

INTEGRATION OF A MOBILE HEALTH CARE SYSTEM TO DELIVER PRIMARY CARE TO THE RURAL AREAS OF ARKANSAS

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ABSTRACT

This research project analyzed the concept of the integration of a mobile health care system to deliver primary medical care to the rural residents of Arkansas. The system was envisioned as hospital based and providing medical services to enrolled members through a health care cooperative established by a regional rural electric cooperative for its members.

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SIGNIFICANCE OF PROJECT

The role of a rural electric cooperative is expanding beyond basic electric service. It has been suggested by a statement submitted to the U.S. Senate Small Business Subcommittee on Rural Economy and Family Farming that the federal government should support cooperative efforts to provide or assist businesses that provide water and sewer, telecommunications, health care and transportation. At the 52nd annual meeting of the National Rural Electric Cooperative Association (NRECA), Secretary of Agriculture Espy encouraged rural electric cooperatives to expand services into community development. At the same meeting, Administrator Beyer of the Rural Electrification Administration urged rural electric leaders to make local economic development one of their top priorities.

Because of their limited populations, rural areas have problems in creating and maintaining accessible, affordable health care delivery. Currently, the NRECA offers health insurance to cooperative employees and their families. It has been suggested to members of Congress that this health insurance could be expanded to include consumers of the rural electric cooperatives. This suggestion to offer health insurance to cooperative consumers has been adopted by the officials at the NRECA. Each of the 1,000 cooperatives would decide individually whether to offer the NRECA health insurance to its consumers.

INTRODUCTION

The American people are greatly concerned with the accessibility of health care in terms of availability of appropriate facilities and services at prices they can afford. The delivery of health care has changed significantly in this country over the past three decades as advances in health sciences are transformed into health service. The hospital, perhaps the most important component of our health care system, contributes to this country's health goals by providing good patient care through high-quality hospital services.

For emergency, acute medical care, there has been the deployment of Emergency Medical Systems that involve the use of highway and air transportation. These transport systems extend the accessibility of hospitals to patients. For short term acute care for one rural community, one metropolitan hospital in Fort Worth, Texas used its air ambulance daily to deliver health professionals to a remote, small hospital where it would not be economical to provide full-time (24 hour) medical support. Other metropolitan hospitals have made agreements with smaller, rural hospitals to provide technical support by furnishing MIR (Medical Imaging and Radiology) equipment housed in trailers for off-site (mobile) use. Small clinics without access to health care personnel and equipment provide elementary medical care.

In many rural areas, the travel time to a facility capable of providing substantive health care services can be extensive. This poses problems in particular for elderly people and others in these areas who require routine medical care on a regular basis. In many parts of Arkansas, travel time is further increased by physical terrain features and roadway infrastructure.

STUDY OBJECTIVE

The objective of this study was to analyze the concept of the integration of a mobile health system to deliver routine medical care to patients living in the rural areas of Arkansas. The mobile health system was envisioned as hospital based and providing medical services for chronic and short term acute care on an outpatient basis. In the analysis, the feasibility of the concept of expanding the accessibility of medical services from a central hospital to those living in rural areas within a geographical region was addressed.

The developmental plan for the study objective has been defined as tasks to be completed in the following sequence:

- Task 1: To search out and document at least four regional health care systems in the United States whose underlying principles of operation would be similar to that of providing rural health care.
- Task 2: To analyze the capabilities and constraints for each system documented.
- Task 3: To define demographics, geographical regions of Arkansas and the location of hospitals within the state.
- Task 4: To define a general configuration of a regional mobile health care system that would be applicable to Arkansas.
- Task 5: To review the general configuration of a regional mobile health care system with those persons in Arkansas who could develop and implement regional mobile health care.

REGIONAL HEALTH CARE SYSTEMS

The first task of this study was to search out and document regional health care systems in the United States whose underlying principles of operation would be similar to that of providing rural health care. The systems that were found and documented were grassroots systems meeting the health care needs at the local level, the community or the county level.

St. Michael Hospital (Texarkana, Arkansas) established a mobile health system for the rural areas of Southwest Arkansas in 1987. The mobile nurse unit provides limited medical services and health education to areas (cities, towns and villages) without a hospital, doctor or health clinic within a fifty mile radius of the sponsoring hospital. There are 20 sites visited on a schedule set to the needs of each community. Each site is visited for at least four hours and at a time period best suited for the community, which could be Saturday and Sunday. Typically, the best days of the week are Tuesday, Wednesday and Thursday, but demand for medical service has increased the schedule to five days per week. The communication between mobile unit and hospital is by cellular telephone.

