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## A Call Away: Investigating a Solution to Healthcare Access Barriers in Remote Communities

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A Call Away:  
Investigating a Solution to Healthcare Access Barriers in Remote Communities

An Honors Thesis

Presented to

The Faculty of the Department of Science, Technology, and Society

Colby College

In partial fulfillment of the requirements for the

Degree of Bachelor of Arts

By

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Waterville, Maine

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## ABSTRACT

This project focuses on the fact that there exist communities in the United States that are underserved in terms of healthcare. Whether this is due to the community's geographical (remote) location, lack of education, or other factors, the members of these communities experience disproportionate levels of care. My focus with this project will be the idea that everyone deserves adequate healthcare, regardless of where they live.

I focus specifically on one community: Jackman, Maine, which has recently implemented a telemedicine program called 'FirstNet' to aid its previously struggling clinic. The Jackman Community Health Center is the only health clinic in Jackman, and is not an adequate size or scope to address the needs of the community without additional assistance. FirstNet, which embodies telemedicine, connects medical professionals with patients in need of care, has served to lessen the strain felt by the few medical assistants on site at Jackman Community Health Center.

The project emphasizes the problems faced by rural and remote communities in the context of inadequate healthcare and the potential solution of implementing telemedicine programs to aid its residents and decrease barriers to care. Telemedicine encompasses monitoring, consultation, diagnostic, and post-operative practices, offering the promise of improved healthcare resources to under-resourced communities. By supplying the members of these communities with remote-presence medical devices, I hypothesize they will see increased access to the professional healthcare resources that they may not otherwise have access to.

## ACKNOWLEDGEMENTS

I would like to first thank my wonderful professor and advisor, Ashton Wesner, for her unwavering support and encouragement throughout the process of writing an honors thesis. Thank you for seeing this project through the many phases it has been through and providing me with a push in the right direction when I needed it most. You have been an integral part of my final year at Colby and your understanding of my goal to bring awareness to a topic I find important in a local context has meant so much to me. Thank you for committing yourself to reading and talking over draft after draft of this project and for believing in your students and the future of STS at Colby!

The depth of this project would not have been possible without the participation of Rick Petrie, the Chief Operating Officer of North East Mobile Health Services and Dr. Jonnathan Busko, the medical director of the emergency department at St. Joseph Hospital in Bangor, ME. I cannot thank you enough for your willingness to elevate my exploration of telemedicine in rural Maine and I wish you and Jackman all the best in continuing to improve rural healthcare via untraditional routes.

Thank you also to the many friends and colleagues who have entertained my ramblings about this topic and supported me with their presence at various presentations this year. I'm so excited to share my findings with you!

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## INTRODUCTION

The problem of unequally distributed healthcare is especially significant in remote communities. The specific detail of this research area which I will focus on is the integration of mobile medical devices with these communities.

People who live in remote areas, those which are situated far away from main centers of population, are often susceptible to limited access to the medical care they need. In the United States, hospitals and health care centers are concentrated largely in cities, with rural or otherwise remote areas of America significantly fewer physicians compared to their urban counterparts. Much of the struggle for adequate healthcare in these communities stems from difficulties in training and retaining physicians to provide their services in remote settings. Some typically successful strategies in implementing these practices have proven ineffective in the unique environment that remote residents find themselves in.

Despite concerted efforts from medical schools across the United States to develop rural medicine training track in an effort to expand the number of qualified professionals willing to devote their time to assisting medically underserved populations, interest in working in these remote communities remains low. The higher age and barriers to public transportation that often characterize such communities heightens the detrimental effects of lacking sufficient healthcare.

In this project, I research the success of FirstNet as an effective telemedicine program in the Jackman, Maine community and discuss the feasibility and logistics of developing and distributing telemedicine programs to underserved communities that are in need of healthcare support.

## LITERATURE REVIEW

Previous research on healthcare disparities and telemedicine includes examples of mobile medical devices in action and policy documents relating to this field of technology. Literature discussing the state of healthcare in rural communities, focusing on the factors that are most crucial to the need for adequate care, is also essential to consider.

Boulos, in “Mobile medical and health apps: State of the art, concerns, regulatory control and certification”, writes about the use of medical technology through mobile applications, focuses on the use of “apps as a medical device” (Boulos 1). He argues that there are significant benefits of using these applications in the context of healthcare. Mobile medical devices create an opportunity for people to better understand and participate in healthcare practices by giving them access to a “wealth of information” (Boulos 3) that they might not typically have had the opportunity to learn.

Integrating mobile medical applications like telemedicine with the communities that live in these locations provides community members with the opportunity to access the healthcare they deserve. This solution would provide a cost-effective way to support communities that are lacking in hospitals and medical professionals. Boulous defends this point, arguing that “the implementation of telemedicine and telehealthcare (including clinical telemonitoring of patients) through the application of mobile devices is clearly a practical and potentially low-cost choice in the delivery of healthcare” (Boulos 6).

Boulos also describes a few major concerns that come along with the use of mobile medical devices: app security and user privacy. His argument recognizes what good could come of more medical technology use and admits that such technology is quite difficult to police.

Boulos supports the idea that community members could be trained to provide amateur level healthcare using such devices and the wealth of knowledge they provide, writing that “the younger generation of technologically capable medical professionals in training, such as students and residents, harness the power of innovative apps to improve learning” (Boulos 25).

In “Wireless Mobile Medical Devices”, an excerpt selected from the Electrical and Computer Engineering Design Handbook, Lenk describes the “rapid developments in wireless technologies have ushered in a new era of medical devices that are improving patient quality-of-life and lowering costs for both healthcare providers and owners (Lenk 1). He writes that “research-level prototypes for wireless mobile medical devices are emerging across all sectors of medicine” (Lenk 2), with “developments across many electrical engineering disciplines have given rise to a new generation of medical devices, ranging from diagnostic to therapeutic, that are wirelessly operable” (Lenk 5).

In “Mobile remote-presence devices for point-of-care health care delivery”, Mendez writes that “timely access to effective medical care is a substantial challenge common to both developed and developing countries” (Mendez). He specifies that in “industrialized nations, barriers to medical care caused by distance and lack of adequate health care infrastructure and medical expertise have a negative impact on the provision of health care to vulnerable populations in underserved remote communities. These barriers are especially prevalent in developing areas, those in which “large segments of the population may lack access to primary health care services”. (Mendez).

Oudshoorn’s “How places matter: Telecare technologies and the changing spatial dimensions of healthcare” works in cohesion with Ergur’s “The Patient Perspective of Telemedicine in the Context of COVID-19 Pandemic” in the description of telemedicine as a an



up-and-coming method of mobile healthcare. Telemedicine, which refers to “the use of telecommunication equipment for the examination of a patient by a physician, and its content” involves “the health-related use of communication technologies taking place between medical providers or between a provider and a patient” (Ergur 2).

Oudshoorn writes that the rise of telemedicine is due largely to “major advances in the use of Internet-based applications” (Oudshoorn 1) that have occurred over recent years. The COVID-19 pandemic, which has been referred to as a “catalyst of transformation” (Ergur 1) for the presence of communication technology in the modern world of healthcare, has expedited the development of telemedicine practices and devices between patients and physicians as both parties adapt to the “new and physically distanced environment” (Ergur 2) created by it. The pandemic will be a major point of discussion in my paper as I argue that despite all that has changed in regards to social interaction during COVID-19, one thing remains constant: people need access to sufficient healthcare, and suffer when they do not have it.

The RP-Xpress mobile presence device has proven to be especially effective in remote areas. In a pilot test of prenatal assessment in the Bolivian Andes, the device facilitated crucial communication between a pregnant woman located in Bolivia and responding obstetricians located in Halifax, Nova Scotia and La Paz, Bolivia. In a “complete prenatal ultrasonographic assessment” (Oudshoorn 5), the RP-Xpress allowed for the transmission of critical patient data across Bolivian cell phone networks in real-time, including the heartbeat of the fetus. Mobile presence devices like the RP-Xpress are particularly useful as they support an all-encompassing patient-doctor experience - one in which the physician receives both hard data about their patient and is given the opportunity to get to know them and their circumstances. Compare the experience of the pregnant Bolivian woman to one in which the attending obstetrician was

simply sent a fetal ECG. This exam would be lacking in personability and understanding the reality of the patient's health experience. Now, consider the exam that actually took place. The obstetricians receive a holistic view of their patients' wellbeing in the form of medical data accompanied by real-time interviews - creating a much more personal understanding of their health. The use of the RP-Xpress in remote areas in Bolivia is a success story for mobile-presence devices, with many of them operating on battery power alone in extremely remote communities (Oudshoorn 5). By distributing mobile-presence devices such as the RP-Xpress to communities in rural or remote areas that may be lacking in physicians and resources, the members of these communities receive additional support, and their wellbeing is consequently improved.

The "Conclusions and Recommendations" excerpt of the World Health Organization's report on Human Resources for Medical Devices discusses the need for accessible, good quality medical devices and the role of engineers in creating them. WHO recognizes the existence of "remote and low source regions" (1) and touches on what accessibility looks like for the people who live in these communities. WHO holds engineers in high regard, indicating that it is within their role to design equitable products. There is an ongoing healthcare transformation occurring as scientific and technological innovation "redefines the nature of health care in virtually every dimension" (3). WHO also discusses some of the barriers that are in the way of healthcare systems adapting to these changes, including staffing, training, affordability, and lack of expertise. This article will be especially useful in my discussion of why rural healthcare is struggling to improve and what can be done to change that by various parties.

In a second excerpt from the World Health Organization's report on Human Resources for Medical Devices, "Medical device research and innovation", the innovation process behind

medical devices and the different roles of the people who make up the teams that create them is discussed. Section 6.7 describes what medical device innovation looks like in low resource settings. This section will be especially helpful in my discussion of integrating mobile medical devices in remote areas. It is noted that disease has especially devastating effects on people who live in such areas because the pharmaceutical industry only attends to areas in which consumers/beneficiaries can pay them. This is perpetually caused by weak health systems that are not being given adequate attention and improvements by policy makers.

## METHODOLOGY

In addition to literature, I draw on several interviews in this project. I interviewed Rick Petrie, the Chief Operating Officer of North East Mobile Health Services - Maine's most prevalent ambulance service; and Dr. Jonnathan Busko, the medical director of the emergency department at St. Joseph Hospital in Bangor, ME about the history and future of the medicine in Jackman and how the use of telemedicine inspired by the Red River Project is helping lessen the strain on the medical professionals who live and work there (full interview transcripts are presented in Appendices A-B).

My goal for these interviews was primarily to learn how telemedicine fits into the pre-existing medical context at the center. How do medical professionals interact with the device? What do they believe the strengths and weaknesses of FirstNet to be and how can I address these topics in my paper? In these interviews, I heard second-hand testimonials from members of the Jackman community who had previously interacted with the FirstNet program as patients at the Jackman Community Health Center. I learned about the resources they felt they were lacking as residents of a remote community in terms of healthcare and what kind of assistance they felt they would benefit from. I also set out to find out what makes a good mobile medical device in the context of telemedicine. How can engineers ensure that their device is usable for people who lack professional healthcare training? I approached interviews with a combination of set questions I will write and general conversation with the interviewee.

My target audience includes legislators and the tech industry. I feel that it is most important for legislators to understand the needs of the communities I will be researching so that they can learn what policies need to be put in place in order to help them (by improving access).

The other side of this is the tech industry. Since my topic also includes the development and distribution of mobile medical devices, it is important for developers to understand the needs of these communities. How can people in tech develop tech products that directly improve the lives of others? What parameters need to be taken into account when developing a device for an amateur healthcare provider (usability)?

Once I gathered and reviewed literature relating to the wide range of topics I set out to research, I refined this research and decided to focus on one rural community: Jackman, Maine and one type of mobile medical device: telemedicine. I spent time researching potential interviewees and developing a list of people I believe would be helpful to quote in my paper.

## CHAPTER 1: INTRODUCTION TO ISSUES OF HEALTHCARE DISPARITY

### *1.1 - History of Healthcare in Rural vs. Urban Areas*

Everyone deserves access to an adequate level of healthcare, no matter who they are and where they live. People who live in remote areas, those which are situated far away from main centers of population, are often susceptible to limited access to the medical care they need. In the United States, hospitals and health care centers are concentrated largely in cities, with “the rural areas of America [having] fewer than half the physicians, per 10,000 people, of their urban counterparts” (Redford 71). Much of the struggle for adequate healthcare in these communities stems from difficulties in training and retaining physicians to provide their services in remote settings. Some typically successful strategies in implementing these practices have proven ineffective in the unique environment that rural residents find themselves in.

All hope is not necessarily lost, however. In fact, many medical schools in the United States have made a concerted effort to develop “rural tracks or concentrations with clinical training opportunities in rural areas, rural-focused lectures, and other incentives” (Redford 71) in an effort to expand the number of qualified professionals willing to devote their time to assisting medically underserved populations. The University of Kansas Medical Center, for example, was one of the first institutions to implement a robust program of “dedicated rural training tracks, financial incentives, preferential admission of rural students, and satellite medical campuses” (Redford 72). The program was designed with the intention of recruiting and retaining physicians specialized in rural medicine.

