

Telemedicine Business Plan

With medical knowledge expanding every day, no physician can keep up without help. By using high-tech medical communication, high-performance computers, high-resolution video, and fiber-optic information “superhighways,” we have been able to put the entire world of medical science at the fingertips of even the most isolated rural family doctor.

—C. Everett Koop, M.D.

Certain community infrastructure is required for a town to not only survive economically, but thrive. One such component is access to high-quality health care in a timely and cost-effective manner. This initiative takes a multi-faceted approach to enhancing the economic vitality and health of Kansans, particularly in rural areas. First is the ability to provide high-quality medical services in a timely and cost-effective manner to remote areas. This is crucial for a small community to attract and retain businesses and their associated employees. As an example, this initiative can selectively reduce the direct and indirect costs to businesses of health-related absenteeism.

One result of this initiative will be that Kansas is a more cost-effective location for businesses to locate. Also, many business opportunities will emerge to capitalize on business opportunities to scale the initiative and role out to other regions. Based on existing strengths, an opportunity exists in the area to develop new innovative business services that deliver solutions to physicians and patients while serving as a national model for efficient delivery of high-quality health care to urban and rural areas alike.

I. The Initiative—*Develop a fully-integrated, statewide telemedicine and disaster-response infrastructure.*

- Leverage Kan-ed, KanRen and other Kansas telecommunication networks to provide private, low cost, high-speed network access to all hospitals and clinics throughout the state.
- Utilize network for interactive videoconferencing, store-and-forward applications and data transmission for clinical, educational and health administration activities.
- Create an environment in which it is possible for health specialists from around the state (or region) to be accessed via the telehealth network by hospitals and clinics that do not have those specialists locally. (Decentralize telemedicine by obviating the hub-and-spoke model). Specific telemedicine activities include:
 - *Organizational Telehealth*: Telemedicine/telehealth can be provided to employees of large organizations/corporations in Kansas for routine ailments while they are on the job, thus reducing time away from the office and increasing productivity.
 - *School-Based Telemedicine*: Currently provided in Kansas on a limited basis, school-based telemedicine for routine conditions can keep kids in school and prevents parents from leaving work to take their child to a doctor. Health issues are addressed in a timely fashion and expensive emergency room visits for routine illnesses are prevented. Productivity of working parents is increased.
 - *Electronic Intensive Care Unit (EICU)*: It is predicted that a national shortage of Intensive Care physicians will occur in the short- and long-terms. Use of the EICU

will disperse intensivist expertise to a broader range of facilities. Improved quality of care, reduced length of ICU stays and reduced costs will be realized.

- *Phase III Cardiac Rehabilitation*: This technology application increases the rate of recovery from a CV event, reduced relapses and reduces costs over a geographic area.
- *Chronic Disease Home Monitoring*: Home monitoring of patients with chronic diseases reduced hospitalizations, reduces costs, improves care and increases patient satisfaction. Medical management becomes continuous instead of episodic.
- *Teleradiology*: One of the most widely used telehealth applications, teleradiology is an electronic means for providing radiology services locally, regionally and even globally. It improves care, drastically accelerates diagnostic decision-making and significantly reduces costs.
- *Interactive Clinical Consultation*: Patients in remote or otherwise underserved areas can visit with their physicians in real-time from a distance. Significantly improves access to health care, health conditions are managed earlier and travel time and costs are reduced for both patients and physicians.
- Utilize the network for interactive video or webcasting of continuing medical education (CME), continuing nursing education (CNE) and allied health educational events that can occur between any facilities that wish to share those programs.
- Through network availability, facilitate electronic health record (EHR) and Picture Archiving and Communication (PAC) system development around the state. These systems, particularly EHRs, are critical for reducing medical errors and the associated high costs of these errors. Additionally, the development of interoperable EHRs in the state is necessary to effectively integrate preventative health, health treatment and health information exchange and has a high level of commercial value. Other benefits of EHRs include:
 - *Improving the quality of care delivered* - helping to ensure that patients with chronic disease receive all of the appropriate care (evidence-based care) known to reduce the risk of cost-consuming morbidity and mortality;
 - *Improving the cost-effectiveness and efficiency* of delivering care at the point of care;
 - *Facilitating the coordination of patient care*, by improving access to patient information at multiple points in the delivery system, reducing redundant testing and reducing costly delays in delivery of service;
 - *Reducing variation* in aspects of care, leading to inefficiencies in delivery of services.
 - *Revenue-generation* via enhanced reimbursement due to more accurate documentation of all the care being provided.
- Develop a real-time telehealth sensor information network for collection of personal health information at remote, rural areas. Integrating this personal health information into safe, secure, and mobile patient records will permit more complete medical records to be used by doctors to diagnose and treat remotely located patients.
- Develop a personal health medical records system that secures personal data from access by unauthorized personnel, makes the personal health record accessible to the patient at all times (remotely) through digital signature technology, permits the mining of data to diagnose disease and successful treatment patterns across a cross section of patients, and integrates the rural doctor's records systems with reliable servers for central or distributed medical database servers.

- Integrate the network with other technology-based initiatives, such as disaster response, agro-terrorism response, and other health professional training or response activities.
- Leverage network to begin developing a population-centric model of health care that builds on the current patient-centered model.

