

**U.S. DEPARTMENT OF COMMERCE
National Telecommunications & Information Administration**

Evaluation of the
Telecommunications and Information Infrastructure Assistance Program

Case Study Report

**Mobile Community Health Information Network
95002**

Mobile, Alabama

Site Visitors:

Barbara Kapinus and Laurie Somers

Dates of Visit:

February 26-27, 1998

PREFACE

On behalf of the National Telecommunications and Information (NTIA), I am pleased to share the following report that is one of a series of case studies conducted on grants awarded by the Telecommunications and Information Infrastructure Assistance Program (TIIAP) in 1994 and 1995. The case studies are part of the program's evaluation effort designed to gain knowledge about the effects and lessons of TIIAP-funded projects. NTIA contracted Westat, a research and consulting firm, to perform an independent evaluation of the program's first two years of grants. The evaluation consisted of a mail survey of 206 grant recipient organizations and in-depth case studies of selected projects. In February, 1999, the Commerce Department released Westat's evaluation report.

The projects selected for the case studies cover a broad range of program types and sizes, planning grants as well as demonstration grants, and they show varying degrees of implementation, sustainability, and replication. Westat selected the projects to represent a cross-section of all projects funded in the program's first two years. Specific selection criteria included geographic region, target population, project application area, project category, and size of award. To conduct each case study, Westat reviewed all project files, including progress reports and the final report, and conducted site visits. The site visits consisted of project demonstrations and interviews with project staff, representatives of partner organizations, and project end users.

NTIA thanks the case study participants for their time and their willingness to share not only their successes but their difficulties, too. Most of all, we applaud their pioneering efforts to bring the benefits of advanced telecommunications and information technologies to communities in need. We are excited about the case studies and lessons they contain. It is through the dissemination of these lessons that we extend the benefits of TIIAP-funded projects nationwide.

We hope you find this case study report valuable and encourage you to read other TIIAP case studies. You may obtain additional case studies and other TIIAP publications, including the final Westat evaluation report, through the NTIA web site (www.ntia.doc.gov) or by calling the TIIAP office at (202) 482-2048. We also are interested in your feedback. If you have comments on this case study or suggestions on how TIIAP can better provide information on the results and lessons of its grants, please contact Francine E. Jefferson, Ph.D. at (202) 482-2048 or by email at fjefferson@ntia.doc.gov.

Larry Irving
Assistant Secretary for Communications and Information

TIAP CASE STUDY

Mobile Community Health Information Network

A. EXECUTIVE SUMMARY

The Mobile Community Health Information Network (MCHIN) is a high-speed computer communications network linking professionals in community health clinics to the University of South Alabama (USA) wide area network (WAN). USA utilizes an integrated health care delivery system of hospitals, outpatient clinics, primary and specialty physicians, and a medical college. MCHIN was established to provide the clinical professionals serving disadvantaged citizens in the Mobile community and the USA physicians and staff with the following:

- Access to the Internet;
- e-mail;
- Clinical information systems;
- Library information;
- Patient information; and
- Medical research databases.

A communications network was established through the Computer Services Center of the University of South Alabama (USA). The network included the following:

- The Mobile County Health Department – five locations
- Franklin Memorial Primary Health Care Center – five locations
- Mostellar Medical Center – two locations
- USA physicians – 26 departments
- Southwest Alabama Health Education Consortium
- Bayside Orthopaedic and Rehabilitation Center
- Pulmonary Associates of Mobile

During the grant period, 14 community health care centers were connected to MCHIN. The project staff installed 24 new personal computer systems in three federally qualified community health care centers. They also connected additional health care users who supplied their own computer systems. New data communication circuits and network equipment were installed at each of the community health care sites. A total of 132 health care users were connected to MCHIN. Project staff also connected 134 USA physicians and staff to MCHIN via direct-wired Ethernet or token ring adapters (described later). Staff

made network enhancements at several sites to accommodate more users. Most of the USA users received training in one-on-one contexts.

It is clear that the network established by this project has enhanced the access of physicians to medical information both for sharing with patients and for their own use. More than one physician interviewed indicated that the network allowed for more efficiency in getting and sharing information. The communication through the frame-relay technology (described later) was especially helpful and would not have been available without the project. A lack of usage statistics makes it difficult to estimate the impact on health care providers and their specific uses for the system. However, future plans include implementing a system by which all medical records, billing records, and other health care information will be available on line through the network, which would not be possible without MCHIN. Several of those interviewed implied that the real benefit of the MCHIN connections will be realized once this system is in place. Additional funding has been secured for the system, but it will not be administered under the same project director. Continued support for users outside of the USA Hospital System is questionable since there is currently no formal mechanism for it. The considerable effort invested in developing sound relationships between the USA hospitals and the individual community health centers may be lost unless the centers are kept alongside the hospitals in moving forward with the technology.

