

Improving Rural Health Outcomes in Dante and Russell County, Virginia

Prepared for: Russell County, Virginia

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Disclaimer

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Executive Summary

Healthcare is among the most pressing issues facing many rural areas, including Russell County, Virginia. Rural areas face disparities in access to care and health outcomes compared to urban areas. Comprehensive, high-quality healthcare is associated with better health outcomes, lower death rates, improved productivity, and higher quality of life.

Individuals in rural areas are more likely to die prematurely from heart disease, cancer, unintentional injury, respiratory disease, stroke, and suicide. Rural areas have higher rates of obesity, maternal mortality, opioid overdose, and disability. On average, rural Americans live further from a hospital, travel longer to access health services, and lack public transportation, which can delay access to appropriate care (Centers for Medicare & Medicaid Services, 2022).

Unequal access to healthcare is a multifaceted issue; one important component of this is variable resource availability, such as access to sites of care like hospitals, and availability of primary and specialty care providers (Streeter et al., 2020). In Virginia and nationwide, the vast majority of Health Professional Shortage Areas (HPSAs) are located in rural areas (Health Resources & Services Administration, 2023). HPSAs have higher mortality (i.e., lower life expectancy) and higher morbidity (i.e., greater prevalence of disease) rates than non-HPSA areas.

Russell County, Virginia is located in a Health Professional Shortage Area (HPSA), a federally designated geographic area that has a shortage of primary, dental, or mental healthcare providers. As in many rural communities in Virginia and nationwide, residents in Russell County face difficulty accessing primary and specialized healthcare services due to geographic distance, affordability, lack of health information, and more, contributing to comparatively poor health outcomes.

This report analyzes three policy alternatives in response to this problem:

1. Leverage university partnerships to target workforce development and recruitment
2. Leverage Platform Accelerating Rural Access to Distributed and Integrated Medical Care (PARADIGM)
3. Maintain the status quo

Alternative 2 is recommended based on a combination of high effectiveness, medium cost, and medium feasibility.

Problem Statement

Russell County, Virginia is located in a Health Professional Shortage Area (HPSA), a federally designated geographic area that has a shortage of primary, dental, or mental healthcare providers. As in many rural communities in Virginia and nationwide, residents in Russell County face difficulty accessing primary and specialized healthcare services due to geographic distance, affordability, lack of health information, and more, contributing to comparatively poor health outcomes. In Russell County, 11,400 years of potential life were lost to premature deaths (i.e., deaths of people under age 75) per 100,000 people, compared to the Virginia average of 7,300 years of potential life lost (University of Wisconsin Population Health Institute, 2024).

Client Overview

Russell County, Virginia is a county of about 25,000 residents located in rural southwest Virginia. While the Appalachian region is quite diverse, Russell County is predominantly white (97.3 percent), and, on average, has an older population. Russell County's median age is 47 years (Federal Reserve Economic Data, 2022) compared to the state and national median age of 39 years (U.S. Census Bureau, 2023).

Unlike most regions in Virginia, Russell County along with the rest of southwest Virginia have seen a negative net migration of residents in the past few decades, meaning there are more individuals moving out than moving in over a given time period. Russell County had a net migration rate of -7.26 per 100 residents in the 2010s, with the rate falling to -23.38 per 100 residents among the 20-24 years age group (Applied Population Lab, 2023).

Russell County wants to revitalize Dante and the rest of the county, making it an attractive place to live for current and prospective residents. The county envisions itself as part of a larger trend of revitalization in rural areas and hopes that they will serve as a model for other rural communities. Access to high-quality healthcare is an essential component of meeting resident needs and improving quality of life in Dante and Russell County.

The county has a shortage of qualified healthcare professionals and, on average, worse health outcomes than the rest of the state and nation. There is one hospital in Russell County, in Lebanon. Additionally, there are almost no specialty care providers in the county, only primary care providers. The county is a part of the Cumberland Plateau Health District (CPHD), one of the 35 local health districts that make up the Virginia Department of Health (VDH).