II. Describe the Long-Term Goal—*The long-term goal is to develop a health care infrastructure that serves as a national model for access to health care, loss-prevention, and community sustainability.*

- a. A healthy state population correlates with a healthy economy. In addition, improved viability of local hospitals and clinics improves the viability of local communities, thus increasing the potential for economic growth. Reducing health care costs to the state and to private industry would be an effective promotional tool in drawing private industry to Kansas.
- b. Extended medical monitoring of human health (through sensor information networks) improves care outside the physician's office, clinic, and hospital (including remote areas in Kansas)
- c. The state of Kansas has an active telemedicine program involving KU Medical Center, multiple hub sites and dozens of smaller, rural facilities around the state. Kansas also has several high-speed internet networks, including KDOT fiber, with significant bandwidth that is currently uncoordinated and under-utilized.
- d. Additional videoconferencing and peripheral telemedicine devices are needed at each participating hospital or clinic around the state.

III. Describe Impact on Innovation Lifecycle

Telemedicine conceptualization and formation has been ongoing in Kansas since the early 1990's. This business plan would lead to more rapid growth and development of the infrastructure and service—especially EHR and remote sensor components--while potentially attracting more health care professionals and network developers to the initiative.

IV. Describe Impact on Innovation Attributes

An expanded telehealth and health-response infrastructure will 1) increase access to health care for underserved areas, thus 2) improving the health of state's human capital, and 3) improve state's financial capital by reducing state health care expenditures and improving preventative health care, providing earlier treatment and preventing many costly health conditions. Cost savings realized by this venture will allow reallocation of dollars by the state and other employers to provide coverage for the uninsured (a cost currently borne by the state and healthcare providers – hospitals), and for supporting development and growth of other parts of our economy.

V. Describe the Implementation Strategy

- Kan-ed and other state networks need to be integrated to connect more hospitals and clinics with high-speed connections at affordable rates. Hospitals and clinics then can be outfitted with videoconferencing and telehealth equipment. Current telehealth expertise from KU Medical Center, Hays Medical Center and Kan-ed can be leveraged to coordinate the telehealth aspects of the statewide network. For the health and/or disaster response

component, additional expertise from KU-Lawrence, K-State, Wichita State and other entities involved in current response initiatives can collaborate.

- Developing a sensor information network to collect patient information remotely requires research into 1) integration of real-time patient data with patient records, 2) high assurance software to collect valid sensor measurement and interconnect the sensor information network to patient records, and 3) security of patient record flow. Again, this is an additional multi-million dollar research program.
- Development of the sensor information network requires basic research in:
 - **Biomedical Sensors:** Development of small, low-power, wireless, plug-and-play sensors for monitoring physiological, activity, and environmental parameters.
 - **System-Level Network Capabilities:**
 - Development of energy-aware and secure multiple-access topologies and wireless communication strategies.
 - Information-reduction and data compression approaches.
 - Tools for automated deployment of software on remote devices.
 - On-the-fly reconfiguration of software and hardware, including the rules of engagement necessary to construct safe and secure ad-hoc networks.
 - Development of high-assurance software to control these systems.
 - **Information Storage and Analysis:** Models and data mining tools to analyze the large volumes of collected data to arrive at an appropriate response.

VI. Describe the Resource Requirements

- a. Ideally, a telehealth and disaster-response committee comprised of state and local leaders from these initiatives would lead the short and long-term implementation of this infrastructure.
- b. Numerous state networks already afford high-bandwidth throughout the state. Integration of these networks is recommended for reduced costs and ease of use.
- c. Additional equipment at hospitals and clinics is required at an estimated rough cost of \$5000-\$8000 per location. The initial investment for most existing equipment sets in the state was provided by state or federal grants.
- d. Once operational, network can be promoted regionally and nationally as a vehicle for delivering high-quality health care and reducing health care costs. Could attract research and/or technology oriented health professionals and health IT industry. Might also attract industries interested in reducing their health care costs for employees.
- e. Significant research expertise exists through Federal NSF funding of sensor information networks at K-State in the Colleges of Engineering and Veterinary Medicine. Faculty in these two colleges are continuing to secure extramural funds to develop these sensor information networks

- f. Expertise in medical records exists at the KU Med Center. Expertise in security and high assurance software exists (and has national reputation) in the Department of Computing and Information Sciences at K-State
- g. A collaborative research group of KU Med Center doctors and researchers and K-State engineers and veterinary medicine scientists would need several million dollars to develop this sensor information network technology. Some of this can be funded through federal grants, but the Kansas legislature should invest in this health care initiative to protect the health of its citizens and to enable new small businesses in medical health care software

VII. Describe Sustainability

Networks and bandwidth already exist in Kansas and are sustained through legislated funding or service fees. Better coordination and integration of these networks could actually result in reduced administrative costs, therefore enhancing sustainability potential. Also, once deployed, telemedicine equipment can be maintained and updated by local facilities as needed via cost-savings reallocations or equipment usage fees.

VIII. Performance Metrics

- Improved health of Kansans as measured by reduced health care expenditures.
- Increased access of health care specialists to underserved areas as measured by patient consultations by county.
- Increased federal and state investment in disaster-response programming and collaboration.
- Increased private investment into telehealth IT and service.
- Retention of current health professionals and recruitment of future providers.
- Increased recruitment of industry to the state as the result of reduced health care expenditures for employees.
- National leader in statewide telehealth and disaster-response infrastructure and innovation.