Several problems also occurred. There were some problems with the telephone company not installing compatible lines. Lines were not turned on where they were supposed to be, and others were cut off during routine maintenance. Staff found that the phone company gave a higher priority to frame-relay and broad-band circuits, rather than the regular lines used for modems.

There were some problems with the quality and level of service in that they were somewhat site dependent. The project did not have the capability to provide the needed support for all users. With both token ring and Ethernet connections, the help desk found it difficult to support so many different computers.

The project generated many lessons that may assist other similar projects. The primary lessons from the project were related to understanding the technology and the establishment of sites. Computers located in physicians' offices or near clinic staff workstations were used most frequently. It became evident that the frame-relay data communication circuits, while initially expensive, were cost effective in that they were speedy and resulted in frequent network use. The dial-up configuration was inexpensive at first but ultimately limited the expansion of workstations. In addition, some of the business analog lines in rural areas were unreliable, and frame-relay circuits would have been a more effective approach.

The project also found that using standard technologies was best. Standard software, hardware, and operating systems are the most easily maintained and supported.

Some lessons about training methods were also learned. Training at sites was sometimes ineffective because the "superusers" identified by managers at the sites were not themselves highly familiar with the technology and did not view training and support of colleagues in technology as part of their primary responsibilities. Training of physicians was limited because they seldom wanted to commit more than an hour to training but actually required more time to become proficient in using the technology and the network.

B. OVERVIEW

Purpose and General Approach

The MCHIN project was developed to address the following problems:

- Lack of integration of health care information among health care providers
- Time-consuming delays in obtaining medical records
- Duplication of tests and procedures due to lack of timely patient information
- No access to Internet medical resources
- No e-mail among providers
- Lack of up-to-date online clinical information databases
- No online access to medical research databases.

These problems are especially critical to providing health care to the needy populations around Mobile, populations that include several distinct subgroups from both urban and rural settings.

By establishing a network for providers, the MCHIN project sought to achieve the following goals:

- Provide better health care for the medically underserved segments of the Mobile area through the integration of medical record information among the health care providers;
- Provide clinicians access to locally available clinical data bases;
- Provide clinicians access to national medical databases and communications via the Internet;
- Reduce the cost of providing health care for the low-income community through coordination of health care among providers; and
- Continue the planning process for the purchase of sophisticated software to support a community-wide, computerized patient record.

The MCHIN project brought physicians and community health care providers on line through the University of South Alabama (USA) system of computer services. In some cases, both the availability of the technology, and its speed were advantages not otherwise available to the project partners.

The users of the MCHIN technology are the 266 doctors, nurses, hospital and clinic staff, and other health care workers who were connected to the network. The project does not have statistics on the number of end users who actually use the network to access and share medical information. However, there was no Internet access from the rural areas outside Mobile before the project began. Even if they had the computer hardware necessary, the health care workers in these areas had no access to online medical information that can assist them in caring for patients. MCHIN planned to have “superusers” who would receive direct services from project staff. MCHIN staff would train a superuser at each site, and

using a trainer-of-trainers model, the superusers then would train other staff. Due to a lack of follow-through on the part of the superusers and their supervisors, this did not occur as widely as intended.

The ultimate beneficiaries of the MCHIN project are the over 100,000 patients, the uninsured families, Medicaid recipients, and poor populations of the Mobile area who are served by the health care systems that are part of the MCHIN network. The project benefited traditionally underserved populations in that it focused services on health care centers that treat urban and rural poor, including culturally diverse groups such as Native Americans and immigrant Asian fishermen. These patients typically receive care within the USA network of hospitals and health clinics at two or three different locations. They may see a primary care physician at a local clinic, but be referred to an OB/GYN at one hospital and receive acute care at another. MCHIN helped doctors working with these populations operate more efficiently and access and share information more readily.

Description of Grant Recipients and Project Partners

Grant Recipient. The grant was awarded to the USA to be managed by the University of South Alabama Center for Health Information, a university-based center composed of health science and information specialists employed by the university. The computer science professionals from the Computer Services Center of USA, who were responsible for establishing the MCHIN and training users, had already helped to establish the USA wide area network. This project built on the USA network and the expertise and resources already in place.

The key personnel included the project director, who is currently the Webmaster at USA and has extensive experience both in putting in place technology for networks, training network users, data processing, and keeping client records in computer systems. He spent about 15 percent of his time on the project. His salary was part of the matching funds provided by the university.