Background

Healthcare Worker Shortage

Over the past two decades—and exacerbated by the COVID-19 pandemic—there has been a trend of healthcare worker attrition, leaving a shortage of healthcare workers nationwide.

In 2016, the Health Resources and Services Administration (HRSA) projected that, under current patterns of workforce utilization and care delivery, national shortages of primary care providers would worsen through 2025 (and likely, beyond). This is largely driven by an increasing demand for services associated with an aging and growing population coupled with ongoing challenges in recruiting and retaining healthcare providers. HRSA’s projection assumed that current patterns of workforce participation and retirement rates as well as healthcare utilization rates would not change substantially from the base year, 2013 (National Center for Health Workforce Analysis, 2016). However, the pandemic has affected workforce participation rates, and to an extent, healthcare utilization rates. The pandemic increased worker burnout, exhaustion, and trauma (Assistant Secretary for Planning and Evaluation, 2022), exacerbating the existing healthcare worker attrition rates. Thus, the ability to meet healthcare needs in the future appears to be even more bleak than HRSA’s 2016 projections.

However, the workforce shortage issue is not merely one of sheer workforce magnitude, but also of geographic distribution. In 2013, there were approximately 19 percent fewer primary care physicians per resident in rural areas than urban areas (Pettersen et al., 2013). In Virginia, metropolitan areas around Washington, D.C., Richmond, and Virginia Beach benefit from fairly strong labor supply, while rural counties near the North Carolina and West Virginia borders experience pronounced labor shortages (Mercer, 2023). Recruitment and retention of healthcare professionals into rural areas has been an enduring challenge in the United States. Urban areas frequently offer stronger labor markets, more desirable living conditions, higher wages, higher spousal satisfaction, and more. Rural health providers may also have more demanding schedules due to fewer providers in the area. The workforce shortage limits access to high-quality health care, especially in poor and rural areas, which are more likely to be identified as HPSAs.

The closures of rural hospitals has also limited opportunities for health workers to practice in rural areas and impeded access to health services. Rural hospitals have lower average operating margins than urban hospitals and face a greater risk of closure. From 2010 to 2022, 138 rural hospitals closed. Additionally, between 2008 and 2018, around 500 out of 4,500 rural nursing homes closed or merged—approximately 10 percent of rural counties do not have a nursing home to care for their aging population (Centers for Medicare & Medicaid Services, 2022). Around southwest Virginia, five rural hospitals (Mountain View Regional Hospital, Pioneer Community Hospital of Patrick, Bluefield Regional Medical Center, St. Luke’s Hospital, and Jenkins Community Hospital) have closed or converted since 2007. Hospitals that are “converted” no longer provide in-patient services,

but continue to provide some healthcare services such as primary care and skilled nursing care (Cecil G. Sheps Center for Health Services Research, 2023)

Health Literacy

In addition to limited healthcare access, health literacy is lower in Appalachia, which is associated with worse health outcomes. There are varying and complex definitions of health literacy. One widely used definition is that used by the Department of Health and Human Services's (HHS) Healthy People initiative: "the degree to which individuals have the capacity to find, understand, and use information and services to make well-informed health decisions" (National Institutes of Health, 2021). Health literacy significantly influences a patient's capacity to navigate healthcare systems and address medical issues appropriately. Lower health literacy levels in rural populations have a more pronounced impact on health outcomes than in urban areas due to reduced access to resources like healthcare facilities and health-related information.

