnosis, management, and patient education including live video, asynchronous store-and-forward, remote patient monitoring, and Mobile Health (mHealth) technologies. Telehealth services are an appealing health care delivery model for much of Maine due to the state’s rural geography, inclement weather, maldistribution of providers, and inadequate and/or costly transportation options. Telehealth technology could play a role in providing greater rural access to specialty services not provided locally—to the benefit of both patients and providers. Telehealth allows patients to avoid traveling significant distances to receive specialty care, which can be particularly burdensome for low-income rural residents who may lack transportation options and/or paid time off from work.

Rural primary care providers benefit from connections to specialty colleagues. Research on Project ECHO (a knowledge sharing model that connects experts to community providers using videoconferencing that is profiled in the behavioral-health focused brief) found that physicians using telehealth to confer with colleagues at remote locations reported feeling more confident in treating complex diseases as well as higher job satisfaction.<sup>12</sup>

In 2014, just 34 percent of rural hospitals and 32 percent of urban hospitals had at least one telehealth application in use.<sup>13</sup> Rural hospitals were more likely than urban hospitals to have just one telehealth service available, and to implement telehealth in radiology departments and emergency/trauma care.<sup>13</sup> Urban hospitals were more likely to adopt telehealth approaches in obstetrics/gynecology/neonatal intensive care/pediatrics, neurology, and cardiology/stroke/heart attack programs.<sup>13</sup>

#### KEY FACTS about telehealth in Maine:

- In an evaluation conducted by the American Telemedicine Association (ATA), Maine received a composite score of “A” for telemedicine coverage and reimbursement standards (one of nine states in the country to receive a top score), due in part to the state’s telemedicine parity law for Medicaid and private insurance.<sup>14</sup>
- The organization gave Maine a composite score of “B” in regard to professional licensure portability and practice standards for providers using telemedicine.<sup>15</sup> Taken together, the ATA’s scores suggest a high level of legislative and regulatory “friendliness” toward telehealth in Maine compared with other states.

- In April 2016 a MaineCare rule change removed the requirement that providers obtain approval prior to using telehealth technology to treat a patient, making provision of telehealth services easier for providers.<sup>16</sup>

## PROMISING STRATEGIES AND MODELS

**EXAMPLE:** Maine has the highest stroke death rate in New England.<sup>17</sup> The chance of surviving a stroke increases if strokes are quickly identified and treated. The FDA-approved treatment for ischemic strokes is a tissue plasminogen activator (tPA) that dissolves clots and restores blood flow to the brain. To be most effective, administration of tPA must take place within the first three hours of experiencing a stroke—making timely identification and treatment of strokes crucial to patient outcomes. But many small and rural hospitals lack on-site neurologists who are able to determine if administration of tPA is clinically appropriate.

The MaineHealth Telestroke Network (Network) based at Maine Medical Center in Portland provides Telestroke services to six spoke sites, including four rural hospitals. The Network leverages the expertise of neurologists at Maine Medical Center and Pen Bay Medical Center in Rockport by connecting them to hospitals that do not have onsite stroke experts through a two way live audio-video platform and electronic transfer of CT scans. Network partners call in concerning patients exhibiting acute symptoms of stroke and are under consideration for the administration of tPA. Remote providers at Maine Medical Center or Pen Bay Medical Center perform a neurological evaluation within twenty minutes of the initial phone call from the Network partner.

The rate of ischemic stroke patients receiving tPA has doubled across the hospitals in the Network.<sup>18</sup> Nearly half (48%) of ischemic stroke patients in the network receive tPA through the Telestroke program.<sup>19</sup> Administration of tPA has been done safely, with partners reporting no hemorrhages due to tPA administration.<sup>18</sup>

Annual contracts are developed with the spoke sites, which pay a tiered fee based on their number of emergency department visits each year and pay for neurology call coverage and response to activation.<sup>19</sup>

**EXAMPLE: Androscoggin Home Care and Hospice (AHCH)** has a robust telehealth program focused on remote patient monitoring in conjunction with in-home nursing visits. Peripheral devices in AHCH's remote patient monitoring program include scales, blood pressure monitors, pulse oximeters, and glucose meters. The telehealth monitoring system can be customized for a variety of conditions including congestive heart failure, diabetes, hypertension, and maternal health. Every day the remote monitoring system guides the client through a three-minute process to collect health information, including a series of yes or no questions. Information is then sent to AHCH via telephone line or cell phone tower. The program helps clients feel more comfortable managing their own day-to-day care, and allows clients to go longer in-between nurse visits. There is a full-time employee in charge of the program, which includes 80-90 clients at a time. Initial review of the program has found that it is keeping patients out of the hospital.