Sixteen hospitals, associated with the same religious order, in the Houston Metroplex and Southern California are using the St. Michael system, as an example, to institute local programs for medically underserved neighborhoods. For example, St. Joseph Hospital (Houston, Texas) has a mobile health care program, operating less than one year, for the Spanish speaking population near the Houston harbor. Churches within this area have been requesting that health education, limited medical services,

and immunizations be performed for the elderly and children.

The two previous examples of a mobile medical facility have one to three member staffs, composed primarily of registered nurses. The staff manning these mobile units provide free health services and education, which includes well-baby and child checkups, immunizations, treatment for minor illness and injuries, prenatal screening, testing for cholesterol and blood sugar, blood pressure and hypertension instruction, ostomy care, colorectal cancer screening, breast examination and nutritional and diabetic instruction.

The Arkansas Department of Health Management Area I that consists of the nine counties of Northwest Arkansas has recently (April 1994) begun to operate a mobile health clinic from the Fayetteville Health Unit. Appointments are made using a 1-800 telephone number to contact the business office. When the mobile clinic is operating, a cellular telephone is used for communications. The emphasis is presently to provide health education and immunization to immigrants and working poor in the industries of Northwest Arkansas. This mobile unit is the only one presently sponsored by the Arkansas Department of Health.

In the Dallas Metroplex, the Dallas County Hospital District (Parkland Memorial Hospital) has instituted nine primary care clinics for medically underserved neighborhoods within Dallas County. Presbyterian Hospital of Dallas has a joint venture with the Dallas County Hospital District in establishing a primary care clinic for the neighborhood nearby to the Presbyterian Hospital.

In Boston, Massachusetts, a mobile facility is used as an office for a child psychologist who is working with children requiring psychological help. As the mobile facility moves from neighborhood to neighborhood, members of the child's family are available for consultation since the mobile facility is near the child's home. The mobility eliminates the transportation costs and time spent in getting a child to and from sessions.

There is an excellent example in the Houston, Texas area of the importance of telecommunications. For the past five years, without leaving his office, a Nephrologist has seen his kidney-dialysis patients who are having their treatment at a small hospital 50 miles away. The hospital in a small town north of Houston had been closed previously, but reopened for kidney-dialysis. Patients drive to the hospital in the small community and not to a hospital in Houston with the Houston traffic. Every two hours throughout the day ten patients or less have an appointment for dialysis. A telephone, video camera, two color monitors and a computer mounted on a mobile cart at the doctor's office and at the hospital allow real time communications between doctor and patients. With the help of a nurse, each patient can see and talk to the doctor and the doctor can see and talk with each patient during treatment. The doctor can see more patients during a day, for the driving to and from the hospital has been eliminated.

CAPABILITIES AND CONSTRAINTS

There are five issues that must be considered in the evaluation of a mobile medical care system: location of potential clients, types of medical services made available, mobile locations needed, staffing of health care personnel, and the utilization/economics to have a viable system. These issues can be addressed in an evaluation of the mobile health system of St. Michael Hospital.

The potential clients are those people living in a medically underserved area, without hospital, doctor or health clinic, within a 50 mile radius of the hospital. The client population are the poor and elderly who otherwise would not seek medical care and whose access to health care is limited.

The medical services made available emphasize wellness, health maintenance and prevention of illness through free health screening. The philosophy of the medical services provided is to promote the concept that individuals are better able to maintain their good health and prevent complications of chronic disease if they have an understanding of healthy lifestyles, preventive health care and their own individual needs for care.

Some of the typical services offered are:

1. blood pressure screening and hypertension teaching
2. cholesterol screening and low cholesterol diet instruction
3. glucose screening and diabetic instruction
4. hemoglobin screening
5. sickle cell screening for children
6. ostomy care and teaching, prevention of decubitus ulcers, skin care and nutrition
7. colorectal cancer screening
8. breast self-examination screening
9. pediatric health screening which includes vision, hearing, blood pressure, dental and scoliosis
10. well-baby checkup to include developmental and nutritional assessments and immunization status

The mobile health system serves six counties in Southwest Arkansas, with one to three communities within each county. Typically, a mobile location in these communities can be the city hall, a fire station, a senior citizen's center, public and private schools and church buildings of different religious organizations. Posters about medical services available are displayed by a contact person in each community to inform the public of the date and time of a site visit. Local media (newspaper and radio), local businesses and schools are also contacted to disseminate information.

The mobile health system is typically staffed by two registered nurses and a driver who is Spanish speaking and has been trained to perform certain laboratory functions. The registered nurses are usually

nurses whose hospital positions do not require personnel to be called in as replacements, but part-time nurses are sometimes required to fill in. Since the staff members supporting the activity of the mobile unit are registered nurses, the mobile health system should be called a mobile nurse unit.

Since its inception in the later part of 1987, utilization of the mobile health system has been increasing yearly as the program gains acceptance by the participating communities. Three days per week was a normal utilization in the past, but the demand has increased to a five day per week schedule.