Despite valiant efforts, these educational programs produce shoddy results, with participation in rural track programs adding up to less than ten percent, and no more than ten

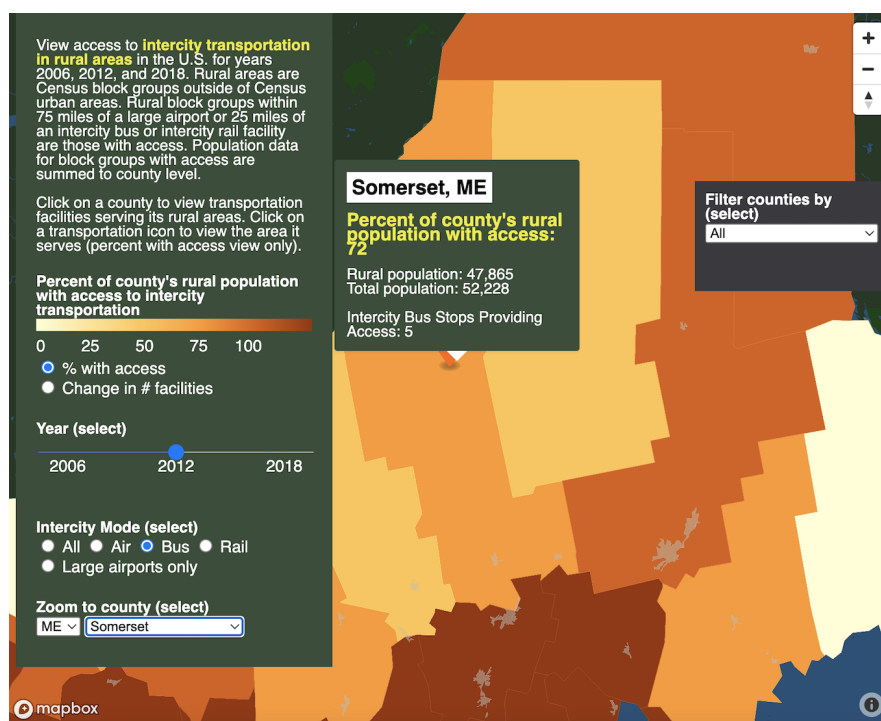
students per year for any one school (Redford 72). And of these students who do graduate from such programs, less than half report actually entering into rural practice, with an even smaller fraction of those graduates sticking out their practice for “more than seven years” (Redford 72). Kansas still holds a primary care shortage in two thirds of its total counties, and the fact of the matter is that physicians just do not prefer to work in remote communities (Redford 72).

### *1.2 - Current Healthcare Climate in Remote Areas*

The lack of physicians in these areas is particularly detrimental for one major reason: the average age of the community. With an average age of 51 compared to 46 as of 2020, people living in remote areas tend to be older than their urban counterparts (National League of Cities). The number of intensive care hospital beds, for example, is disproportionate between rural and urban areas: 1.7 vs. 2.8 per 10,000 people, but when this statistic is adjusted for age, rural areas report only 1.6 ICU beds per 10,000 people compared to the urban 2.9 (KFF). With greater age comes greater susceptibility to health problems, making the age of remote residents a critical factor in the need for adequate medical care in their communities.

An additional contributing factor to this need stems from the lack of another necessary resource: transportation. As of 2018, eleven percent of the rural population (groups located outside of census-defined urban areas) reported living “farther than 75 miles from a large airport and/or 25 miles from a smaller airport, intercity bus stop, and/or intercity rail facility with scheduled service” (Bureau of Transportation Statistics). This statistic represents 9.9 million people living in the United States, and when combined with the increased age of populations in

remote areas, constitutes a group of people with a greater need for care than your average city-dweller who face a substantially more arduous barrier to accessing it.



*28% of Somerset County (including Jackman) does not have access to intercity transportation, leaving about 219 residents without a way to access large-scale hospitals themselves.*

(Bureau of Transportation Statistics, 2022)

### 1.3 - Reimagining Healthcare Policies

It has been established that the current healthcare system in the United States does not always provide equitable access for its intended beneficiaries. A crucial step that must be taken in improving access in this context for the people who need it is the re-imagining and engineering of the public policies that direct their level of access to care. An influential factor in these policies is the nature of innovation exhibited by healthcare technologies. The cancer



screening technologies of this generation, for example, are “relatively affordable, but not distributed equally” among those whose lives depend upon them (Parthasarathy 30). This inequity has recently come to be understood not wholly as a “fault of our decentralized, privatized health care system,” but “a circumscribed understanding of innovation that focuses solely on scientific and economic output” (Parthasarathy 30). When technological innovations that hold potential for a revitalization of patient care are monopolized and made accessible only to the wealthiest percentage of a population, real people suffer.

There are many barriers that policy-makers could and *should* act on to enforce more equitable access to innovative healthcare in the United States. In addition to the high cost of necessary resources, inequitable distribution also poses an issue. Life-saving products are often distributed primarily to those who live in wealthy urban areas, with marginalized communities receiving an inadequate level of policy-driven care. A prime example of this disparity in recent years comes in the form of access to COVID-19 testing materials. The diagnostic tests developed were intended to be “used to identify people with COVID-19 who needed to isolate themselves to limit disease spread” (Parthasarathy 32). However, even though these tests are an example of an innovative healthcare product developed by both public *and* private sector laboratories, their availability in isolated communities remained inadequate. The particular healthcare climate created in the context of the COVID-19 pandemic and these diagnostic tests was largely due the design and development of the tests themselves. The choice to restrict diagnostic testing to in-person test centers initially minimized equity, causing people who lived far away from these centers to go undiagnosed and consequently experience complications from COVID-19. Home tests later provided a cheaper and more accessible version of a COVID-19 diagnosis. These tests could be purchased at local convenience stores and did not require the

presence of a physician in order for the patient to receive results, making cost and location less directive factors of care. When a product of healthcare innovation is reimagined with equity in mind, as with these diagnostic tests, more people receive the care they so desperately need.

Success stories like this can continue to occur in our current healthcare system as long as innovation and healthcare equity are considered in parallel with each other and understood to be directly affected by public policy.

## CHAPTER 2: DISCUSSION OF MOBILE MEDICAL DEVICES

### *2.1 - Definition of Mobile Medical Device*

A mobile medical device is one which has the capacity to aid the health and wellbeing of a patient while they are not in the direct physical care of a physician. Such devices, which are typically handheld and operable by another person or the patient themselves, create an opportunity for people to better understand and participate in healthcare practices by giving them access to a “wealth of information” (Boulos 3).

Integrating mobile medical applications with the communities that live in these locations provides an opportunity for community members to access the healthcare they deserve. This solution has the potential to provide a cost-effective way to support communities that are lacking in hospitals and medical professionals. The latest generation of technological products, which includes devices that are wireless, flexible, and miniaturized, serves as a catalyst of hope for the “improving patient quality-of-life and lowering costs for both healthcare providers and owners” (Lenk 1). These types of devices, which are constantly evolving in design and distribution, “have given rise to a new generation of medical devices, ranging from diagnostic to therapeutic, that are wirelessly operable” (Lenk 5).

### *2.2 - Example of Mobile Medical Device Use: Telemedicine*

One subsection of medical devices is particularly on the rise: telemedicine. Telemedicine, which refers to “the use of telecommunication equipment for the examination of a patient by a physician, and its content” involves “the health-related use of communication technologies taking place between medical providers or between a provider and a patient” (Ergur 2). The

emergence and success of telemedicine is characterized by the “major advances in the use of Internet-based applications” (Oudshoorn 1) that have occurred over recent years. The COVID-19 pandemic, which has been referred to as a “catalyst of transformation” (Ergur 1) for the presence of communication technology in the modern world of healthcare, has expedited the development of telemedicine practices and devices between patients and physicians as both parties adapt to the “new and physically distanced environment” (Ergur 2) created by it. Despite all that has changed in regard to social interaction during COVID-19, one thing remains constant: people need access to sufficient healthcare, and suffer when they do not have it.

Telemedicine is an all-encompassing field of virtual medicine, including monitoring, consultation, diagnostic, and post-operative practices. It offers hopeful promise in the addition of improved healthcare resources to under-resourced communities. Supplying the members of such communities with remote-presence medical devices: smartphone, laptop, or tablet devices that support standard wireless network connectivity and cell phone signals, sometimes accompanied with additional features such as cameras and microphones supplies them with professional healthcare resources that they may not otherwise have access to.

The RP-Xpress mobile presence device, for example, has proven to be especially effective in rural areas. In a pilot test of prenatal assessment in the Bolivian Andes, the device facilitated crucial communication between a pregnant woman located in Bolivia and responding obstetricians located in Halifax, Nova Scotia and La Paz, Bolivia. In a “complete prenatal ultrasonographic assessment” (Oudshoorn 5), the RP-Xpress allowed for the transmission of critical patient data across Bolivian cell phone networks in real-time, including the heartbeat of the fetus. Mobile presence devices like the RP-Xpress are particularly useful as they support an all-encompassing patient-doctor experience - one in which the physician receives both hard data

about their patient and is given the opportunity to get to know them and their circumstances.

Compare the experience of the pregnant Bolivian woman to one in which the attending obstetrician was simply sent a fetal ECG. This exam would be lacking in personability and understanding the reality of the patient's health experience. Now, consider the exam that actually took place. The obstetrician receives a holistic view of their patients' wellbeing in the form of medical data accompanied by real-time interview - creating a much more personal understanding of their actual health situation. The use of the RP-Xpress in rural areas in Bolivia is a success story for mobile-presence devices, with many of them operating on battery power alone in extremely remote communities (Oudshoorn 5). By continuing the distribution of mobile-presence devices such as the RP-Xpress in rural or remote communities that may be lacking in physicians and resources, the members of these communities would receive additional support, and their wellbeing would be consequently improved.

### *2.3 - Case Study: Chhattisgarh*

The landlocked state of Chhattisgarh in central India exhibits an amalgamation of circumstances contributing to a less-than-ideal environment of healthcare for the people who live there. Chhattisgarh, which is made up of 27 districts with a total 2020 population of 32.3 million (Ibrahim), has one of the most severe cases of healthcare provider shortage in the country. Like the remote areas of Maine, few professionals are willing to work in this vast forestland community, leaving 28% of needed positions unfilled.

In 2001, recognizing the detrimental impact this shortage was having on its people, the Government of Chhattisgarh implemented a rural healthcare training course for healthcare practitioners in an attempt to attract qualified professionals to the area. These professionals,

which become known as Rural Medical Assistants (RMAs) after completion of the necessary diploma program, are expected to enter into primary health centers in rural/tribal Chhattisgarh and provide care to the people there. In contrast to some of the comparable rural medicine training programs which exist and fail in the United States, Chhattisgarh has experienced an “overwhelming positive response in terms of providing healthcare” (Ibrahim).

In a motivated response to this recent success, the Government of Chhattisgarh, in partnership with the National Institute of Mental Health and Neuro Sciences (NIMHANS), has taken on a new goal: coming to the aid of the more than 75% of Chhattisgarh residents that require treatment for mental disorders who have yet to be met with sufficient care - a situation which has resulted from the inability of the mere 78 trained mental health professionals in the region to get to everyone. The desired solution? A certification training program designed to help primary care doctors and psychiatrists learn to “handle common psychiatric disorders that present to the primary care settings” (Ibrahim): the Chhattisgarh Community Mental Healthcare Tele-Mentoring Program (CHaMP).

CHaMP was designed with effective learning practices in mind, consisting of three modules which aim to teach medical professionals methods in psychiatric history-taking and mental state examination via the study of “case examples most commonly seen at primary health centers” (Ibrahim). The program combines two days of onsite training with several videoconference-based e-Learning and Skill Development (eLSD) sessions, along with collaborative video consultations, for maximum efficiency in training the 2,000 medical professionals that require the certification in Chhattisgarh.

CHaMP is commended as a program “designed to overcome one of the longstanding and biggest challenges in implementing the National Mental Health Program (NMHP)” in terms of

addressing “inadequate human resources” in states like Chhattisgarh (Ibrahim). CHaMP boasts raging success as of 2020, with 190 training sessions being conducted in less than a year and 15,000 patients having been cared for by 501 newly trained mental health professionals (Ibrahim).

The success of the CHaMP program in helping to meet minimum mental health care standards in Chhattisgarh is due largely in part to its ability to rely on telemedicine systems as a digitally driven initiative. CHaMP allows primary care providers to “effectively deliver mental health services to the underserved population along with having support and supervision from specialists” (Ibrahim) - a radical breakthrough care practices relating to both training and dynamic modes of provision. CHaMP is a prime example of the use of technology to overcome the common barriers to care that residents of rural areas experience and holds promise for both patients, qualified caregivers, and hopeful (but not-yet-trained) medical professionals everywhere.

#### *2.4 - Case Study: The Red River Project*

One of the first community paramedicine projects in the country began in Red River, New Mexico. Established in the mid-90's, the Red River Project was born from a combination of the fact that the closest hospital to the town was over an hour's drive away and the idea that clinicians could be capable of more than their job description entailed. A clinic in Red River teamed up with the University of New Mexico's emergency medicine residency and the Red River fire department, which, at the time, was training firefighters in minor medical care practices.