Early in the grant period, an applications specialist was hired. The applications specialist installed equipment, coordinated with the computer services center the configuration of machines, installed software, set up e-mail and server accounts, and trained users. His salary was entirely supported by MCHIN, and consequently, when the grant ended, his position ended.

The project also hired a secretary who prepared a monthly MCHIN newsletter, arranged project meetings and clinic visits, and coordinated help desk support. Like the applications specialist position, the secretary position was funded by the TIIAP grant and ended with the grant period.

Additional personnel employed by the Computer Services Center included a programmer, systems analyst, automation specialist, manager of technical computer support, operations specialist, client coordinator, and associate director. Each dedicated 5 to 10 percent of their time and provided services to USA physicians and clinics. Through the life of the project, the applications specialist hired by MCHIN appeared to undertake the duties initially intended for these personnel.

The South Alabama Health Information Consortium was established to provide oversight, monitor the project on an ongoing basis, participate in the evaluation of the project, and provide recommendations on disseminating health information. It comprised administrative and medical leadership within USA, the other health care partners, and consumer representatives. The group met several times but discontinued regular meetings once the project had made its major decisions.

Project Partners. The project partners were the health clinics and USA affiliates who provided matching funds to connect their offices and who received training by the project staff. They included the following:

- The Stanton Road Clinic provides care to the disadvantaged and serves as an outpatient residency teaching site for the USA College of Medicine.
- The USA Hospital System consists of three centers that provide a large amount of uncompensated care to disadvantaged patients.
- The USA Health Services Foundation is a nonprofit, educational, research, and charitable organization that supports the university through activities in health services, research, and education.
- The Mobile County Health Department operates a federally qualified health clinic (FQHC) in four locations. This facility also provides a large portion of uncompensated care. MCHD has approximately 23,950 individual patients and 98,667 visits or encounters in 1997.
- The Mostellar Medical Center, another FQHC, operates two sites which together served 92,000 patients in 1997, serve approximately 300 per day currently, and employ 12 physicians and 2 dentists.

These partners were not networked before the implementation of MCHIN. The frame-relay access provided through MCHIN has been especially helpful to some sites where access to Internet and e-mail would have been very slow and access to the frame-relay would have been financially impossible without MCHIN.

Although not official project partners, Excel Network Systems Inc., a local contractor, and Bell South were consulted when the project staff selected communication circuits and equipment. Neither provided funding; in fact, both provided services as paid contractors. Excel did the premises wiring at the community health centers, and Bell South made the line connections.

Project Costs

The total project costs were \$777,972. The TIIAP grant for the MCHIN project was \$224,744. The non-federal share was \$553,228, including in-kind contributions totaling approximately \$440,000 mainly in USA staff salaries and benefits and Computer Services Center charges, as well as cash contributions of approximately \$13,000 from the community health centers and USA for equipment and connection matching funds. USA also provided over \$100,000 in indirect charges.

C. PROJECT CONTEXT

Community Description

In Mobile County, about 16 percent (65,119) of the total population is Medicaid eligible, 75 percent of whom are women and children covered under Aid to Families with Dependent Children (AFDC), Women, Infants, and Children (WIC), and Supplemental Security Income. Over 50 percent of births are to Medicaid mothers, compared to 33 percent nationally. Over 20,000 citizens do not qualify for Medicaid but are still economically disadvantaged. Because Alabama has one of the most restrictive

Medicaid programs, USA and the other health care partners provide over \$59 million in uncompensated care to indigent patients in 1994. Health care is typically provided in fragmented and crisis-oriented ways. Often all health care is provided through an emergency room or through multiple sources. Patient information, followup, and health education are almost nonexistent in these cases. With a high rate of uncompensated care, the health care centers cannot afford to do more.

The MCHIN project serves both urban and rural communities in and around Mobile. The FQHCs all serve disadvantaged populations that are culturally diverse. One center serves a population that consists of a large number of Asian immigrants working in a fishing area. Another center serves a Native American population on the reservation. A third serves 11 rural and economically depressed counties.

Status of Telecommunications/Information Infrastructure Environment Prior to the TIIAP Project

Prior to the MCHIN project, physicians working at the participating clinics had little access to technology to support their work. Some had computers at home or in USA offices, and some were using e-mail. However, they did not have speedy access to medical information on line; nor did most of them have any Internet and e-mail skills. Prior to the TIIAP grant, physicians in the outlying clinics had little or no access to the Internet for medical information. Not until mid-1997 did one of the rural areas even have an Internet service provider. Especially when they wanted to give patients information on conditions and treatment, they would rely on the patient's ability to remember information or need to write directions themselves. The clinics had limited access to printed brochures, and then only for more common conditions and only in English or Spanish. Now they can print pertinent information for patients directly from the Internet for a variety of conditions and in several languages.