One study that examined data from residents in central Appalachia found low rates of health literacy regarding cardiovascular disease, which disproportionately affects Appalachia. Less than 50 percent of respondents answered all five questions correctly. Having less than a college degree and being older than 50 years were significantly linked to lower literacy level (Mamudu et al., 2020; Nipper, 2020). The study has several limitations that should be considered when interpreting its findings. The study's sample size is relatively small, consisting of only 82 respondents. Additionally, while the study suggests the integration of cardiovascular disease health literacy into cardiovascular disease care and the incorporation of educational attainment in cardiovascular disease policies and programs, it is important to acknowledge the complexity of addressing health disparities solely through higher educational attainment. A more comprehensive approach that considers the broader socioeconomic context, culture, and addresses various determinants of health is likely necessary for developing effective policies and programs to improve cardiovascular health outcomes in the region.

Strategies to increase health literacy include creating a welcoming environment for patients, providing clear and simple verbal and written communication, improving support for navigating healthcare systems (Seidel et al., 2021).

Socioeconomic and Cultural Influences

In addition to healthcare access, many factors influence physical, social, and mental health outcomes, including housing, education, employment, diet, and physical activity. Rural areas tend to face unique challenges in these dimensions as well (Centers for Medicare & Medicaid Services, 2022).

The culture and history of a region affects its health outcomes. For example, rural communities have cultural dietary regimens that are high in saturated fats (e.g., red meats), which can be linked to a history of self-sustaining farming communities where people raised their own crops as well as livestock. A diet that is high in saturated fat and cholesterol has a strong causal link to deadly

diseases, such as coronary artery disease. In this way, culture is strongly linked to diet which, in turn, is linked to health outcomes.

Another important cultural driver of health is tobacco use, particularly cigarette smoking. Appalachia has the highest incidence of smoking tobacco products in the nation, which is ingrained in culture—the Appalachian region is particularly good at growing tobacco products. During the Great Depression, many Appalachian families sustained their livelihoods by growing tobacco which, in turn, means they frequently used tobacco themselves (T. Kincer, personal communication, October 2023). That culture continues to propagate forward: in Russell County, 22 percent of adults are current cigarette smokers compared to 13 percent of adults in Virginia (University of Wisconsin Population Health Institute, 2024). Tobacco smoking increases the risk of heart disease, stroke, mouth cancer and other significant health conditions.

Education is also an important driver of inadequate healthcare. Russell County has lower rates of high school and college completion compared to the rest of the state (University of Wisconsin Population Health Institute, 2024). This dampens employment outcomes, which can lead to lower levels of healthcare attainment through having insurance and the income necessary to afford healthcare.

Consequences

Limited access to healthcare contributes to troubling financial and health consequences for rural communities.

Figure 1 compares the prevalence of various health outcomes between Russell County and the rest of the nation. Russell County has higher rates of important indicators of health, such as heart disease and obesity.