The success of the Red River Project marked the future of what EMS could be. With the intention to “better serve patients and communities earlier in the disease process, reduce unnecessary transports that remove needed emergency resources from the community, be cost effective and reduce the healthcare costs on society, and take advantage of a large, well-positioned grassroots workforce (EMTs)” (Ludwig), Red River successfully reimagined the use of telemedicine to help a specific population.



## CHAPTER 3: THE ROLE OF ENGINEERS IN DEVELOPING TELEMEDICINE

### *3.1 - The Engineer-User Relationship*

It has been established that, in a global context, there exist communities that do not hold sufficient access to healthcare. The effects of disease and emergency scenarios are especially devastating on people who live in remote areas because the pharmaceutical industry only attends to areas in which consumers/beneficiaries can pay for their services. People who are suffering in these areas rely largely on donations of medical supplies. In fact, nearly 80% of medical devices in remote, low income countries are acquired by donation (WHO 85). The communities in these underserved areas then “continue to rely on donations to replace devices and equipment that cannot be maintained or repaired” (WHO 85). Such is also the case in the withholding of life-saving drugs from areas that cannot afford their distribution. Such situations are caused perpetually by weak health systems that are not given adequate attention or improvements by policy makers or the pharmaceutical industry as a whole.

### *3.2 - Design, Manufacturing, and Distribution*

The use of mobile medical devices for the integration of telemedicine in remote areas must be supported by a level of design and manufacturing that is appropriate for the “local needs and conditions” of that area (WHO 85). Essentially, the devices intended for use by community members must be designed with their level of medical knowledge and skill in mind. It is not just telemedicine systems alone that make improved healthcare available. The people who choose to take creative approaches to their innovation processes play a major role in their success, and do so by establishing new cooperations and collaborations across different positions and defining

norms of communication and place-based medical needs without the community members themselves needing to figure out how to reorganize themselves around the particular capacities of telemedicine.

A goal that comes hand in hand with the integration of mobile medical devices such as telemedicine in remote communities then becomes the priority to develop them in a manner that is “simple enough to use that lay health providers can deliver or perform some of the more common and urgent health services and tasks previously undertaken only by highly trained health providers” (WHO 86). “Lay” in this context refers to a lack of professional qualifications. In this context, it can be assumed that the people providing amateur medical care are standard members of the community.

As critical actors in the development of modern healthcare systems, engineers play a crucial role in satisfying the ever-present demand for investment in medical device innovation - especially when they are tasked with different roles and responsibilities in different sectors and resource settings. In order to satisfy this demand, engineers must center their design of mobile medical devices around both people-centered research and inclusive design. It is also important that the work of these engineers is influenced in a collaborative manner by all members of innovation teams (WHO 82). In their profession, biomedical engineers are often met with the challenge that comes at the intersection of healthcare professionals desiring useful technological devices and the producers of such devices desiring a use for their creations. It then stands to reason that all stakeholders of this type of technology, be they “users, patients (and their advocates), health economists, government officials, health-care managers, insurers [or] regulators” must dedicate themselves to the contribution of “identifying needs and demands for new technologies as well as determining which of these will be integrated into mainstream care,

how they will be used, distributed, paid for, evaluated and monitored” (WHO 84). These stakeholders play a major role in deciding which factors of innovation are the most important to consider in the development process of technological devices for specific communities.

### *3.3 - Cost as an Integral Factor in the Engineering Process*

An integral factor in this process, of course, is the cost of the device. As previously mentioned, many communities in remote locations depend wholly on the donation of medical supplies to their area in order to support patients. The implications of this situation can be understood by two categories of manufacturing: upstream and downstream. The nature of upstream manufacturing, which refers to the scope of supplies and materials required for production, must be taken into account in terms of considering how much a medical device will cost. When the implied cost of a new device is made transparent to the aforementioned stakeholders, the chances of that advice being “accepted as a valuable contribution to ensuring affordable implementation” is higher, and this has a “greater likelihood of successful adoption and utilization”. This process is known as “early stage Health Technology Assessment” (WHO 85).

Downstream manufacturing, on the other hand, which encompasses all activities relating to the distribution of the product to the customer, involves the “user training, technical support and maintenance, calibration and testing” of medical devices (WHO 85). As the manner of these processes is so integral in ensuring that users in remote areas are equipped with the knowledge to operate them, telemedical devices must be considered within the bigger picture of their development and distribution - downstream manufacturing included.

### *3.4 - Influence of the World Health Organization on Device Development*

The World Health Organization introduces the term “jugaad innovation” in reference to the idea of a “cost effective technology developed [specifically] for low-resource settings” (WHO 87). Jugaad innovation refers to a type of solution that is improvised, born out of necessity, and is typically ingenious in nature. The development and distribution of mobile medical devices in remote settings can be considered an example of jugaad innovation due to the unique constraints that are presented within such settings. WHO encourages the design of devices that are “adaptable to the realities of health care in these settings,” including but not limited to: “unreliable power supplies, the lack of user training and technical support and low budgets,” and suggests that immersion of innovators in these low-resource settings in order to “fully understand the solutions they need to deliver, and how” (WHO 87).

It is important to acknowledge that this level of skill and understanding may not yet be fully developed for most innovators. As the actual practice of integrating this level of technology into remote areas is still in development, engineers must always consider how their products will be received in the communities they serve, and how that reception fits in parallel with “the imperatives of universal health access and coverage” (WHO 87). Innovators now exist in a healthcare climate which aims to both “extend diagnostic and therapeutic capabilities down to nano-and molecular scales” and move “beyond the traditional hospital-centric model into outpatient specialized clinics, homes and emergency settings,” including “wearable personal sensors, mobile phones, tablets, mobile clinics, teleconsultations and portable diagnostic devices” (WHO 144).

## CHAPTER 4: CASE STUDY IN JACKMAN, MAINE

### *4.1 - Introduction to Healthcare in Jackman, Maine*

Nestled in Somerset County, ME, just sixteen miles from the Canadian border, is the town of Jackman. With a population of just 782 (2020), the rural area has struggled for years with attracting doctors and physician assistants to keep its healthcare system alive. In separate formal phone interviews, I interviewed Rick Petrie, the Chief Operating Officer of North East Mobile Health Services - Maine's most prevalent ambulance service; and Dr. Jonnathan Busko, the medical director of the emergency department at St. Joseph Hospital in Bangor, ME about the history and future of the medicine in Jackman and how the use of telemedicine inspired by the Red River Project is helping lessen the strain on the medical professionals who live and work there (full interview transcripts are presented in Appendices A-B).

The history of medicine in Jackman begins with the Marie Joseph Hospital, an initial attempt at providing care to the residents of the area. Founded in the early 1900s by Canadian nuns, Marie Joseph, which also included nursing home facilities, marked the first instance of a healthcare system in the area. In 1940, after recruiting its first physician, the nuns of Marie Joseph bought a house and turned it into a real hospital. The early 1970s marked another hallmark of healthcare in Jackman, when Marie Joseph ultimately succumbed to weather and location and briefly downsized to a clinic before being taken over by Maine General. Dr. Busko, tells me that they maintained a free version of "one of the first freestanding emergency departments in the U.S".

The nursing home nurses who provide the nursing care and the physicians working up there will provide the physician care. And

it became one of only two places in Maine that ambulances are actually allowed to transport to directly that aren't emergency departments. So that it's there in the Vinalhaven clinic on Vinalhaven island. So that worked fine. Until 2012.

In 2012, it became clear that Maine General's new rural health center was "losing money hand over fist". Rural health centers get paid at what Dr. Busko describes as "cost plus" - essentially, it was providing primary care in a place where it was "not financially viable to do it".

Fortunately, the future of the clinic was initially saved when Penobscot Community Health Care, the leading healthcare organization in Bangor, and the "largest federally qualified health center in the state," stepped in, Dr. Busko recalls.

PCHC, Mr. Petrie says, initially agreed to "keep the primary care practice open and see patients after hours with acute care issues and on weekends," but could not commit to the urgent after-hours care the town needed. Only one doctor was willing to step up and provide this type of care, and she became Jackman's sole source of 24-hour emergency care. "PCHC has not been able to recruit a new full time clinician up there for over 20 years," Dr. Busko says. "Each and everyone else was there for four years or less."

PCHC's solution was temporary, however, and after another few years, PCHC ultimately also notified the town of Jackman that they could no longer support the clinic. In 2017, Maine General, which continued to struggle with the upkeep of the now-clinic, recommended its permanent closure. Mr. Petrie explains that "they were losing a half million dollars a year and they just couldn't sustain it...they could no longer keep up the acute care nights and weekends, they didn't have the staff, and financially it was killing them". This type of barrier to healthcare sustainability is an issue that is all too common in rural areas, especially in Maine.

### *4.3 - Hybrid Model: Jackman Meets Telemedicine*

Dr. Busko recalls needing “some way” for the Jackman clinic to “provide this after hours urgent care that [wouldn’t] crush them financially” and wouldn’t “[burn] out their medical assistant who stepped in for the nurses.” He notes the 2018 release of a revolutionary program from the Center for Medicare and Medicaid Services: the Emergency Treat, Triage, and Transport model. The model was born out of Medicare data which suggested that “around 15% of the people who get transported to emergency departments do not need the emergency department level of care.” The model would allow ambulance services to sign up for a payment program in which they could use “[emergency] protocols, triage patients to alternate care sites in the emergency department, and specifically treat or transport them to an urgent care to use telemedicine.”

Dr. Busko explains that because of his connections with EMS, he was “able to convince [his] hospital, St. Joe’s, that [they] wanted to be a hospital willing to do that kind of telemedicine.” “There was some reluctance,” he says, in reference to establishing this type of program in Jackman. “People weren’t sure what it would mean to have paramedics working up there.” As Dr. Busko explained the early stages of planning the telemedical model, he specifically names different types of caregivers and forms of care that were targeted for availability:

We came up with the idea that every visit would be a tele-urgent care visit facilitated at the originating site by an advanced practice paramedic, who could then, on the order of the physician, after the full evaluation of the patient, perform a

set of advanced skills. So, wound repair, suturing and stapling, taking foreign bodies out of people's ears ... medications that aren't in the scope of practice of a paramedic, basically facilitating the telehealth exam.

That's what really clicked with the community. And that was it. I think that was the thing that made this a potentially viable program, knowing that they weren't going to lose physician visits, the physician visits were just going to be a little different. And they were going to be done by these paramedics who are going to be coming up and staying in town and accessible to all.

Mr. Petrie explains how Dr. Busko's revolutionary idea to create an advanced practice paramedic training program in Jackman changed the dynamic of rural medicine in the small town forever. EMTs began expanding their service beyond the confines of their job description and members of the Jackman community followed suit, allowing themselves to be treated under the instruction of a virtual physician.

He came up with this idea, the model was: everybody's staying in their typical silo, right? Nurses doing nursing things, doctors doing doctor things, paramedics and EMTs doing EMT and paramedic things. And the reality is, in rural areas in the state of Maine, you can't do that anymore. It isn't a sustainable model.



So, what he came up with was this concept of putting paramedics in Jackman who could respond as paramedics with the local ambulance service that are at the all of their personnel or at the EMT level. So now, so they can respond as paramedics, they can help out in the clinic during the day, during the week, with the doctor who's there, as rural health care technicians who work under delegated practice for that physician.

At night, and on weekends, they can be the healthcare provider, using telemedicine to interact with a doctor in the ER at St. Joseph's Hospital. And then the fourth role, the paramedic, is as a community paramedic, which is going out and visiting, checking on patients who have been discharged from the hospital or have chronic medical issues, things like that. And they can also use telemedicine to facilitate a visit as well.

Mr. Petrie notes that it took some time to establish the program in Jackman, as “nobody [was] doing anything like this, at all”. Once people were on board with the idea, there were several logistic steps to take before the EMTs could set out to help.

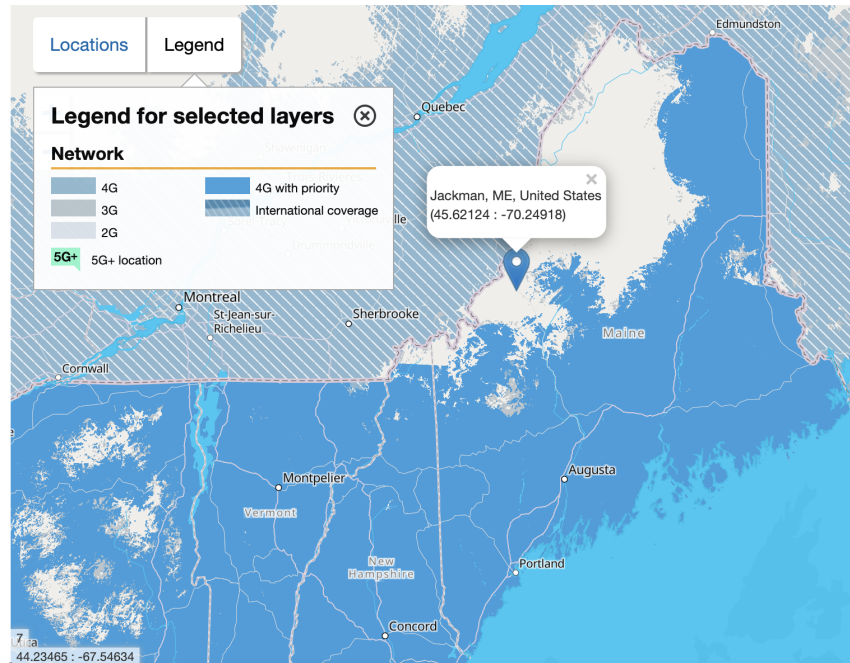
#### *4.4 - Discussion of FirstNet and Related Devices*

Deeming Dr. Busko's vision “a community health model,” Petrie explains that he immediately identified inadequate cell phone coverage in the Jackman area as a major issue and

involved FirstNet. FirstNet's team helped the clinic make some initial equipment upgrades and provided them with compatible phones and tablets, as well as additional service coverage.