Since it is the mission of St. Michael Hospital to provide health care services and programs which will contribute to the physical and psychological well-being of the citizens of the four state area (Arkansas, Texas, Louisiana and Oklahoma), the recurring expenses for the mobile nurse unit (personnel, equipment, supplies, data processing for record keeping and patient information, and vehicle insurance) are absorbed into the operating budget of the hospital. A grant was obtained to purchase the mobile unit. The health screening for the clients is free.

A mobile health care system, such as St. Michael Hospital, is constrained as to what services can be performed due to the absence of a physician in the system. The mobile nurse unit did have the services of a physician's assistant for a short time but the problem of authorization to prescribe medication required considerable communication between the mobile unit and a physician at the central hospital. The experiment with a physician's assistant did highlight the fact that with the inclusion of a physician, the mobile system can expand the availability of the medical services tremendously. With a physician and a telecommunication system linking the mobile unit with the central hospital, the mobile nurse unit can become a mobile medical service center.

ARKANSAS HOSPITALS

In Arkansas, the delivery of health care is a grassroots system. The greatest share of the health care delivery is based at the local level, in the community and county. Within the 75 counties of Arkansas there are 78 hospitals capable of participating in a mobile health care system. The number of hospitals and the total hospital beds, defined by county in Figure 1, are general medical/surgical hospitals. These may be owned/operated by a city, county, or non-profit religious order, or they may be investor-owned. All can participate in contractual agreements with other organizations. The 78 hospitals were identified using the 1994 Institutional List of the Arkansas Hospital Association and the 1993 Hospital Listings of the American Hospital Association Guide.

The Arkansas Department of Health has formed ten management areas to assist in the delivery of health care services to the various regions of the state. These health management areas are groups of counties selected for geographic contiguity, similarity of demographic characteristics, transportation infrastructure and health problems. The regional health management areas are displayed in Figure 1 as shaded areas with each county population taken

from the 1990 United States Census. The population in each county represents urban, suburban and rural residents. In the Appendix, each health management area is further defined by the name of each area hospital, its location, bedsize, the number of physicians and electrical distributors.

ARKANSAS COOPERATIVES

The identification of rural residents and their location within Arkansas can be a difficult task, until one considers that those served by the consumer-owned rural electric cooperatives are largely rural residents. The rural electric cooperatives had their beginning when the Rural Electrification Act of 1937 made available low interest capital for centrally distributed electrical networks to supply electricity for farms and homesteads throughout the United States. The Rural Electrification Administration (REA), the 57-year-old U.S. Department of Agriculture agency, oversees the lending of money to the local cooperatives to build and maintain their electrical networks. Today, there are 1,000 consumer-owned rural electric cooperatives in the United States.

There are seventeen electric cooperatives within Arkansas serving approximately 306,700 customers who are suburban and rural members of their local cooperative. Each cooperative is a non-profit electric distribution system owned by those who are served. A member in a cooperative is an owner/customer -- in essence, a stockholder in a company.

Another purveyor of electricity in Arkansas is the Arkansas Power & Light Company (AP&L), a subsidiary of the Entergy Corporation. This company has 600,642 customers statewide with rural residence customers totaling 196,399, which is approximately 33% of the company's total customers within Arkansas. Rural residence customers were defined by AP&L as those living in communities of less than 3,000 persons.

Figure 1: Hospitals and Total Beds by County

The total number of rural residences in Arkansas is approximately 503,099. The number is inflated because some of the membership of the cooperatives include suburban residence members. In general, the cooperatives serve approximately 61% of the rural residences and AP&L serves the remaining 39%.

The name of each electrical distributor within Arkansas serving rural residences is displayed in Table 1 and additional information can be found in the Appendix as to the location of each central office and the approximate membership. The information contained in Table 1 highlights the fact that sixteen cooperatives are operating in three or less health management areas, with four cooperatives within one area, ten cooperatives within two areas and two cooperatives within three areas. The spatial relationship between the service areas of the cooperatives and the health management areas is a favorable match.

In Figure 2, the spatial relationship between the hospitals defined in Figure 1 and the electrical distributors of Table 1 is displayed. The information contained in Figure 2 reinforces the conclusion concerning the favorable match between the service areas and the health management areas.

REGIONAL MOBILE HEALTH SYSTEM

The development of a regional mobile health system shall require a partnership between an interested hospital or hospitals and the cooperative that provides the electric service within the region.

This partnership will probably require the development of a health maintenance cooperative (HMC) which, when organized, would assure the delivery of coordinated health care services to a voluntarily enrolled group of persons under some type of payment plan. There can be many structural forms for an HMC, but all will require that the following elements be provided:

1. Health care services with an emphasis on preventive health care without underemphasizing acute medical treatment.
2. A contractual agreement under which individuals or a group of individuals can voluntarily enroll as members of the HMC.
3. A payment plan for which the organization (HMC) is committed to provide health care service for one or more years.