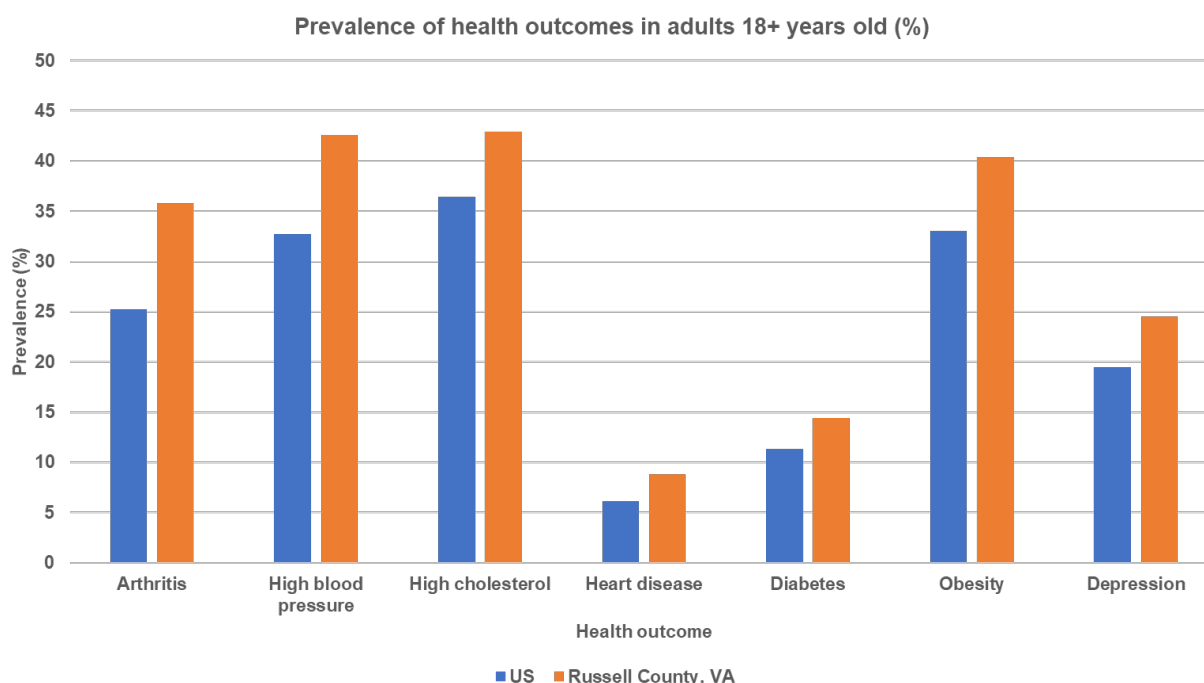


Figure 1, source: CDC PLACES: Local Data for Better Health (2021)

The average life expectancy of Russell County is 73.8 years compared to the Virginia average of 78.1 years and the national average of 77.6 years (University of Wisconsin Population Health Institute, 2024).

Limited access to healthcare is also associated with higher costs for patients. Rural patients must travel greater distances and spend more time out of their day to access certain healthcare services, incurring costs associated with gas, vehicle maintenance, and lost wages. The increased travel burden is associated with reduced access to preventive care, exacerbation of pre-existing chronic conditions, later diagnoses of cancers, poorer treatment outcomes, which can further drive up healthcare costs due to late intervention (Ferdinand, 2021).

Criteria

Three policy alternatives that address the issue of healthcare access will be evaluated against three distinct criteria:

Criterion 1: Effectiveness

Effectiveness as measured by the extent to which the proposed alternative improves measurable health outcomes (e.g., morbidity and mortality rates).

Criterion 2: Cost

Cost as measured by the costs to initiate, implement, and maintain the proposed alternative for five years.

Criterion 3: Feasibility

Feasibility as measured by the extent to which it is practicable to implement the proposed alternative, based on resource availability (the availability of human, financial, and technological resources required for implementing the policy) and stakeholder support (the level of support from key stakeholders, such as local communities, universities, and governments). It evaluates the willingness of stakeholders to endorse and actively participate in the policy's implementation.

Policy Alternatives and Evidence

Three proposed policy alternatives to the problem are described below. They are rated against the Effectiveness, Cost, and Feasibility criteria. Also included is evidence describing how similar alternatives have been implemented elsewhere and factors that influence success of the alternative.

Alternative 1: Leverage university partnerships to target workforce development and recruitment

Alternative 1 proposes creating a partnership between the Cumberland Plateau Health District (CPHD), which includes Russell County, and Virginia universities and medical schools, including the Virginia Tech Carilion School of Medicine and Virginia Commonwealth University (VCU) School of Medicine. It will support the pipeline of rural health workforce development from career exploration and recruitment to medical training.

Strategies that may attract healthcare professionals to rural areas include exposing trainees to healthcare delivery in rural areas through rotations or curricular content tailored to the particular needs of underserved populations; targeted recruitment of health professionals with connections to or experience with the populations in a specific underserved area; and providing personal and professional support to rural practitioners (Streeter et al., 2020).