The First Responder Network Authority, also known as FirstNet, is an AT&T network that seeks to empower first responders in the U.S. with a nationwide communications network created specifically with the preservation of public safety in mind. FirstNet works by pairing increased cell coverage with “advanced, innovative mobile technologies [that] deliver performance and reliability for public safety (FirstNet, 2023). It encrypts incoming network traffic within its specialized core dedicated specifically for public safety - creating “the highly secure environment public safety requires” (FirstNet, 2023).

FirstNet was designed with one primary concept in mind: interoperability (FirstNet, 2023). Interoperability, which is the ability of computerized systems to transfer information between each other, is a priority in technical communication between first responders. FirstNet provides a “single dedicated nationwide platform that all responders can use to communicate” (FirstNet, 2023) in place of radio calls, which are often unreliable and coverage dependent.



*Reliable LTE is scarce in northern Maine, with Jackman only being covered by 2G connectivity.*

(FirstNet, 2023)



#### **2.91M+ square miles of coverage**

FirstNet covers more first responders than any other network with 250K+ square miles more than commercial networks.



#### **Always-on priority**

FirstNet subscribers maintain always-on priority across LTE – Band 14 spectrum plus all of AT&T's commercial LTE spectrum bands.



#### **150+ dedicated assets in the FirstNet fleet**

Public safety agencies have access to a nationwide, dedicated fleet of over 150+ portable cell sites – including satellite cell on light trucks and cell on wheels.

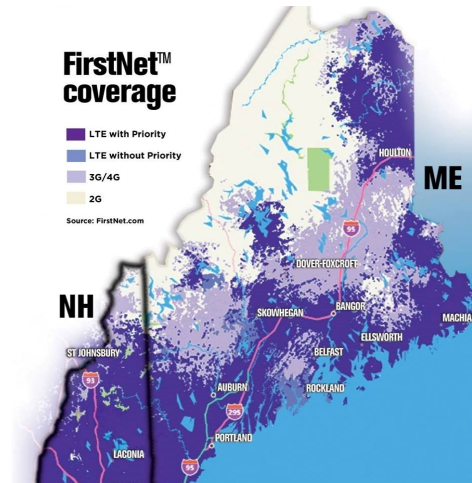


#### **Comprehensive security ecosystem**

FirstNet is now the first-ever nationwide network with comprehensive tower-to-core network encryption based on open industry standards.

*FirstNet commits itself to maintaining coverage with privacy as a main priority.*

(FirstNet, 2023)



*FirstNet has expanded LTE coverage in Maine, providing Jackman with reliable, encrypted 2G.*

(FirstNet, 2023)

In reference, to the healthcare scene in Jackman, FirstNet “absolutely saw this as an opportunity to demonstrate how effective providing cellular broadband could be for making rural health care work,” Dr. Busko says. Although the above coverage map suggests that Jackman still does not have much beyond a 2G connection, he notes that “there are [now] very few places in the Jackman region where you can’t get a bar or two on a FirstNet device.

We ended up getting FirstNet boosters put into the clinic itself. And so all of the outgoing ... data transmission for the program for telehealth goes over the network. And, so we started doing these telehealth visits back last May. And that's where we're at now.

The team's next step was to devise a plan of action for patients. How could they best receive a collaborative version of care from paramedics and doctors in a telemedicine setting? Mr. Petrie describes the combined-effort type of patient care experience received in Jackman as one focused on acute care issues.

Nights and weekends when a patient shows up at the clinic, for not an emergency but an acute care issue, it could be something as simple as a laceration or a fish hook caught in a thumb or an ear infection. Anything like that at all they show up at the clinic. And the paramedic does a basic initial assessment, determines whether or not it's worthwhile to facilitate a telehealth visit with the physician or just transport him to the hospital.

We have the system where we use our tablets, cameras, Bluetooth otoscopes and other equipment [so] that when we're looking in somebody's ear or looking in their eye, we transmit the picture to the physician in the ER. So they're right there, they're interviewing the patient, following up and directing their care.



*An example of a FirstNet device, which requires a minimal LTE connection to operate.*

(FirstNet, 2019)

“It keeps people from having to drive an hour and a half,” he says, in reference to the time it takes to get from Jackman to the nearest major hospital. Driving hours to receive care for a condition that may not necessitate that an emergency room response is a hassle. On the other hand, when a patient is experiencing life-threatening symptoms, this type of distance is simply not an option. Petrie recalls the very first case the clinic saw following its partnership with FirstNet:

When we went live on our first day, a woman showed up in the acute care clinic because while she was getting ready for work, she got out of her shower and cleaned her ears with a Q tip and the little cotton swab tip came off in her ear. Oh my gosh. And so she's not in any pain, but she knows she can't go to work.

It's going to drive her crazy, right? So she comes to the acute care clinic and our paramedic digs out the otoscope, looks in the ear, the doctors watching what they're doing on the other end. He sees it. He said, yeah, he said it doesn't look like there's any trauma. He said, can you get it? The paramedic had reached in with ... needle nose forceps, pulled it out, looked at it again, no trauma, and 20 minutes later this woman's at work.

Whereas if they hadn't been there, she would have had to have driven for an hour and a half to go down to the hospital ER, waited a couple of hours to be seen, and then driven back. She would have missed a complete day of work. Yeah.

The need for this combined-approach virtual program is also clear in the case of the opposite situation. Imagine a patient experiencing life-threatening symptoms, such as an allergic reaction for which they need immediate medical treatment that goes beyond paramedic expertise. Before the integration of the FirstNet telemedicine program in Jackman, this patient would be looking at an hour-plus drive to the Bangor for treatment by a physician. With the virtual treatment program, however, they can be treated on the scene by a paramedic under the instruction of a specialized physician who is trained specifically on this type of medical scenario.

Looking forward to the future, Petrie describes his vision for the future of telemedicine in Jackman.

We're always looking at ways we're going to expand it over the next couple of months, probably by the fall, to where the paramedics can actually go to the house and initiate a telemedicine visit. And the other thing we're looking at is, I just had a meeting yesterday, where we want to introduce palliative care and hospice at home up there. Which would also utilize telemedicine with the paramedics being there to help manage the patients, make them comfortable. And I'm very excited by that.

He mentions that this specific clinical telemedicine partnership with FirstNet is currently only in use in Jackman.

Because of the success we've had up there, we are having ongoing conversations with several of the island communities and other rural areas in the state of Maine. We're very interested in this.

Dr. Busko elaborates on the unique nature of the program.

Right now, aside from Alaska, the only other place, this kind of work is being done is industry. So oilfield extraction, remote worksite. For a couple of years, I was a professor at a Maritime Academy, teaching the ship's medicine program, which is



an even, that's just an absolutely insane medical practice that these guys do. So you know, set to get 70 hours of training, your full time job is keeping the ship from running into things or keeping the engine running. And if there's a medical emergency, or a public health incident or anything, you're responsible for all the medical care on the ship. So then that setting is some of this being done.

Mr. Petrie accredits much of the success of the Jackman telemedicine program to Busko's out-of-the-box idea to consider the abilities of medical professionals beyond their traditional roles. "This model blows that away," he says. "These paramedics have four different roles, depending on what the need is."

It's cutting edge. It's the kind of thing that we need to look at down the road if we're going to meet the needs of our rural communities.

The key to it is that paramedics are not independently licensed practitioners. This is a collaboration between doctors and paramedics and you know, St. Joseph's Hospital, the town of Jackman, Penobscot Community Health Care, and our organization. And none of this would have been possible, if all of those people didn't come to the table and be willing to look at doing something different.

### *3.5 - The Future of Healthcare in Jackman*

The Jackman clinic essentially now functions as a primary care practice, with that same sole doctor who has been there since the late 80s, in addition to a few medical assistants who work Monday through Thursday. The paramedics on call work with the doctor to respond to acute patient care cases during the week and act as medical practitioners at night and on the weekends.

Mr. Petrie explains that the one doctor in Jackman is “everything to everybody and Jackman.”

[She's] been there for 35 years ... and the only real sad part is, she's at the point where she's thinking about retiring. And they've been trying for years to attract other doctors to come up there. But, they aren't successful. It's a special - you know, it's a special type of person to do that.

She's an ardent supporter of the program. She's a key member. Without [her] support, we never would have been able to pull this off. And she's 100% on board with us ... she's very proud of the paramedics. She's very close to them and provides a lot of guidance. She has literally been everything to everybody and Jackman for years, and she's been a tremendous supporter of this program.

The new hybrid model in Jackman has alleviated much of the burden placed on this doctor.

She was on call all the time when she was in town. There are about 100 to 105 of [emergency calls] a year. And that's one every three days. If you've ever been in a position or a job where you're on call for something, even when you're not doing something you really cannot relax, you can't engage in doing anything else. And so that's an incredible burden.

[The telehealth system] also makes PCH's ability to recruit someone much easier because they're having the paramedics up there now and [with] the telehealth, they could easily take all the urgent care. Right now during regular business hours, it's being done by whoever's on, which makes sense. But if they wanted, it's a community of 1200 people, there's probably, I don't know, maybe 700 patients in the practice, that's not nearly enough for a full time position.

But on the other hand, you really can't. Somebody's got to cover them all the time. So having the ability to say look, you know, you can have someone live a couple days a week, and then all the urgent stuff covered by somebody else, the rest of the time.

The people of Jackman seem to have adapted well to the integration of telemedicine in their community. They have learned to trust the combined approach method of the physical EMT and the virtual physician, and have effectively benefited as a result. Mr. Petrie notes the following:

The people in the town of Jackman are really appreciative of having the service, they liked the fact that even if they know, even if they ended up being transferred to the hospital, they liked the fact that they have immediate contact with a health care provider.

## CHAPTER 5: USER DATA CONCERNS

### *5.1 - Privacy*

The sole factor of telemedical practices that enables them to be so successful is also the one that holds the most potential for its downfall: personalization of health data. As an industry, healthcare poses a significant security risk factor due to its use of patient data. Millions of profiles are accessed through clinic and hospital servers every day, requiring the confidentiality of medical professionals and the overlying trust of patients at risk. Add in the sending, storage, and manipulation of data over state and country lines associated with telemedicine, and you have an entirely new amalgamation of privacy risks to consider.

From 2014 to 2017, the healthcare sector alone experienced a 300% increase in cybersecurity attacks (Martin 1), with the majority of attackers taking advantage of the critically weak information technology infrastructure that National Health organizations employ. In fact, the healthcare sector is “chronically underinvested”, with only 1-2% of annual budgets being spent on tech infrastructure - which pales in comparison to the up to 10% being spent by other sectors (Martin 3). In addition to their questionable use of funds, many health organizations have failed to stay up to date from a technical perspective, using unsupported operating systems and weak privacy networks to store their data.

Most NHS trusts in the United Kingdom, for example, still rely on Windows XP to access and send patient information (Martin). Windows XP, which was shut down by Microsoft in 2014, initially gained popularity for its individualistic approach to data, providing each user with their “own private files and system privileges” (Petreley). In doing so, however, the system automatically also provides each user with administrator access that allows them to reach its

inner architecture - allowing near total control of the entire PC. While this comprehensive level of control may be useful for some, it mainly raises concerns about the information that could be compromised should the device fall into the wrong hands. Windows XP received major criticism for allowing this kind of access in the first place, in addition to not controlling for the option to “administer security policies and deny [user] access” in certain cases (Petreley). And the security concerns surrounding Windows XP do not end there. The system is infamously known for its weak buffering capabilities and “susceptibility to malware such as viruses, trojan horses, and worms” - downfalls furthering the valid scrutinization of Windows XP (Petreley).

The tendency for rural healthcare organizations in particular to prioritize funding for equipment and workers makes them especially susceptible to cyberattacks. Hiring an expert in cybersecurity can cost upwards of \$5,000 a month (Amaxra). Compare that number to the limited amount of expendable funds the Jackman Community Health Center has, and you have a serious problem. This susceptibility, when combined with the below-par infrastructure that is used widely throughout the sector, has created a perfect storm of , and stealthy opportunity for those who are looking for it. Telemedicine is a fairly new field of technology, and just as developers are learning to create the technical architecture that can stand up, hackers and cyberattackers are mastering the art of exposing the confidentiality and integrity of healthcare data.

## *6.2 - Security*

A demonstrated proponent of telemedicine, Dr. Busko takes the privacy concerns posed by the technology and extends them further by introducing an important privacy reality of the small town community culture - the idea that “everyone knows”. “Everyone knows, if you've

gone to the clinic, like there's no health privacy that way," he says. Something as standard as a car parked at a clinic would be enough to raise speculation within the community about an individuals' health needs or issues - which is perhaps acceptable in the case of emergency medicine or physical treatment, but might raise some eyebrows if a patient is receiving, say, mental health care. The same applies to paramedics performing "telehealth visits done through the clinic where they can come to your home". Recalling a program that employed virtual and live-in social workers at a clinic and received no visits from community members, Busko refers to the case of mental health as "the one place where ... telehealth is best done privately".