D. PROJECT IMPLEMENTATION

Activities/Milestones that Occurred Prior to the TIIAP Grant Period

Like many health care providers in rural and economically depressed areas in the country, the USA hospital administration realized the current information services and data processing systems were not effective, and an enterprise-wide system was needed. Moreover, the USA Hospital System did not traditionally have a good relationship with the community health centers. USA created a new position to investigate the problem and determine how to create a system that would improve countywide health information and, subsequently, health care delivery. The MCHIN project director transferred from the university's data processing center to the new position, which was under the Center for Health Information. (This office was later renamed Medical Systems Planning and Development.) He began by trying to develop relationships with the community health centers to understand their needs; this needs assessment was conducted in a very informal manner. After finding that the centers were willing to work with the USA Hospital System by offering \$500 for a computer and about \$5,000 for each center's set up, the project director wrote the TIIAP grant application.

Activities/Milestones that Occurred During the TIIAP Grant Period

Community Health Centers. The project director, with some assistance from the USA Computer Services Center staff, began with detailed network planning and site visits to each community health center to plan communication circuits and workstations. The project director met with administrators and physicians at each site to assess their needs. He met with a local contractor and telephone company

representatives to discuss wiring and other project needs. After researching costs and vendors, he ordered equipment and both frame-relay and dial-up communication circuits.

A frame-relay system employs dedicated high-speed telephone lines to send data through a central system such as Bell South's, which sends the data on to the recipient. Multiple computers can utilize one frame-relay circuit. For the MCHIN project, this was a cost-effective technology when more than one computer per location was to be connected because it provided a dedicated line at a fixed cost. On a dial-up system, the computer uses a modem to call the network computers, and fees are constructed by the length of the call. Data quality is similar, although the frame-relay system is faster because it uses a high-speed T-1 line rather than the regular telephone lines that the dial-up modem system uses. However, the dial-up system may not be as dependable or allow for as much user and usage expansion. But having the dial-up system in some of the centers allowed all users, including those who had frame-relay connections, remote dial-up access from locations other than their offices with the frame-relay circuit.

Part of the cost savings from this system went toward funding a secretary position at a higher level so the project could hire a more experienced person. After hiring and training the secretary and an applications specialist, the director and new staff prepared a project narrative booklet and brochures, a newsletter, and the MCHIN User Reference Manual. The booklet and brochures described the kinds of access users would have and were designed largely to market the system to administrators and managers. The monthly newsletter also described the system and how it was expanding in the community, as well as discussed other computer health networks and advances in telemedicine. It provided tips and techniques in using the system software and applications and addresses for Internet sites and tips for finding medical information on the Internet. The User Reference Manual provided instructions and information on logging on to MCHIN, using Windows 3.1, GroupWise e-mail system, Netscape, and the USA Hospital Information System, as well as information about obtaining user support, medical records security, and a glossary.

Bell South installed the frame-relay and dial-up circuits at the USA Computer Services Center, Mobile County Health Department clinics, and the Mostellar Medical Center clinics first. Wiring locations were identified at the sites and premise wiring was installed at four sites. The project director and applications specialist installed personal computer equipment at all 14 community health centers in the project. The seven sites that had more than one computer were connected with a frame-relay system; the other seven sites with only one computer used dial-up connections.

The project director and applications specialist provided one-on-one training to the "superusers" or resource persons at the health centers in logging on to MCHIN, GroupWise e-mail, Netscape, Windows 3.1 or Windows 95, and when appropriate, the USA Hospital Information System. Superusers were typically clinic staff selected by their administrators. Many of the 134 connected clinic staff also received one-on-one training from MCHIN staff.

USA Physicians. Planning for the installation of network connections for USA physicians began with meetings with key physicians joining the network. MCHIN offered to pay 40 percent of the connection costs for USA physicians; the departments paid the additional 60 percent. Staff prepared cost proposals for connecting each department interested in joining the network. The project connected 134 USA physicians and staff to the network through direct-wired Ethernet or token ring adapters. Ethernet connections send information directly to the recipient without passing by other recipients first. Token ring connections send information around the network in one direction; when the information reaches a matching address, it stops. The significance of the difference between the two systems for MCHIN was in the type of network connections each of the physicians' offices already had. In many cases project staff replaced token ring adapters with Ethernet technology in an attempt to create a standard system.