Establishing and fortifying formal partnerships between institutions granting degrees and local health departments could enhance the availability and accessibility of healthcare opportunities for students and graduates. This approach aims to eliminate some of the logistical barriers to entry for rural healthcare practice. A notable example of a successful university partnership is the Future Public Health Leaders Program at the University of Michigan, which was backed by the CDC and successfully increased the representation of underrepresented groups in the public health workforce through a residential summer program and field experiences (University of Michigan School of Public Health, 2023). Virginia health departments and universities could replicate elements of this model by offering the opportunity to complete field experiences in rural areas during formative schooling years.

Other organizations that have used a pipeline model for healthcare workers include HRSA, the principal federal agency tasked with increasing access to basic medical care for those in underserved communities. It administers various programs to expand services in underserved communities and improve the distribution of the workforce. For example, the National Health Service Corps supports practitioners working in underserved, rural, and tribal areas that are located in HPSAs. This program significantly improves the distribution of a much needed basic health workforce in areas that otherwise would have no such access.

Additionally, HRSA's Teaching Health Center Graduate Medical Education program supports the resident training of future physicians and dentists in community-based settings in rural and

underserved areas. Empirical evidence indicates that physicians trained in these settings are more likely to practice in these same settings upon completion of their training (Streeter et al., 2020).

Effectiveness:

This intervention has the potential to significantly impact health outcomes by addressing workforce shortages and increasing the number of healthcare workers in rural areas. In order to maximize effectiveness for this intervention, there must be a strong partnership between universities and health departments. Characteristics of successful partnerships between higher education and healthcare include a joint development target, agreeing on collaboration, communication, providing resources for partnership, enhancing mutual understanding, sharing operational culture, commitment, and participatory change management (Arja Häggman-Laitila & Rekola, 2014). Expanding healthcare access by increasing the healthcare workforce is associated with better health outcomes, however, it does little to address other issues affecting health outcomes, for example, health literacy. **Alternative 1 rates medium for effectiveness.**

Cost:

The initial costs of this alternative include a dedicated staff liaison to help facilitate formal partnerships and other programmatic costs (e.g., recruiting events, implementing rural health training programs). The cost of a full-time staff member salary is estimated to be \$60,000. This estimate is based on the pay range of similar community coordinator positions currently posted at VDH. After factoring in modest salary increases, the cost of a staff liaison over five years is estimated to be \$330,000. Programmatic costs also include recruiting events targeted at prospective medical and healthcare students and current students who may have had little exposure to rural health. There would be four such events annually, at an estimated cost of \$1,000 each for a total of \$20,000 over five years. **Alternative 1 rates medium for cost.**

Feasibility:

Feasibility depends on the availability of resources such as funding, educational infrastructure, and community support. Partnerships must be sustainable, which has been a complication in past partnerships between Virginia health districts and universities. For example, in 2015 the New River Health District formed a partnership with Virginia Tech, designed to enhance public health instruction, practice, research and workforce development and to improve community health in the health district. However, over the years, the program fell into a state of disuse as it lacked adequate staffing and institutional support. In order for a partnership to be feasible and sustainable, it must have proper support and collaboration.

There is plenty of opportunity for these partnerships and pipeline programs to be successful. For example, in Virginia, VCU has worked to expand the healthcare workforce through various pipeline programs for underrepresented minority students pursuing health careers. While not necessarily a partnership with another institution, it is an example of a successful educational pipeline to grow and diversify the healthcare workforce.

While there have been strong university-healthcare models elsewhere and there are strong pipeline programs in the state, local health districts have struggled in the past to maintain consistent partnerships. As such, **Alternative 1 rates medium for feasibility.**

Alternative 2: Platform Accelerating Rural Access to Distributed and Integrated Medical Care (PARADIGM)

In early 2024, the Advanced Research Projects Agency for Health (ARPA-H), a unit within the National Institutes of Health (NIH), launched PARADIGM, a mobile medical platform that integrates numerous medical devices to address a wide range of health conditions. PARADIGM is designed for large-scale deployment by healthcare systems, particularly in rural and resource-limited areas. This rugged, multi-functional electric vehicle is designed to travel to even the most remote locations. Just as telehealth expanded access to primary and mental health care, PARADIGM seeks to increase access to advanced hospital-level care. The PARADIGM mobile unit travels to the patient, instead of the traditional model of a patient traveling to a healthcare facility.