What then, is to be done to combat the sensitive security situation in healthcare tech at hand? Dr. Busko suggests that in terms of telemedicine, the issue is not health data necessarily, but all of the other identifiable metrics that are recorded at the time of patient treatment.

I think one of the things that people miss, in all the concerns about health data privacy, is that no one cares about patients' hemorrhoids. What they care about is their name, their address, and their social security number, because every one of those is worth 25 bucks, right? And that's what's getting stolen. And so none of that gets transmitted. That's not the data that goes through any of these systems. The registrars talk to the patients on the phone and they register them. So that's how all the data is going in. The only thing transmitted is real time video. And so you know...if you're worried about your real time video being hacked...Okay, we never got any patients naked. When people are like, "oh, I don't want anybody to know", but like,

do they really care about your laceration? Or your rash? No, not really.

“There’s a sort of general concern that anything is hackable,” he elaborates - a fact which is relayed to patients upon agreement to use the system. But the FirstNet devices use a method of data transmission that is HIPAA compliant, meaning that personal health information is private and protected within the system.



## CONCLUSION

Although there do exist medical technologies that hold potential to make up for the lack of access to equitable healthcare that some remote communities experience, there is still much to be done in terms of determining development and distribution processes that make sense in the current healthcare climate. Such a task requires the commitment of socioeconomic relations, modes of labor and collaboration, and various silos of expertise. These determinations include a possible reimagination of current healthcare and device policies and the methods adhered to by biomedical engineers from a more technical standpoint. This problem requires immediate attention due to the especially devastating nature of disease, illness, and otherwise poor health in remote populations. People in remote areas, especially those which lack funding and rely on donations of medical supplies, experience barriers to not only the hospitals and care centers that their beneficiary urban counterparts enjoy, but also equitable transportation systems that would allow them to reach those resources. By implementing a jugaad-esque innovation implementation in the form of a “cost effective technology developed [specifically] for low resource settings (WHO 87), the integration of telemedicine in remote communities can come to support the lack of healthcare professionals in those areas.

My future research will include more in-depth topics of device policy, additional user data concerns, and a revised personal opinion of what an effective plan of telemedicine development and distribution would look like. I call on future researchers to identify specific regions (in Maine and beyond) which have been known to experience barred access to healthcare based on their geography and conduct a further investigation on the effects of this lacking care.

While no single action is going to reverse decades of barred care for millions of needy people, something as minor as reimagining a current healthcare or device policy or questioning why more effort is not being put into increasing access to care in remote areas can act as initial steps towards revolutionary solutions. By reimagining telemedicine as a potential solution to these issues, the needs of community members who lack sufficient healthcare services due to their remote location could be wholly or partially satisfied.

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## APPENDIX A: INTERVIEW WITH RICK PETRIE

*Interviewer: Tamsin Rogers (TR)*

*Interviewee: Chief Operating Officer of North East Mobile Health Services, Rick Petrie (RP)*

*Date and time: March 2, 2023 5:30pm*

*Location: via phone*

*This interview was transcribed using Otter.ai*

**Permission for Audio Recordings**  
Colby College Department of Science, Technology, & Society

Title of the Study: Medical Technology & Mobile Devices: Investigating a Solution to Healthcare Access Barriers in Remote Communities

Researcher Name(s): Tamsin Rogers

As part of this research project, I will make an audio recording of you while you participate in the study. Please indicate what uses of this recording you consent to by initialing below. We will only use the recording in ways that you agree to. In any use of this recording, your name would not be used unless you consent to being personally identified.

A. The recording can be studied by the researchers as part of this project.  
Please initial: Yes RP or No \_\_\_\_\_

B. The researchers can identify me by name in publications or presentations. (If you mark No or leave this prompt blank, then the researcher will use an alias instead of your real name.)  
Please initial: Yes RP or No \_\_\_\_\_

C. The recording can be used in scientific publications.  
Please initial: Yes RP or No \_\_\_\_\_

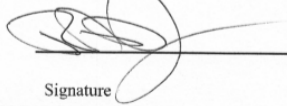
D. The recording can be presented at scientific meetings.  
Please initial: Yes RP or No \_\_\_\_\_

E. The recording can be presented to students in class.  
Please initial: Yes RP or No \_\_\_\_\_

F. The recording can be used in public presentations.  
Please initial: Yes RP or No \_\_\_\_\_

G. The recording can be presented on radio or television programs.  
Please initial: Yes RP or No \_\_\_\_\_

I have read the above description, I give my consent to be recorded, and I give my consent for the recording to be used as indicated above.

 \_\_\_\_\_

Signature 03-03-23

Date



**TR**

Hi, Rick. This is Tamsin over Colby. How are you?

**RP**

Good Tamsin, how are you?

**TR**

Good. I just wanted to say thank you so much for finding the time to fit me in, I really appreciate it.

**RP**

No problem, no problem at all.

**TR**

So I am sitting here with a nearly completed version of my thesis. I'm writing about ways that we can kind of break down some of these barriers that are in place in rural areas in Maine, in terms of getting adequate health care out to those people. So I read this article that you are featured in and you had some pretty cool quotes about the use of telemedicine and Jackman, is that correct?

**RP**

Yes, yeah.

**TR**

So, this is not going to be like a super structured call, I kind of more just want to have like a casual conversation with you just kind of about who you are, where you fit in with that, your thoughts on the system, and just anything that you think might be good information to have in terms of using that. I'm just trying to see like, is it a good idea?

**RP**

Hi, I'm here. Okay. Can you hear me? Okay? Yeah, I can hear you now. Yeah. Awesome. I'm happy about this. I am. So I'm the Chief Operations Officer for Northeast mobile health. But I was brought in originally to be the program director for Jack and for the Jackman project, and I don't know what you know about the background, but if I start down a path you're already good on, just cut me off. Okay?

**TR**

Okay. Yeah, I have some basic information, but I really just want to hear it from you like kind of what your level of involvement is. Yeah, anything you're willing to talk about would be so awesome.

**RP**

So, so many, many, many years ago, there used to be a hospital, in Jackman: Marie Joseph, started by a group of nuns out of Canada, there was a hospital up there and, and just because of the weather, location, eventually, it just couldn't sustain itself as a hospital, went through a process of becoming a clinic and then Maine General took it over in Augusta and then back in 2017, I believe Maine General notified the town that they could no longer maintain the clinic and

the nursing home there because they were losing a half million dollars a year and they just couldn't sustain it. And which is the problem with rural areas and everywhere, but in the state of Maine in particular is that these operations take money to survive. And, and if you don't have the high acuity patient volume, you don't, you know, bring in enough money to be able to cover the cost.

So they notified them that we're leaving, and the healthcare organization in Bangor, Penobscot Community Health, stepped in and said they would keep the primary care practice open, and they would still see patients after hours with acute care issues and on weekends. And then after they did that for a couple of years, they notified the town of Jackman that they could no longer keep up the acute care nights and weekends, that they didn't have the staff, and financially it was killing them.

So what happened is, this is a physician in Maine who's worked in the emergency room and, and as an EMS physician overall, Dr. Jonathan Busko, who actually used to work in Alaska as well, as part of their community health aid program, and the Flying Doctor program that they have. And so Jackman was trying to figure out what they were going to do. And Dr. Busko came up with this program where he would take paramedics and train them to be advanced practice paramedics, train them to deal with a few more acute care issues that we normally don't deal with. Right.

**RP**

Do I still have you?

**TR**

Yeah, definitely.

**RP**

All right. And, and what he would do is because up until then, up until he came up with this idea, the model was: everybody's staying in their, their their typical silo, right? Nurses doing nursing things, doctors doing Doctor things, paramedics EMTs, doing EMT and paramedic things. And the reality is, in rural areas in the state of Maine, you can't do that anymore. It isn't a sustainable model. So what he came up with was this concept of putting paramedics in Jackman who could respond as paramedics with the local ambulance service that are at the all of their personnel or at the EMT level, right. So now, so they can respond as paramedics, they can help out in the clinic during the day, during the week, with the doctor who's there, as rural health care technicians who work under delegated practice for that physician. And then at night, and on weekends, they can be the healthcare provider, using telemedicine to interact with a doctor in the ER at St. Joseph's Hospital. And then the fourth role, the paramedic, is as a community paramedic, which is going out and visiting, checking on patients who have been discharged from the hospital or have chronic medical issues, things like that. And they can also use telemedicine to facilitate a visit as well. Right, a community health model.

So it took a while to get all the approvals that we needed because nobody's doing anything like this at all. And, and we brought, we got FirstNet involved right from the very beginning because cell phone coverage up there, it was gonna be key. Absolutely key. And that's not typically an

area that cell phone companies focus on because there's very few people. I mean, you look at Jackman's population per square mile was like 19 people and Portland's is 3200. So, so, so, so FirstNet got involved from the very beginning, and made a bunch of upgrades and provided us with with some equipment, and phones, tablets, and then an upgraded the the coverage up there.

And, and so now what happens is nights and weekends when a patient shows up at the clinic, for not an emergency but an acute care issue, it could be something as simple as a laceration or a fishhook caught in a thumb or a sport could be an ear infection, right? Anything like that at all they show up at the clinic. And the paramedic does a basic initial assessment determines whether or not it's it's worthwhile to either a facilitate a telehealth visit with the with the physician or just transport him to the hospital, you know, a nine month pregnant female coming in with abdominal pain, we're not gonna we're not even going to bother with a telehealth visit, they're going to get in an ambulance or we're going to to the hospital. But, and so we have the system where we use we use our tablets, cameras, we have Bluetooth otoscopes and other equipment that were when we're looking in, in somebody's here or looking in their eye that we transmit the picture to the physician in the ER, and, and so they're right there, they're interviewing the patient, following up and directing their care, right. And so what it does is it keeps people from having to drive an hour and a half. Right, right.

To get to, I gotta tell you, it sounds very simple. But our first call on the first day after all the training and everything we did when we went live on our first first day which was, might have actually been April 1 of last year. A woman showed up in the acute care clinic because while she was getting ready for work, she got out of her shower and cleaned her ears with a Q tip and the

little cotton swab tip came off in her ear. Oh my gosh. And so she's not in any pain, but she knows she can't go to work. It's going to drive her crazy, right? So she comes to the acute care clinic and our paramedic digs out the otoscope looks in the ear, the doctors watching what they're doing on the other end. He sees it. He said, yeah, he said doesn't look like there's any trauma. He said, can you get it? The paramedic had reached in with a lot, paralogue needle nose forceps, pulled it out, looked at it again, no trauma, and 20 minutes later this woman's at work. Whereas if they hadn't been there, she would have had to have driven for an hour and a half to go down to the hospital ER, waited a couple of hours to be seen. And then drive back, she would have missed a complete day of work. Yeah.

And so the people in the town of Jackman are really appreciative of having the service, they liked the fact that even if they know, even if they ended up being transferred to the hospital, they liked the fact that they have immediate contact with a health care provider.

**TR**

Right, that makes perfect sense.

**RP**

Yeah, and, and we're always looking at ways we're going to expand it over the next couple of months, probably by the fall to where the paramedics can actually go to the house and initiate a telemedicine visit. And the other thing we're looking at is, I just had a meeting yesterday, where we want to introduce palliative care and hospice at home up there. Which would also utilize

telemedicine with the paramedics being there to help manage the patients, make them comfortable. And I'm very excited by that.

**TR**

I'm sure.

**RP**

The people who live in Jackman do that very consciously. Either they've grown up there their whole life, or they've moved there specifically because they want to get away, right. And in a fair amount of these patients, when they've been diagnosed with a terminal illness, they want to go home to die. They want to go home to Jackman to die, and they don't have the ability to do that.

**TR**

Right.

**RP**

So this is going to be another area where we can use telehealth to really, to really help out. And now because of the success we've had up there, we are having ongoing conversations with several of the island communities and other rural areas in the state of Maine. We're very interested in this.

**TR**

So is it being used anywhere else currently or is focused on Jackman. This specific program?

**RP**

I mean, it's not being used anywhere that I'm aware of.

**TR**

I see. Cool. Yeah, yeah, well, that sounds like a great next step with the hospice program and definitely sounds like that'll be very beneficial.

**RP**

I think it really is. What happens in rural America is many times they go without, because they choose to live in a rural area out there. And that's, and that's been the case. And we've certainly had, you know, the trend is to close local hospitals in Maine and kind of move patients to the tertiary care facilities, but there are some places where that's, you know, that's difficult, and it makes it harder on them.

But the real, the biggest obstacle to us, you know, being able to serve them particularly in healthcare, is that we always think of everybody in their traditional roles. And, and this, this model blows that away. We these paramedics have four different roles, primary roles, depending on what the need is.

You know, over the last year, we had a patient show up at the clinic, he's a local Maine guy who showed up to the clinic having crushing chest pain. And he was having a massive heart attack and the paramedic diagnosis didn't have to use telemedicine in that case. I gave him



thrombolytics, which is clot busting medication, stabilized him, put him on a helicopter to fly into Bangor. And, and five days later, the guy showed back up at the clinic and said the cardiologist said I have to come, I needed to come tell you you know thank you for saving my life.