**EXAMPLE:** In order to increase access to obstetric care for women with high-risk pregnancies living in rural Arkansas the University of Arkansas for Medical Sciences (UAMS) created the Antenatal & Neonatal Guidelines, Education and Learning Systems (ANGELS) program—a statewide network of maternal-fetal medicine providers that utilizes telemedicine to support case management, deliver clinical care, and provide outreach, education, and support for obstetric providers.

The ANGELS program includes an initiative to develop and disseminate clinical guidelines for obstetrical, neonatal, and pediatric care through an online platform that allows providers around the state to access guidelines on desktop or mobile devices. In the first year and a half of the program, over 1,000 health care providers (predominantly from Arkansas, but including providers from almost every state in the country) registered on the ANGELS Guidelines website.<sup>20</sup>

Through the ANGELS program maternal-fetal medicine specialists and genetic counselors located at UAMS clinics provide telehealth consultations. A majority of the telehealth consultations are in regard to obstetric ultrasounds. Other issues handled through telehealth include review of colposcopy exams, high risk obstetric cases, fetal echocardiography, and obstetric psychiatry.

Through its various initiatives, ANGELS has increased access to care for pregnant women in rural Arkansas. Since the project's inception 44 rural sites have been equipped with telemedicine technology, over 13,500 triage calls have come into the project's call center which has facilitated over 550 high-risk maternal transports, and Arkansas has seen a 0.5 percent decrease in 60-day infant mortality rate.<sup>21</sup>

### Considerations for Application in Maine

- Reliable delivery of telehealth services to rural areas of the state depends on the availability of broadband internet—which is slowest in rural Piscataquis, Franklin, and Somerset counties and not available in some rural areas of Maine.<sup>22</sup>
- Adoption and use of telehealth requires considerable planning and adjustment to provider workflow to ensure effective use of the service.
- Rural providers considering or adoption of telehealth need technical assistance and training to address financial, workflow, technology, training, and other issues.
- Although Maine's telehealth reimbursement policies make financially stable, non-grant funded provision of telehealth services more feasible, financing and reimbursement challenges remain a barrier to implementation and use of telehealth in rural health systems.



## PROMISING STRATEGIES

### Care Coordination Programs

#### What are care coordination programs?

Care coordination is the deliberate organization of patient care activities between two or more providers involved in a patient's care to facilitate the appropriate delivery of health care services.<sup>23</sup> Care coordination programs seek to integrate patient care across various health and social services providers to avoid duplication of care and effort; improve health and social outcomes; ensure safe care transitions; and reduce avoidable Emergency Department use.

The [Rural Health Information Hub's Care Coordination Toolkit](#) identifies six care coordination models and strategies that can stand alone or be blended to best serve a community's unique needs:

- Care Coordinator Model: health care workers (either clinical or non-clinical workers including nurses, community health workers, social workers, health educators, and others) provide care coordination support and patient navigation services to patients and families;
- Partnerships Model: health care organizations create partnerships to improve care coordination and care transitions through the sharing of resources and data, exchange of best practices, and enhanced communication;
- Patient-Centered Medical Home Model: a physician-based model of care coordination that focuses on access to care, is committed to quality and safety, and is whole-person oriented;<sup>24</sup>
- Health Homes Model: a model established by the Affordable Care Act that is designed to coordinate health care and social services for Medicaid and Medicare-Medicaid dual eligible individuals with chronic conditions and behavioral health disorders;
- Accountable Care Organizations (ACO) Model: a model established by the Affordable Care Act that creates financial incentives for care coordination (ACO models are discussed at length in the financing and payment-focused brief in this series);
- Health Information Technology: Electronic health records, telehealth, and chronic disease management systems support care coordination models by facilitating communication and relationships among healthcare providers, care coordinators, and patients.

Research suggests that care coordination models share four common elements: assuming accountability for care coordination, providing patient support, developing relationships and agreement with key outside providers, and establishing connectivity that enables information transfer.<sup>25</sup>

## KEY FACT about care coordination programs in Maine:

- Maine's State Innovation Model (SIM) grant is funding several care coordination efforts, including the MaineCare Accountable Communities Initiative, and the use of HealthInfoNet—Maine's health information exchange—to provide MaineCare Care Managers with real-time electronic notifications when a member is seen in an emergency room or discharged from the hospital.