For those electric cooperatives that are considering extending health insurance to cooperative members, the HMC should have a favorable influence on the cost of health insurance. The benefits derived from the creation of a regional HMC to serve the rural residents would cause a ripple effect of viability to the rural region.

Table 1: Spatial Relationship

ELECTRICAL DISTRIBUTORS	HEALTH MANAGEMENT AREA									
	1	3	4	5	6	7	8	9	10	11
AP&L	X	X	X	X	X	X	X	X	X	X
ARKANSAS VALLEY	X	X								
CARROLL	X	X								
OZARKS	X									
PETIT JEAN	X	X							X	
FIRST		X	X		X	X	X	X	X	
RICH MOUNTAIN			X	X						
SOUTH CENTRAL			X	X						
SOUTHWEST ARKANSAS			X	X	X					
OUACHITA				X	X					

C & L	X	X				
ASHLEY-CHICOT		X				
WOODRUFF			X	X		
CRAIGHEAD				X		X
MISSISSIPPI COUNTY				X		
FARMERS					X	X
NORTH ARKANSAS					X	X
CLAY COUNTY						X

Figure 2: Hospitals and Electric Service Areas

Before the partnership of an HMC can be formed, several determinations must be made as to

feasibility:

1. Development of a preliminary list of health care services to provide
2. Interest of cooperative members and their requests for additional services through general client profiles
3. Development of preliminary configuration of the mobile medical center as to staffing by health care professionals, equipment, supplies, etc.
4. Development of a price/cost system for the health care services
5. Presentation of the price/cost system of the HMC for the acceptance/rejection by the cooperative members.

If accepted by the cooperative members, the development of a regional, mobile, preventative health-care, health maintenance cooperative can proceed. In some cases, an electric cooperative might use more than one hospital to provide health care services to members. In other cases, one hospital may serve more than one electric cooperative.

MOBILE HEALTH CARE MODEL

The general configuration for a mobile health care system must involve mobility, information technology and telecommunications. The importance of mobility can not be underrated for it will give the system the flexibility to deliver health care services where rural residents are located. As changes are required in the services provided, the system is not confined to one or more fixed locations. Information technology can be used to administer the system more effectively, such as using computerized medical records and histories of patients and a central appointment schedule using a 1-800 telephone number. Telecommunications between the central hospital and the mobile medical center can use electronic communication technology, such as using computer/telephone video transmission, FAX and digital/voice paging.

The proposed model envisioned for the mobile health care center is similar to the St. Michael system, previously presented in the sections of Regional Health Care Systems and Capabilities and Constraints. The selection of mobile sites would be easier to define because the number and location of participating members of the HMC would be known so that travel time and distance to the mobile site could be minimized. With a knowledge of the participating members at each mobile site, the staffing of health care personnel and services to be provided could be more specialized.

The mobile health care system must include the following staff: a family practice or internal medicine physician, registered nurses, laboratory and radiology technicians. As the need arises, physicians with other medical specialties could be included. The registered nurses who will have the most patient contact will set the standard by which patients will judge and determine their satisfaction with the system. The diagnostic services performed by the laboratory and radiology technicians are also a key element in the system because they provide important diagnostic information to the physician and nurses.

With the use of computer/telephone video transmission, the physician, located at the hospital, could give instructions to the registered nurses, laboratory and radiology technicians in the mobile center and see patients as well. Persons at the mobile center could also converse with the physician at the hospital.

In the Appendix, for each health management area there is a list of medical/surgical hospitals segregated into two classes: those hospitals with 99 or more hospital beds and those hospitals with 98 or less hospital beds. This is not an arbitrary division: all 78 hospitals were evaluated as to their services and facilities as documented in the 1993 American Hospital Association Guide to the Health Care Field.

The criteria for the division were the availability of an emergency department, laboratory and radiology services, and other medical specialties. The presence of an active emergency department is an indicator of the total number of physicians who use a hospital for their patients. The match between the total number of physicians available and an active emergency department at a hospital could serve as a good indicator that the development of an HMC at this hospital would be more feasible than at a small hospital.

CONCLUSION

The study has documented several regional health care systems that have been developed and are operating presently. The capabilities and constraints of one regional health care system has been analyzed. All of the systems documented have been considered in the development of a general configuration for a mobile health care model. A generic model was presented so that each health care cooperative developed within Arkansas would have a common structure but implemented uniquely for its region.

The development of health care services in Arkansas must be a grassroots process. The 17 electric cooperatives, in partnership with some of the 78 hospitals identified in this report, have the opportunity to take the leadership role in the development of a regional mobile health care system for the state.

APPENDIX