**TR**

Wow.

**RP**

And then two weeks later, I was a paramedic on duty up there. And the guy, the same guy, came in with a fish hook, and yeah, and I used telehealth there to just go through the process of removing the hook. Yeah.

**TR**

Wow.

**RP**

So it's really, it really is. It's cutting edge. It's the kind of thing that we need to look at down the road if we're going to meet the needs of our rural communities.

**TR**

Yeah, it definitely seems like it.

**RP**

And the key to it is that paramedics are not independently licensed practitioners. They never happened. They probably never will be. Right. So this petition really is a collaboration between doctors, doctors and paramedics and you know, St. Joseph's Hospital, the town of Jackman, Penobscot Community Health Care, and our organization. And none of this would have been possible, if all of those people don't come to the table and be willing to look at doing something different.

**TR**

Yeah, definitely. So am I right in understanding, I've been reading a lot about the Community Health Center, and Jackman, that's still functioning? Or that was one of the ones that was shut down.

**RP**

It functions as a primary care practice.

**TR**

Okay.

**RP**

Monday through Thursday.

**TR**

I see.

**RP**

So there's a doctor and two or three M.A.'s that work there. And they work Monday through Thursday as a primary care practice for the residents up there. And then, if on, during the week, if an acute care patient comes in during the day, the paramedic works with the doctor that's there to take care of them. And then the paramedic is the practitioner at night and on the weekends.

**TR**

I see, I see if that makes sense. So it sounds like you obviously have a very hands on role with this. Have you heard anything specifically from - I'm assuming there's very few doctors that actually work at the center? Would you say?

**RP**

There's only one.

**TR**

There's only one doctor at the center? Okay, I see.

**RP**

Patricia Doyle's been there for 35 years, she's been everything to everybody and Jackman. And the only real sad part is, she's at the point where she's thinking about retiring. And they've been

trying for years to attract other doctors to come up there. But, they aren't successful. It's a special - you know, it's a special type of person to do that.

**TR**

Yeah, well, I'm sure you're aware, there's lots of medical medical schools, they have some of these programs that are like, specifically for training doctors in rural medicine. And from what I understand, it kind of seems like no matter what they do, like no matter how much funding there is, there is just not an interest in it. And they cannot get students that want to go down that track.

**RP**

They really don't. Matter of fact, I was really surprised. During the month of February, and maybe for one more week, we had a physician out of residency out there, who is spending three weeks up there. Working with Pat during the day and working with the paramedics at night, just to see that part of it. But I was stunned because you're right there just is not a big call for that. There's not a big one, just *drive* for that.

**TR**

So yeah, it definitely seems like it. So I don't know what your relationship necessarily is with Dr. Doyle. Have you heard from her that this program, does it noticeably lessen the strain on her, at least to get to the patients that she needs to see?

**RP**

Ya know, I talk to Pat on a regular basis. And, and she's, she's an ardent supporter of the program. She's a key member. Without Pat 's support, we never would have been able to pull this off. And she's, she's 100% on board with us. And she's, she, she's very proud of the paramedic. She's very close to him. And it provides a lot of guidance. So

**TR**

Yeah, that's great to hear. I would actually really liked to speak with her. Would that be something you'd be able to help me set up?

**RP**

I can. Yeah, I can. When I get into the office, actually, because I'm driving. Will you do me a favor? Just send me an email. Yeah, for sure. And then I'll make an introduction tomorrow with you.

**TR**

Oh, that would be so amazing. Yeah, I would super appreciate that.

**RP**

Yep, that's, that's, that's wonderful. She has literally been everything to everybody and Jackman for years, and she's been a tremendous supporter of this program.

**TR**

Yeah, she sounds like a superhero.

**RP**

For sure. Absolutely. Yeah. Yeah, it'd be great to talk, we can get patient satisfaction surveys, because of the healthcare connection. So right now the people of Jackman are thrilled. They're really happy with it.

**TR**

Oh, that's great. Yeah. Yeah, okay, well, I don't want to take up too much of your time. And this has been super, super helpful. I'm just kind of trying to flesh out my paper a bit because I was feeling kind of meaningless to me to write about all this stuff in this town that I really don't know about. So it's great to just have more of a personal impact on it. So yeah.

**RP**

Where do you live?

**TR**

Well, I am from the Boston area, originally. So lots of hospitals down there. This has been such a learning experience taking on this project.

**RP**

If you ever decide you want to, if it would be helpful to you at all, come to Jackman

**TR**

Yeah, no, I mean, I'm Colby right now. I'm 40 minutes away.

**RP**

Yeah, come to Jackman, we have a place for you to stay right at the health center. We have a little series of apartments that they made for us. And, and, and if you ever wanted to go up there, we could make arrangements for you to talk to some of the townspeople. And anybody up there. And if you think that would help you at all.

**TR**

I actually might take you up on that, that would be super helpful. Because I'm kind of looking at my list of things that I want to check off with this project. And I wanted to talk to people like you, I want to talk to medical professionals that work in the center. And it kind of sounds like Dr. Doyle is going to be my best bet with that.

But I also, yeah, I really want to talk to some just local people from the area and people who have had an experience like using the services, and I don't really know how to get in contact with them. So yeah, that would be great.

**RP**

So so I can't obviously what I can't do is give you names.

**TR**

Right, of course.

**RP**

**Rick**

What I can do is contact some, see if any of them would be willing to talk to you. And then once they give me permission, I can give you their contact information.

**TR**

That would be great. Yeah. Yeah, that would be so great.

**RP**

Yeah, the guy that we gave the thrombolytics to takes every opportunity he can to talk about this.

**TR**

Sounds like it, definitely.

**RP**

So yeah, And I can make ... to talk to Dr. Busko as well. He's the medical director.

**TR**

Yes, he is also on my list. Definitely seems like he's very high up there. Because this whole thing was his idea. Right?

**RP**



It really was. Yeah. Yes, if you send me an email, I'll look tomorrow. And I'll make the arrangements.

**TR**

That would be great, Rick, I appreciate it so much. Yeah, I will need to send you an email with a consent form about the interview just to see if I can use it in my project. But I can also just include some stuff about, like people that I would like to talk to, if that's something you'd be willing to help me set up?

**RP**

Yeah, absolutely. I'd be happy to help you with that.

**TR**

Thank you. Yeah, I mean, my goal with this is to kind of just put this out here and see if I can get the paper published. And then my ultimate goal is to advocate for programs like this. Because I think that a lot of areas, especially in rural Maine, just aren't aware that these things exist and don't really know how helpful they could be. So that's the goal, at least in my opinion.

**RP**

Yeah. That's great. Yeah. Well, that's wonderful. Well, thank you for calling.

**TR**

Thank you so much. You're the first person I've talked to actually. And this is so much more than I even imagined it would be. So I super, super appreciate it.

**RP**

All right. All right. Well, I look forward to talking to you soon. Take care.

**TR**

Yes, sounds good. Have a great night.

## APPENDIX B: INTERVIEW WITH DR. JONNATHAN BUSKO

*Interviewer: Tamsin Rogers (TR)*

*Interviewee: Medical Director, Care Delivery Transformation and Associate Emergency*

*Department Medical Director at St. Joseph Hospital, Dr. Jonnathan Busko (JB)*

*Date and time: March 9, 2023 5:15*

*Location: via phone*

*This interview was transcribed using Otter.ai*

### Permission for Audio Recordings Colby College Department of Science, Technology, & Society

Title of the Study: Medical Technology & Mobile Devices: Investigating a Solution to Healthcare Access Barriers in Remote Communities

Researcher Name(s): Tamsin Rogers

As part of this research project, I will make an audio recording of you while you participate in the study. Please indicate what uses of this recording you consent to by initialing below. We will only use the recording in ways that you agree to. In any use of this recording, your name would not be used unless you consent to being personally identified.

A. The recording can be studied by the researchers as part of this project.

Please initial: Yes ☒ or No ☐

B. The researchers can identify me by name in publications or presentations. (If you mark No or leave this prompt blank, then the researcher will use an alias instead of your real name.)

Please initial: Yes ☒ or No ☐

C. The recording can be used in scientific publications.

Please initial: Yes ☒ or No ☐

D. The recording can be presented at scientific meetings.

Please initial: Yes ☒ or No ☐

E. The recording can be presented to students in class.

Please initial: Yes ☒ or No ☐

F. The recording can be used in public presentations.

Please initial: Yes ☒ or No ☐

G. The recording can be presented on radio or television programs.

Please initial: Yes ☒ or No ☐

I have read the above description, I give my consent to be recorded, and I give my consent for the recording to be used as indicated above.

  
\_\_\_\_\_  
Signature

3/14/23  
\_\_\_\_\_  
Date

**JB**

Jonathan.

**TR**

Hi, Jonathan. This is Tamsin over at Colby, how are you?

**JB**

Doing great. How are you doing?

**TR**

Well, thanks. Do you have some time to just have a little chat?

**JB**

Yeah.

**TR**

Awesome, that would be great. Um, so I wanted to just introduce myself a bit better. So I'm graduating from Colby this spring. And I'm writing a honors thesis with the STS department, which is Science, Technology and Society. And so I wanted to do a project that involved rural communities in Maine. So I came across this article that I sent you, which you are heavily featured in. And I was wondering if we could just talk a little bit about who you are and what you do, and Jackman and Rick kind of told me that using FirstNet was kind of all your idea. So I

would just kind of love to hear about how it came about. And I know it's a fairly new thing for the community. So yeah, just looking to have a casual discussion. I don't want to take up too much of your time. I'm sure you're very busy.

**JB**

Sure, no problem. So a little bit about me, I guess. So I am not a major. But I have been here for 17 years now, 18 or 18 years. I grew up in Pennsylvania and a college, EMT, paramedic, and worked as a paramedic for a while after college, went to medical school, Pittsburgh and worked as a paramedic through medical school as well, and did a master's in public health. And at the time, there was this new thing called expanded scope of service in practice EMS that was just starting. And it now goes by mobile integrated health for community paramedicine. The idea was that clinicians could do more stuff under newer clinical circumstances. And there was a project out in New Mexico in the mid 90s, called the Red River Project. And it was in a small town called Red River about an hour and a half north of Albuquerque. And they set up this project with the University of Mexico with emergency medicine residency, but with their own local medical director with the Red River fire department, where the firefighters were trained how to suture and do minor medical care. And so patients could go to them instead of having to go an hour and a half to Albuquerque, which was the nearest hospital. And that was being held up as the future of what EMS could be. And so that plagued Emily's thesis, which was pre and postnatal home visit program by EMS. The same time I was introduced to the Alaska health practitioner, or community health aide at that time. Do you know anything about that?

**TR**

Um, yeah, Rick and I talked briefly about it, but I would love to learn more.

**JB**

Okay, so. So the Alaska Native health system is, obviously the carrier is spread over a huge area. And in the 1950s, there was a gigantic outbreak of tuberculosis. And there was a realization that they could not control it in the villages. And so they started this program called the community healthy, which is my wife's family medicine that best describes it. We found the village mom, and they taught her how to do medical care, basically. So it was a lay, a lay practitioner model. And that actually worked amazingly well. In the late 80s. It was struggling. And the question was, do we shut it down? Or do we do something else.

Unfortunately, though, the US Public Health Service which oversees the Alaska Native health system, had a really smart guy who ended up here in Maine, a guy named Jared Kremens. Who did a complete transformation of the system in which they developed these massive protocol and instruction books that are simply the best thing I've ever read for walking someone through how to do almost any type of care. And they coupled it with telemedicine and built what is probably still the most robust telemedicine system in the world.

And so every one of these, every one of these villages, became part of a regional system of care. And actually, in 2003, my wife and I both went up to possibly Alaska. And she did Family Medicine, and I flew netbacks into these villages in Kotzebue which serves 14 small villages. And so, in each of these villages, the community health practitioner would do most of the care.

And if there was something they needed to contact the doc about. They did well, and then at the end of the day, all the cases were reviewed by a doc.

So it was an absolutely amazing system, but they really didn't have good emergency care. And speaking at the time, I'd be amazed if we could treat paramedics to be community health practitioners as well. And then they could provide care everywhere. Like they, they could literally be, well, EMS is the touchstone of health and every community you go to, no matter where you're at, are, with extraordinarily few exceptions. There is some EMS service that serves that area. And so EMS has the potential to really provide not just that, the emergency care, but be truly integrated into the healthcare system. And so, so anyway, I moved to Maine after my residency and fellowship and working here since I was heavily involved in EMS, and about five or six years ago. Not really, with any particular outcome in mind. I reached out to the Chief Medical Officer of Kenosha community health care, because the Jackman clinic there, it's really interesting.

So they, like pretty much everyone else, the healthcare system was started by the nuns in the beginning of the 1900s. And in the 1940s, they recruited a physician. And in the 1950s, they bought a house and turned it into a hospital. And in the early 1970s, they built a new hospital in town, and that became part of the main general healthcare system. They had two hospitals in the system, that hospital, main general, and at that point down in Waterville, no Augusta. And so in the late 70s, they realized the Jackman hospital was not making any money. So they shut down the hospital part of it, but kept the primary care, and turned the hospital into a nursing home. And interestingly, they also kept basically a free one of the first freestanding emergency departments

in the US. So the nursing home nurses who provide the nursing care and the physicians working up there will provide the physician care. And it became one of only two places in Maine that ambulances are actually allowed to transport to directly that aren't emergency departments. So that it's there in the Vinalhaven clinic on Vinalhaven island. So that worked fine.