## PROMISING STRATEGIES AND MODELS

*Care coordination can be challenging in rural areas due to the geographic distance between primary care providers and specialists, and the complexity of rural patients' medical and financial situations. Rural care coordination programs can adopt a combination of the models described above to develop a program that best serves the health needs of their community.*

**EXAMPLE: ECARE-DIABETES** is a treatment model that utilizes nurse, pharmacist, and dietician certified diabetes educators to deliver diabetes education and coaching on the same day and in the same location as a patient's primary care visit. The model has been adopted and tested in rural North Carolina primary care clinics in an effort to coordinate the care of low-income African American patients living with Type 2 diabetes. The program was developed in response to high diabetes mortality rates among minority and rural North Carolinians. Adjusted diabetes mortality rates were 2.2 times higher for minority males and almost three times higher for minority females compared to their white counterparts, and rural eastern North Carolina experienced adjusted diabetes mortality that was 42% higher than the rest of the state.<sup>26</sup>

The six core components of the ECARE-DIABETES project are: (1) education and behavioral counseling by non-physicians; (2) medication intensification; (3) a point-of-care design that allows patients to receive education and behavioral coaching and care management at the same location and on the same day as primary care appointments; (4) expanded roles for front desk staff, office assistants, and nurses in patient evaluation and management; (5) a team-care approach with frequent inter-professional collaboration; and (6) medical provider leadership.

A rigorous controlled evaluation of the program found that the ECARE-DIABETES model is associated with improved blood pressure, blood sugar, and lipid control among rural African Americans living with diabetes.<sup>26</sup> The model is **financially supported** by fees, Medicare and Medicaid reimbursement, and improved provider productivity.

**EXAMPLE: The Wyoming Rural Care Transition Program** is a statewide initiative that helps patients who are 65 or older and have complex, chronic conditions, transition between care settings (i.e., hospitals and post-acute care sites such as nursing homes and patient-centered medical homes) while building patient knowledge and skills for self-management of their condition(s). The Program utilizes Care Transition Nurse Coaches to plan hospital discharge and care transition procedures, provide teaching specific to a patient's diagnosis prior to their transition, and facilitate medication management, information sharing, and provider collaboration during the transition of care. After the transition of care the Care Transition Nurse Coaches provide follow-up visits to teach patients additional self-care skills. Preliminary studies of the program demonstrate decreased costs, increased self-management behavior, and increased quality of life for program participants.<sup>27</sup>

## Considerations for Application in Maine

- Care coordination systems within the boundaries of a single health provider and system are easier to establish than partnership models involving multiple health and social service providers in the community.
- Funding for some care coordination models can be challenging. Although Medicaid and Medicare reimburse for certain types of care coordination, funding to support the core care management infrastructure (e.g administration, information technology) can be difficult to secure, especially for smaller rural providers.
- Staffing for care coordination services may be difficult in some rural areas.
- If a care coordination program involves visiting patients in their home or workplace, care coordinators may need to travel long distances on rural roads, potentially in inclement weather. This presents a liability for the care coordinator's employer and necessitates safety training.

## REFERENCES

1. American College of Emergency Physicians. Definition of an Emergency Service. 2015; <https://www.acep.org/Clinical---Practice-Management/Definition-of-an-Emergency-Service/>. Accessed September 22, 2016.
2. Myers SR, Branas CC, French BC, et al. Safety in Numbers: Are Major Cities the Safest Places in the United States? *Ann Emerg Med*. 2013;62(4):408-418 e403.
3. Singh GK, Azuine RE, Siahpush M. Widening Socioeconomic, Racial, and Geographic Disparities in HIV/AIDS Mortality in the United States, 1987-2011. *Adv Prev Med*. 2013;2013:657961.
4. Weiss A, Wier L, Stocks C, Blanchard J. Overview of Emergency Department Visits in the United States, 2011. Rockville, MD: Agency for Healthcare Research and Quality; June 2014.
5. Kilbreth M, McGuire C, Gray C, Chitashvili T, Finison K. Analysis of 2006 Maine Emergency Department Use. Portland, ME: University of Southern Maine, Cutler Institute for Health and Social Policy, Muskie School of Public Service; February 2009.
6. Lawner BJ, Hirshon JM, Comer AC, et al. The Impact of a Freestanding ED on a Regional Emergency Medical Services System. *Am J Emerg Med*. 2016;34(8):1342-1346.
7. Simon EL, Griffin PL, Jouriles NJ. The Impact of Two Freestanding Emergency Departments on a Tertiary Care Center. *J Emerg Med*. 2012;43(6):1127-1131.
8. Williams J, Song P, Pink G. Estimated Costs of Rural Freestanding Emergency Departments. Chapel Hill, NC: North Carolina Rural Health Research Program; November 2015.
9. A Bill to Amend Title XVIII of the Social Security Act to Create a Sustainable Future for Rural Healthcare. Grassley C, trans2015.