PARADIGM's mission is to “solve rural America’s most critical health challenges by revolutionizing access to hospital-level care”. This project is projected to last five years, ending in 2030. Its five-year lifespan consists of research, development, initial deployment, and the transition to persisting outside of ARPA-H. This project is still in its early stages; the federal government has currently put out a draft solicitation and will be seeking proposals from contractors in the coming months (Advanced Research Projects Agency for Health, 2024).

A similar mobile medical unit has been operating in southwest Virginia for decades, showing the potential for PARADIGM's success in the region. Founded in 1980, the Health Wagon now travels to eleven towns across southwest Virginia on a weekly, biweekly, and monthly basis. It offers medical, dental, and behavioral health services as well as specialty clinics free of charge. The organization is supported by grants and donations from individuals, corporations, and foundations and has served over ten thousand patients since its inception. PARADIGM can fill an important gap in the Health Wagon's services by providing advanced care and more specialty services.

This intervention proposes building trust and awareness of the PARADIGM program in Russell County, to help ensure high uptake of this program.

Effectiveness:

PARADIGM has the potential to enhance healthcare access, particularly advanced care options, potentially leading to improved health outcomes. PARADIGM will be able to provide services such as advanced imaging tests, multi-cancer screenings, CT scans, and other essential medical services. A platform like PARADIGM would be particularly useful in Russell County, where there are almost no specialty care providers in the county. Expanding advanced-level care has great potential to improve health outcomes. ARPA-H estimates that if 1,500 mobile units equipped with CT scanners

were deployed to rural areas (or one mobile unit per every two counties), the impact of lung cancer screenings alone would be around 41,000 lives saved and \$11.4 billion in economic productivity gained annually (General Services Administration, 2024). Using the assumption that each rural county has similar population sizes and would benefit equally from these mobile units, this would mean around 14 lives saved and \$3,800,000 in economic productivity gained in Russell County from lung cancer screening alone. Considering other functionalities such as screening for cervical cancer and heart disease would further increase economic and health outcomes. As such, **Alternative 2 rates high on effectiveness.**

Cost:

[Evaluate cost of promoting awareness of PARADIGM, health literacy campaigns]

Feasibility:

The feasibility of this alternative hinges on securing the necessary resources for the development, deployment, and maintenance of PARADIGM as well as ensuring resident uptake. This includes technological expertise, financial support, and collaboration with healthcare systems. It is important to note that this project is still in its early stages. The federal government has currently issued a solicitation to contractors to submit proposals for this project. The proposal due date is in late April 2024. Later this year, ARPA-H will evaluate the proposals against four criteria, including scientific/technical merit and reasonableness/realism/funding availability/affordability. Feasibility is baked into ARPA-H's evaluation process. They will only acquire goods or services that meet needs and are within their budgetary constraints.

PARADIGM is a large and complex undertaking, meaning there are more points where failure—technological or organizational—might occur. For example, one major technological challenge of designing PARADIGM is creating a miniaturized CT scanner for use in the vehicle. CT scanners provide an abundance of medical information and traditional CT machines are too heavy and reverberate too much for use in a vehicle.

To help ease the transition of PARADIGM into local communities, ARPA-H's Project Accelerator Transition Innovation Office (PATIO) provides transition support and commercialization support to increase the likelihood that the medical advancements funded by ARPA-H reach its end users at the end of the five years. This helps improve its feasibility.