Until 2012. And in 2012. This is a little bit like financially speaking, but the Center for Medicare and Medicaid Services pays different rates to different health care entities. And so they in particular, there's something called a critical access hospital where they get paid at cost plus a small percent for the care they provide. And they can open what are called rural health centers, which also get paid at cost plus. And then there's another entity called a federally qualified health center, which has contracts with the the Health Research Services Administration, or HERSA. To provide care to communities that are underserved and to provide a whole team of care. So they've got to have dentists and they've got to have pharmacists and they've got to have behavioral health specialists and provide all the services and so the FAQ It sees and the rural health centers go into places to provide primary care where it's not financially viable to do it.

And Maine General was neither of those. And so their rural health center or their basically their primary care center was losing money hand over fist. And so they basically said, we're pulling out and they looked around for somebody to take over. And the only one willing to do it was Penobscot community health care, which is the largest FQHC federally qualified health centers and state. So that when they did that, they kept the nursing home open. And they told them, but PCAC said, Well, you know, we don't do this urgent after hours and urgent care, so we're going



to shut it down. And the community lost its mind. And Pat Doyle, who used to work there with her husband, said, No, that's fine, I'll do it.

So PCAC paid her to do the available 24 hours a day for emergency care, meaning general supply nurses, and that worked reasonably well till about 2017, when Maine General said when we're losing money on the nursing home, too, so we're shutting that down. And that was about when I reached out to know an SM kind of...

Coincidentally, I knew Jackman worked with a doc who'd grown up there and called it the call that the outs of Maine. I have a camp up that way. So all those things made it interesting to me. So we talked a little bit about what what could What could that community use, because they were still planning on doing primary care. But they needed some way to provide this after hours urgent care that wasn't crushing them financially and wasn't causing the wasn't burning out their medical assistants who were who stepped in for the nurses. So we went off and had some community meetings. And that was in 2018 to 2019. So in 2018, another thing came out from the Center for Medicare and Medicaid Services called the emergency treat, triage, treatment and transport are 83 programs. And do you know anything about that? I do not know. Okay. So, so EMS gets paid when they transport people. That's it. And Medicare looked at its own data and said, you know, somewhere around 15% of the people who get transported to emergency departments do not need the emergency department level of care. So they created this payment program that ambulance services could sign up for that would allow the ambulance to use protocols, to triage patients to alternate care sites in the emergency department and specifically to treat or transport them to an urgent care to use telemedicine.

And, because of my connections. With EMS, I was able to convince our hospital St. Joe's that we wanted to be a hospital willing to do that kind of telemedicine and became the number one hospital in the state that would work with ambulance services want to move to three. But that just didn't happen kind of right in the middle of when we were talking up at Jackson. And there's been some reluctance people weren't sure what it would mean to have paramedics working up there. What would they do? How would they take care of these protocols, what the quality of care would be and I thought about Alaska and I connected Niki three to this.

And we came up with the idea that every visit would be a tele urgent care visit facilitated at the originating site by an advanced practice paramedic who could then on the order of the physician after the full evaluation of the patient perform a set of advanced skills. So wound repair suturing and stapling, taking foreign bodies out of people's ears, doing some getting some medications that aren't in the scope of practice of a paramedic and basically facilitating the telehealth exam. And that's what really clicked with the community. And that was it. I think that was the thing that made this, a potentially viable program was knowing that they weren't going to lose physician visits, the physician visits were just going to be a little different. And they were going to be done by these paramedics who are going to be coming up and staying in town and accessible to all.

So there were a couple of ways we could have done it. And we got some, I think, some bad advice from the Board of Medicine about what we could or couldn't do with delegated practice. But either way, we ended up rolling this into the EMS EMS pilot project. And one of the consequences of that was that, in theory, these services could be provided anywhere. So there

could be a 911 call that the paramedic responded to at somebody's home. And they could say, oh, well, you don't need to go to a hospital to take care of you right here. And they could initiate a telemedicine visit. But the only way that was going to work was if we had good cellular broadband. Right. And so, Kevin McGinnis. And is that a name you've heard?

**TR**

No, it's not.

**JB**

Okay. So Kevin McGinnis was the state EMS director in the early 90s. And went on to become kind of a, a national mucky muck in EMS, administering administrative stuff. But one of the things that he did was he became the nationwide coordinator for the initial FirstNet rollout. And in particular, focused on Maine, because that's where he still lives. And so when we were talking about this project early on, I met up with him and said, Kevin, I think we need deeper coverage up there is not a lot of cell coverage around Jackman. And you know, what FirstNet makes sense.

And he said, absolutely, and connected us to the FirstNet authority, who absolutely saw this as an opportunity to demonstrate how effective providing cellular broadband could be for making rural health care work. So they bumped up the town's coverage. There are very few places in the Jackman region where you can't get a bar or two on a first neck device. And we also realized that while there's kind of broadband service in the Jackman and up to the Jackman clinic, and in fact, they've been doing some telehealth there are with their own big telehealth cards beforehand mostly tell the behavioral health that it would be better for us if we were just consistent. So we

ended up getting FirstNet boosters put into the clinic itself. And so all of the outgoing basically all the data transmission for the program for telehealth goes over the network. And, so we started stretching doing these talent visits back last May. And that's where we're at now.

**TR**

Great, yeah, that answers a bunch of questions that I had. Yeah, I just I kind of stumbled upon the article. And I didn't really know anything about Jackman, you know, I'm not a Mainer.

Originally, either. I'm from the Boston area. So yeah, I mean, it's been fascinating, just kind of deep diving into this. And I've learned so much in the past couple months. So yeah, super, super helpful to hear all of that. Can I ask you just a couple quick questions?

**JB**

Sure.

**TR**

So I talked to Rick a bit about this too. And I also am hoping to speak with Dr. Doyle. Could you speak just a bit on like, if you feel that the use of telemedicine in Jackman specifically has like, lessen the strain on the medical professionals who work there? Are there any instances where you've really seen that happen?

**JB**

I would say absolutely. So PCAC has not been able to recruit a new full time clinician up there for over 20 years. And, and even before that, it was typically a Pat's been there since the late 80s.

Each and every one else was there for four years or less. And it's for the simple fact, you know, come to Jackman, Maine, it's absolutely gorgeous. It's true. You can hunt, you can fish, you can snowmobile, you can say, oh, no, wait, no, you can't because you're on call 24/7 365 When you leave the town for vacation, nobody wanted to work that.

And so basically, Pat was working, she was on call all the time when she was in town. And they were paying if she was out of town, they were basically paying someone full time clinical rates to sit in Jackson to be available to provide care. And so when I started this, Pat, and she can, she can give you much more perspective was better, but part of the reason why there was a panic was she's gonna retire, she's burning out was the question. And she jokingly says that now that she has a life, she may just keep working for the next 20 years. So this has been a huge reduction in her responsibility.

And on her workload. You know, even so these calls happen, the off hours calls, they're about 100 to 105 of them a year. And that's one every three days. But if you've, if you've ever been in a position or a job where you're on call for something, even when you're not doing something you are track, you really like you cannot relax, you can't engage in doing anything else. And so that's, that's an incredible burden. So that makes the pathway much easier, which you can speak about. It also makes PCH's ability to recruit someone much easier because they're having the paramedics up there now and the telehealth they could easily take all the urgent care. Right now during regular business hours, it's being done by whoever's on, which makes sense. But if they wanted, it's a community of 1200 people, there's probably, I don't know, maybe 700 patients in the practice, that's not nearly enough for a full time position. But on the other hand, you really

can't. You got it, you got to cover them, somebody's got to cover them all the time. So having having the ability to say look, you know, for I can you can have someone live a couple days a week, and then there, then all the urgent stuff was covered by somebody else, the rest of the time, vacuum changes how you can stash

**TR**

Right, yeah, that makes perfect sense. Um, so I'm also wondering, Jonathan, you talked a little bit about some similar programs? Or inspiration for this program, I guess? Do you see this specific program that's being used in Jackman right now, like being expanded into other places in rural Maine or beyond that? Are you familiar with any similar ones?

**JB**

So right now, the Aside from Alaska, the only other place, this kind of work is being done is industry. So oilfield extraction, remote worksite. And I guess, one other facet to all of this is that for a couple of years, I was a professor at a Maritime Academy, teaching the ship's medicine program, which is an even, that's just an absolutely insane medical practice that these guys do. So you know, set to get 70 hours of training, your full time job is keeping the ship from running into things or keeping the engine running. And if there's a medical emergency, or a public health incident or anything, you're responsible for all the medical care on the ship. So So, so then that setting is some of this being done.

The Red River Project actually folded in in early 2000s, because it lacked good medical oversight. And they ended up doing a lot of things that they never should have with very bad

outcomes. They just figured they could do whatever they wanted. And that didn't work out. And that was that was also part of the reason why We added the we added the Telehealth is because it takes, it takes all of there's there's something that's taken to calling disposition medicine. And that is all about deciding who you can safely discharge from an emergency department or from from a primary care office. And I, in doing all this, I realized that in my emergency medicine residency, I saw about 10,000 patients, all of whom were was supervised every one of them, an attending physician knew about it and I discharged home about 75% of them. And even though I learned how to take care of really sick people, the biggest part of my learning was figuring out who to send home safely. And you can, you can't expect a paramedic or anyone in EMS to be able to do that that was three years of intensive training, several 1000 hours of supervised one on one supervised work. And that's something they physicians, but we make physicians that way to have that kind of judgment.

So that's how you end that, that's why I think the telemedicine piece is critical in these programs. And so that's why things like the Ethan program in Houston, EHA Ed, which allows EMS to respond on a call. And if they think someone doesn't need to be transported to, to start our telemedicine visit. They don't have the advanced practice piece. But they do have those health urgent care visits, when that's been so successful. So right now we're working on grants to explore in three other remote or frontier parts of Maine, what the communities feel like they're missing and healthcare services, what they don't have access to. And if they identify Urgent Care Services as a real area deficit for them, then we'd look to expand the Jackman project into those communities. And they're all two of them are islands, ones in the western mountains as well.

They are all places where access to a hospital or access to after hours care is at least an hour to an hour and a half away. Which I think is a really important number for this type of a telehealth program. Because any closer and the setup time and the connection time, particularly in a setting like ours, where we're using on duty emergency physicians who are seeing these patients in the middle of seeing other live in person patients, the time savings drops. If it's if you're 45 minutes from a hospital, yeah, you'd have to sit in the waiting room. Yeah, you're gonna have to drive home. So it still benefits you. But the cost benefit ratio goes way down of not being actually seen by somebody alive. Whereas over an hour, putting aside ER waiting time, if you have a relatively minor complaint, you're talking about a minimum of three hours of your time. So even if it takes 45 minutes to get through it in a Jackman or any of these other sites. That's still, you know, basically a 70% reduction in your time cost, right? I'm getting these services.

**TR**

Yeah, it makes sense. So do you have patients and physicians and other towns coming to you and saying, like, we've seen what you've done with FirstNet. And we want this where we live?

**JB**

So we've what we sort of, we have what we have our EMS leaders typically, who have heard about this, we say we'd be interested in talking about it, the communities. I mean, this day, this is not one of those things that necessarily gets advertised now to like there haven't been there's actually been more national news coverage on this and there's been made news coverage.

**TR**



That's super interesting.

**JB**

Yeah. So I was out in Colorado, meeting with a bunch of community paramedicine folks last June. And then I knew there was a crew that had been out filming and, and Jackman. Well, that's the first place it was released was actually on a Denver television station before it was released in Maine. So it's, it's, I think that what we need to really get this out here is a couple of things. The first is we need state legislators to look at this and talk about it, and talk about what it can be doing for their communities. And federal legislators on a much grander scale. But also, there's a Municipal Association, which is basically, it's a support association for municipalities, and they help groups purchase insurance, and they do all the compliance training that every time an employee has to have, and all that kind of stuff. But the Maine Municipal Association pushes this out to the municipal members, I think that there'd be a lot of places that say, Hey, wait a minute. We haven't heard about this. And this is potentially something that's really good for our community. So I think there's a I mean, not at this point that we're really ready and able to do a huge expansion. So I don't mind things like slow, but I think there's, there's some PR that could be done that would make this something that becomes much more ubiquitous and Main.

**TR**

Yeah, definitely. Sounds like that. I think there's some opportunity there. Yeah. I mean, that's kind of me really, I don't know how much of an impact I can have myself. But part of my goal with this project is to just kind of put it out there that this is a program that's really helping people. And I just kind of think that a lot of people aren't necessarily considering telehealth as a

potential solution to this problem and rural areas. So yeah, I don't know, I'm just kind of trying to spread the word, especially if people in Maine are not as aware of this program as people in Colorado.

**JB**

And I think that that's, I think, you've got one of the key points about this. So telemedicine, the way I think a lot of doctors think about telemedicine and the way a lot of patients think about it, there's parts of it that are really bad. So, the major limitations of telemedicine are that you can't do a really good physical exam. And if the patient needs something done to them, you can't do anything.