10. Andrews M. Sometimes Tiny Is Just the Right Size: 'Microhospitals' Filling Some ER Needs. Kaiser Health News; 2016.
11. Stempniak M. SCL Health Tries out Microhospitals. Hospitals and Health Networks 2016.
12. Dixon B, Hook J, McGowan J. Using Telehealth to Improve Quality and Safety: Findings from the AHRQ Portfolio. Rockville, MD: Agency for Healthcare Research and Quality; December 2008.
13. Ward M, Ullrich F, Mueller K. Extent of Telehealth Use in Rural and Urban Hospitals. Iowa City, IA: RUPRI Center for Rural Health Policy Analysis; 2014.
14. Thomas L, Capistrant G. State Telemedicine Gaps Analysis: Coverage and Reimbursement. American Telemedicine Association; January 2016.
15. Thomas L, Capistrant G. State Telemedicine Gaps Analysis: Physician Practice Standards and Licensure. American Telemedicine Association; January 2016.
16. Nadeau S. Adopted Rules: 10-144, Chapter 101, Mainecare Benefits Manual, Chapter I, Section 4, Telehealth Services; 10-144, Chapter 101, Mainecare Benefits Manual, Chapter I, Section 1, General Administrative Policies and Procedures. In: MaineCare Services, ed 2016.
17. Xu J, Murphy S, Kochanek K, Bastian B. Deaths: Final Data for 2013. Hyattsville, MD: National Center for Health Statistics; 2016.
18. Maine Medical Center. Telestroke - Joe's Story. 2016.
19. Louder D. Telestroke in Maine and Beyond: Regional Updates and Resources. Paper presented at: Advances in Stroke Care in Maine; September 13, 2016; Augusta, ME.
20. University of Arkansas for Medical Sciences. ANGELS 2015 Annual Report. Little Rock, AR 2015.
21. ANGELS: Antenatal & Neonatal Guidelines, Education and Learning System. 2016; <https://www.ruralhealthinfo.org/community-health/project-examples/681>.
22. National Telecommunications and Information Administration, Federal Communications Commission. National Broadband Map. 2014; <http://www.broadbandmap.gov/>. Accessed August 15, 2016.
23. McDonald K, Sundaram V, Bravata D, et al. Closing the Quality Gap: A Critical Analysis of Quality Improvement Strategies: Technical Review 9. Rockville, MD: Prepared by the Stanford University-UCSF Evidence-based Practice Center; June 2007.
24. American Academy of Family Physicians. The Patient-Centered Medical Home (Pcmh). <http://www.aafp.org/practice-management/transformation/pcmh.html>. Accessed October 24, 2016.
25. Horner K, Schaefer J, Wagner E. Care Coordination: Reducing Care Fragmentation in Primary Care. Seattle, WA: Qualis Health and the MacColl Center for Health Care Innovation at the Group Research Institute; 2013.
26. East Carolina University, Vidant Health. Ecare-Diabetes: Improving Diabetes Outcomes through an Evidence Based Integrated Program. <http://www.ecarediabetes.org/index.cfm>. Accessed October 24, 2016.

27. Alfero C, Coburn A, Lundblad J, et al. Care Coordination in Rural Communities: Supporting the High Performance Rural Health System. Iowa City, IA: Rural Policy Research Institute, University of Iowa; June 2015.

The authors would like to thank interviewee Brenda Czado for taking the time to speak with us about her work.

Suggested Citation:

Burgess A, Coburn A. *Innovations in Rural Health System Development: Service Delivery Advances in Care Coordination, Emergency Care, and Telehealth*. Portland, ME: University of Southern Maine. Muskie School of Public Service, Maine Rural Health Research Center; November 2016.