In addition to the development and deployment of the PARADIGM mobile unit, a crucial component of its feasibility is to ensure that county residents will actually utilize the system. Residents must be aware of this resource and have adequate health literacy to make informed decisions regarding their personal use of this resource. They must have confidence that they will receive high-quality care. Empirical evidence demonstrates that health literacy can be improved by creating a welcoming environment for patients, providing clear and simple verbal and written communication, and improving support for navigating healthcare systems (Seidel et al., 2021). An

important part of building trust within the community is clearly describing what the medical unit is and how it works. It is important to clear any misconceptions regarding the unit. For example, residents may believe that the mobile unit is self-operational or robotized. Emphasizing that the mobile unit will be operated and staffed by human healthcare workers who provide healthcare services may help build trust and uptake. The prior success of the Health Wagon suggests that southwest Virginia residents would be similarly receptive to a mobile unit like PARADIGM.

The project has not yet faced major obstacles and has made timely progress as expected, but due to the longer time horizon, complexity of this project, and number of federal and local actors involved, **Alternative 2 rates medium on feasibility.**

Alternative 3: Maintain the status quo

This alternative proposes maintaining the current state of affairs.

Effectiveness:

As this alternative proposes no intervention, there is no reason to assume that health outcomes would improve. Various health outcomes (e.g., high blood pressure, heart disease) have remained fairly stable over the past few decades in Russell County (Centers for Disease Control, 2023). As such, Alternative 3 rates low on effectiveness.

Cost:

Under the status quo, Russell County would not bear any costs of intervention. Alternative 3 rates low on cost. (However, in the absence of intervention, there are costs associated with not allowing health outcomes to improve. For example, there would be an estimated loss of \$3,800,000 in economic productivity in the absence of adopting PARADIGM to complete lung cancer screenings.)

Feasibility:

Under the status quo, Russell County would continue acting in a similar pattern as in the past. **Alternative 3 rates high on feasibility.**

Outcomes Matrix

	Effectiveness	Cost	Feasibility
University partnerships	Medium	Medium	Medium
PARADIGM	High	Medium?	Medium
Maintain status quo	Low	Low	High

Recommendation

Alternative 2: PARADIGM is recommended for its combination of high Effectiveness, medium Cost, and medium Feasibility. PARADIGM aims to increase access to advanced hospital-level care by bringing it to where residents are. This program would be particularly useful in Russell County, where there is very limited access to specialized and advanced care. PARADIGM will be able to provide numerous services including advanced imaging tests, multi-cancer screenings, and CT scans. The program would reduce much of the costs associated with travel and transportation for advanced care. It is reasonable to think that residents would be receptive to this intervention as a similar mobile health unit, the Health Wagon, has been operating with success in southwest Virginia for several decades. However, the county should still work to raise awareness and build trust for the PARADIGM initiative in its implementation process.

Implementation

To maximize the benefits of PARADIGM, Russell County should focus on maximizing the uptake of PARADIGM.

The county should first identify key actors in the county's healthcare landscape, including local healthcare providers, community health organizations, and CPHD. The county should facilitate meetings and discussions to introduce the PARADIGM initiative and garner support from these actors. These actors can help pass along the information to patients and prospective PARADIGM users.

The county should also focus on community outreach and education. It would be beneficial to utilize multiple channels, including social media, local newspapers, and community events, to disseminate information about PARADIGM. Conducting health literacy campaigns to educate residents about the services offered by PARADIGM and how to access them can also help address any misconceptions or concerns about the program through clear and transparent communication.

The county should also plan to identify suitable locations for deploying the PARADIGM mobile unit within the county, considering factors such as population density, healthcare access gaps, and transportation routes.

Finally, the program is off the ground, regular monitoring and evaluating is important. The county should collect and analyze data to assess the impact and effectiveness (e.g., patient utilization, health outcomes, satisfaction with PARADIGM services). The county should regularly review performance metrics and adjust implementation strategies as needed to optimize program delivery and achieve desired outcomes.