And it's and that's, that's really not inconsequential. That is a huge limitation. Like how urgent cares are really good for you to say, well, you know, my ear really hurts. And you say, Okay, well, maybe you have an ear infection. Why don't I give you some antibiotics? Like that's, there are technologies out there that would let you share a picture of your ear with this doc, but not everybody has them.

So, so non facilitated telemedicine is really, it's okay, but it's not fantastic. Whereas facilitated telemedicine, where you've got someone at the originating site, who is trained to use all sorts of peripherals and who is trained to facilitate a good exam. That's an entirely different type of medical practice. And that's what we're really pushing for. So it's interesting I've been talking with there's a, there's a county the second northernmost county in Sweden is called Boston, Boston. And they have something called the Center for rural rural primary care, Rural Health for

Rural Health. That focuses on a lot of these, mostly primary care, but a number of health access issues because Rasta Bowden, in a lot of ways is like me in terms of a couple, one large academic Hospital, a couple of smaller, smaller, large tertiary care of a community hospital and then a whole bunch of very small hospitals.

And one of the things they did was they started these things called telehealth rooms, which were basically designated rooms where people could go and get telecare. And kind of like the new library program in Maine. And they found that they sort of work, but there wasn't a big uptake. Until they trained. They have nursing assistants, they don't have EMS licensees in Sweden, but they have nursing assistants, who, who they trained to facilitate these visits. So instead of you just going in and seeing what's out there in this telehealth room, when you just happen to make it in there, and you schedule something, this person meets you there and they facilitate the visit, they help with the physical exam. And they kind of help through whatever the plan is that the doctor comes up with. And the uptake just surged. People love that the nurses, the nursing assistants loved it because they went from basically being home health aides to being considered significant, significant members of the healthcare team for these communities.

And, so facilitated telehealth really is community empowering. It creates a healthcare job and a permanent healthcare access point into a community. And it engages the community because you've got this person who's a facilitator who's there, to make all these things work. And I think that's why a program like Jackman is going to succeed in a way that just says, okay, you know, we've signed up with Dr. Go at your, where your insurance company, we signed up for Dr. Go, and you can just call to get urgent care when you want it.

These companies are very, very tight-lipped about what the US is. They talk about the number of lines covered when they contract with insurance companies, it is very hard to get utilization data. But the kind of the unofficial stuff from the original telehealth centers is uptake is really low. People in the community just or people just don't use these services, even though they're available. Because it's, you know, it's you know, I talked to somebody on Zoom and said some stuff and maybe send a prescription as opposed to when people show up in Jackman they're greeted by the paramedic and they get a set of vital signs and they get your initial physical exam and then the paramedic connects into a physician and the physician talks to him the physician has the paramedic do stuff for referrals to help with the exam. And then the physician can give a solid opinion about what they think's going on. And then the paramedic can execute the plan and that really engages the community.

Helen Duplicitous who's one of the board members of PCAC and has been a big advocate for this program all along. So he goes out to the grocery store, he goes out anywhere he goes out in town, people will always stop and say, We love having the paramedics here. We think this is fantastic. They're so excited because they're there and they're engaging the community and they're providing this telehealth service and people are feeling good about using it to make it feel way more personable.

**TR**

Definitely. Do people ever have any kind of ethical concerns when you have the physician kind of being streamed in? Like, is there any just looking at it from a technical perspective? Like, is

there any concern of like leaking data are falling into the wrong hands? Because I know some of these systems you like, are sending, like biological statistics or information or things being read, like data is being sent through these devices.

**JB**

So I don't know. Is there ever a concern about anything relating to that? I mean, there's there any sort of general concern that anything is hackable? Yeah, that's what I mean. But all of all of these systems are, I mean, basically, we, we tell patients, this is what it is, is this data transmission system is HIPAA compliant, which means they've done all the which there's actually nobody who gives you a HIPAA compliance certificate that doesn't exist, you just get this as these are all the things your system has to have. And you could say, Okay, we have all those things.

Therefore, we can say we are HIPAA compliant. But it's ISO.

Standards are much more useful. Standard when because then when the company says we've got it, the ISO can say, yes, they did, we would confirm that. But we say look, you know, it's HIPAA compliant, and could it be high? Sure. But could your two year your timing Eric know the electronic health record behind? Yeah, absolutely. And I think one of the things that people miss, in all the concerns about health data privacy, is that no one cares about patient's hemorrhoids.

What they care about is their name, their address, and their social security number, because every one of those is worth 25 bucks, right? And that's, that's what's getting stolen. And so none of that gets transmitted.

That's not, that's not data that goes through any of these systems, the registrar's, talk to the patients on the phone, and they register them. So that's how all the data is going in. So that would be on. The only thing transmitted is real time video. And so you know, if that's, if you're worried about your real time video being hacked. Okay, we never got any patients naked. People, when people are like, Oh, I don't want anybody to know, but like, do you really care about your laceration? Or your rash? No, not really.

Yeah. Whatever, like you want to invite more people in because you know, we use a system, we can invite lots of people in. We're not going to but the reality is, people these aren't, these aren't deeply private conversations, and people are fine with it. And that's the other thing about a small community. So everyone knows, if you've gone to the clinic, like there's no health privacy that way. And that's actually where I was, I was talking to this group on Saturday. So they set up a system where they had a live social worker, and then a video social worker in the Community Health Center. And no one even though that was identified by the town has one of their biggest needs was behavioral health support. By buying community members, nobody ever went there. And so there's a place where, like, if I were finally, finally iterating, the next step of this and I want to, say sell a whole package to a community of you'll get the paramedics who can do all these various things, you will get these tele, these telehealth visits that will be done through the clinic where they can come to your home. And again, everybody knows that they come to your home, and we have a contract with a better home for you. And you could do that in the privacy of your own home and no one ever knows you've done it.

That's where that's the one place where I think that that the that telehealth is best done privately without it out of a context where people know for the direct medical care, having people see the paramedic and everyone knows they're at the clinic and if they see your vehicle to clinic, they know what's going on. That's phenomenal. That's a huge plus for a medical care system. But for a behavioral health system telehealth system, that's a big downside.

**TR**

So yeah, Rick seemed super interested in that too. Like the idea of having home visits or hospice workers, is like just making those home visits. We talked about that.

**JB**

And that's so there's a couple pieces to that. One is, one is the community paramedicine piece. So expanding the paramedic scope of practice to be able to do those kinds of supplemental work with hospice programs. You know, there's their, that doesn't necessarily require a telemedicine, we are very interested in.

In adding tele nursing, I'm not sure where it's legal yet. Barriers, the laws around telehealth are always kind of a moving target, I'm sure because it feels like such a new field. I'm sure people just don't know how to handle it. And there's a question of, you know, what I like about it. And so in Maine, nurses can delegate their practice to nursing assistants, LPNs, and nurses in training, but they can't delegate their practice to anyone else the way a physician, a PA, or NP.

And so you run into this question of well, is having a trained paramedic, who is trained and credentialed to do these rules, having a nurse say, Well, I want you to do it, they're there, they're, you know, change this dressing, let me take a look at that, okay, that doesn't look infected, that looks pretty good. You can just go ahead and dress them with this, this and this, they're not delegating their practice, because the paramedics already have a scope of practice that lets them do that.

Is it? Is it okay to have a nurse doing that? And we don't know, we're gonna have, we're gonna find out in the next couple of years, we're gonna have to go before the Board of Nursing and say, hey, try this big problem here. Can we do this? We don't, we don't know. But yeah, I think home visits are going to be a big piece of this. And I think the other thing that's going to become a really big piece of this originating site is facilitated healthcare, etc, three, rollout just before the pandemic started, and then the rules basically survive, everybody can do 83 If you want.

Now, it takes a little bit of work to pull that off. So you can't just say, Okay, now tomorrow, we're just going to start calling dogs to do telehealth visits on these 911 responses. But I, I absolutely believe that every EMS system should have every EMS system should have a contract with someone to provide telehealth visits for lower acuity patients. And when they get there to be able to say, you know, I think you can just do this telehealth visit. And even without all this advanced practice, the things that paramedics can do, or even EMTs, advanced EMTs can do are pretty, pretty impressive.



And so, for example, if I had somebody who had a 911 call for an asthma attack, and yeah, they're wheezing really well, Vernier. The reason we didn't want their oxygen levels are a little bit on the low side. But I think that if the paramedic gives them some steroids, and a couple of Back to Back nebulizers, that they'll probably be fine at home, and then I can send in a prescription for steroids. That's all within the scope of the paramedic. And they could just do that. Now under current reimbursement, they wouldn't get reimbursed. So there's not a big incentive for them to do it. And it's not clear what we'll be able to do in terms of telehealth billing, but what's the public health emergency in terms of like, the

**TR**

is that in terms of like the physician's time, the reimbursement?

**JB**

So, so it's in the main has a telehealth parity law which basically says, if in the physician judgment, they can provide the same services via telehealth that they can provide in person then the they have to be reimbursed at the same rate, as if they do the visit in person.

And so that means it protects us pretty well in terms of being able to get reimbursed. But that's a you know, it's, it's not. There's also limitations as to what types of visits you can do via telehealth. So, for example, we're not billing emergency department bills up in Jackman, we're billing them, basically as urgent care which bills exactly the same way as a primary care office. So that's it, these visits are all being billed, like, again, at dollar offices.

So, that impacts how you want to do a program like this in terms of who you want doing it, and how they're going to be reimbursed. And that's why we're using on duty emergency physicians, because if we were paying someone to do a call every three days, we would also be losing money hand over fist, right.

**TR**

So that money doesn't come straight from the Jackman clinic. In terms of the reimbursement, yeah, I'm just thinking about how this is a cost effective program in terms of like the center's past of losing money.

**JB**

So we bill the patient's insurance companies.

**TR**

Okay. Yeah, that makes sense.

**JB**

So, and then for now, if that doesn't get paid, then we can get reimbursed from the grant that we have. But in the future, it'll be just like any other medical visit and will either get reimbursed by their insurance company where the patient will pay for it, or will write it off.

So now given that there are 100 to 150 visits a year, this isn't me putting on my administrators cap, I would much rather if we contracted so that the town of Jackman is paying for what was on

the hook to pay for these services. They've gotten grants so far to cover them. But they're basically responsible for paying for what it costs to have the paramedic up there to do the program. And I would if I were going to another community and saying yeah, I'd like to roll this out, I would bundle the costs of the billing for St. Joe's into that as well.

And, say, you know, it's so it's here, it's \$10,000. And you have essentially unlimited up to 200 calls a year. And it's paid by the town. So it's not paid by any individual, but it's paid collectively by the community through tax funds. And, you know, it's, that's, that's it, and if you know if that works, if you if you guys do 100 calls, then we're making 100 bucks a call. And if you guys do the full 200, then we're making 50 bucks a call, but it doesn't matter, because we can budget a fixed number on it.

Now, who's saving money with this, the insurance companies, right? At the end of the day, every visit that we do is saving even though the town is paying for the access, the insurance company is pocketing the difference between an urgent care bill and an ED bill, which is, you know, for the kinds of things we're seeing is probably a 400 \$400 difference that the insurance companies get his profit.

So that's a that's, that's a legislative and insurance oversight issue that needs to be resolved. But if a community wants to commit to something like this, the insurance companies should basically give them a refund because they're getting services that they don't have to pay for. But that gets off into serious fiscal policy land, which is of interest to me, theoretically, but not in turn. Not something I actually feel like I can do anything about.

**TR**

Gotcha. Yeah, that definitely makes sense. Well, I don't want to take up too much of your time.

But I guess I kind of have a part in question. That's just kinda like, is there anything that you feel that I can help do to advocate for this program? Just in the scope of like, getting the word out and making people aware?

**JB**

I mean, I think that's probably the big piece. And I guess what I would say is if you look around, look around Colby. And you look at what, what professors or what programs are having policy impacts in the state. Those are the people who need to hear it, you know, if there's someone, a professor of public policy who does advising for a state senator or a representative, they need to know about this.

And, and then the, I guess the other thing is the So, this may not happen in some parts of Maine, because there's no broadband connectivity. And so I think getting the feature feedback, back to back to FirstNet. About, you know, the work that you do and your analysis, because even though you know, the ideal is we're gonna we're gonna lay fiber all over the whole state. I mean, I camp up north of Greenville I can get I can get but it's, you know, it's not to get steep, but it's a heck of a lot better than the satellite. I've got a fiber link to a camp on the end of a terminal road in the middle of nowhere. So it's common everywhere. But it's coming really slowly. And so using this as a use case to advocate for rural broadband is a big deal moving credibly helpful.

**TR**

Okay. Yeah. That's great to know. That's super, super helpful. Yeah, well, thank you so much.

This is a great just like initial talk, you answered so many of my questions that I had, and it's also great to just kind of hear similar things from you and rec, it helps me understand what's going on in Jackman a bit better. So super, super appreciate it. I'm gonna send you an email with just some follow up information about the project. But yeah, that's all for now. I think. Thank you so much.

**JB**

At any point, anything else comes up just email me and if we need to try it again, just let me know.

**TR**

Definitely. Thank you so much. Have a great night.

**JB**

You too.