Network enhancements had to be made at several of the USA buildings to support more users. The project installed fiber optic wiring throughout one of the hospital buildings, with final network connection expenses paid by the medical departments themselves.

The physicians were trained by MCHIN staff as well. Most received one-on-one training in logging on to the network and to use GroupWise e-mail, Netscape, and the USA Hospital Information System when necessary. Training was difficult because physicians were rarely willing to dedicate more than 1 hour to training, and since few had network, Windows, or Internet skills, much training was needed.

Steps Taken to Sustain Project Activities Beyond the TIIAP Grant Period

During the grant period, responsibility for costs was shifted increasingly to the health care centers and the USA medical departments. By the end of the grant period the centers were paying for their connections. In the sixth quarter of the grant period, three FQHC centers agreed to begin paying for their own communication circuits and an invoicing system was set up for billing the community health care centers.

Also ensuring continued usage of the network, the Mobile County Health Department and Mostellar Medical Center agreed to fund the connection of administrative staff to the WAN, in addition to the physicians already connected.

Activities/Milestones that Occurred Following the TIIAP Grant Period

A \$3 million direct appropriation has been secured from the U.S. Department of Health and Human Services, Health Resources and Services Administration, to continue and expand the work initiated through the TIIAP grant to establish MCHIN. The project has clearly leveraged additional money in both grants and contributions from users.

The USA Hospital System is currently investigating the SMS (the vendor) Lifetime Clinical Repository which will store in a password protected system all patient records. Doctors and nurses will be able to pull up a patient's X-ray report or another clinic's data file, and the system includes a centralized patient billing system which gives patients one bill for all departments. Staff feel that the system will be more secure than written records, since currently anyone in a lab coat can pull a patient's file.

Issues

In the third quarter the project requested and received a no-cost 6-month extension to the grant period. A 3-month extension was granted in the sixth quarter, extending the original 12-month grant period to 21 months. Delays occurred initially because after the project learned it was funded, there was some question of whether TIIAP funds would come through. Planning, ordering equipment, and hiring additional employees could not begin until grant funds arrived. Additional delays occurred because of troubles in obtaining network equipment and receiving USA hospital departments' approval for wiring projects.

Problems

According to the project director, most of the problems and challenges were related to convincing potential users to participate. Securing the cooperation of the community health care centers was a major

challenge because traditionally USA did not have a good relationship with them. A relationship of trust and mutual respect had to be established to convince the centers to participate. In spite of efforts at training and support, the project director indicated that supervisors at some sites did not do their part. The superusers in some sites were not really effective. This meant that there was a continuing burden on the director and applications specialist to provide training and support. It also meant that the system was not fully utilized in some sites since there was not sufficient encouragement or support.

Departments in the College of Medicine had some difficulty finding the funding to become part of the network. One physician used research funds for bringing his department into MCHIN. In addition, it was not clear at first whether TIIAP was going to provide the funding promised; this concern delayed initial planning, ordering of equipment, and hiring. In the end some departments were connected free of charge because the departments did not have the matching funds and because MCHIN needed to spend the remainder of their TIIAP grant money.

There were few major problems related to the hardware or software. In some instances outdated equipment was a limiting factor. One physician mentioned that approximately 800 terminals at the USA hospital need to be replaced. Sometimes it is difficult for center staff to determine where the glitches are between routers, hubs, gateways, hardware, software, etc. They have found that most often problems are located in users' computers.

There were some problems with the telephone company not installing compatible lines. Lines were not turned on where they were supposed to be, and others were cut off during routine maintenance. Additionally, the project director initially asked BellSouth to contribute to the project matching funds, but they would not provide funding or in-kind services although they said they wanted to participate. Staff found that the phone company gave a higher priority to frame-relay and broadband circuits, rather than the regular lines used for modems. At one of the rural clinics there continue to be problems with telephone lines not being adequate. Lightning has struck several times and ruined the modems. Some of the staff are frustrated to the point of no longer using the system. MCHIN staff continue to work to solve the problems, but due to the distance are not able to reset the equipment as often as it fails.

There were some problems with the quality and level of service in that they were somewhat site dependent. In addition, the Computer Services Center did not have the capability to provide the needed support for the project. With both token ring and Ethernet connections, the help desk found it difficult to support so many different computers. They found that token ring systems while more expensive, are also more efficient and require less maintenance and support.

An additional problem was that the project staff did not have much experience in dealing with granting agencies, nor was there anyone at USA who had experience who could provide advice. Expectations and procedures for securing technical assistance were not clear. Staff felt they were not given an adequate explanation of what would be required of the grant recipient. At the end of the grant period, they learned that TIIAP required detailed information, such as equipment serial numbers, that was not readily available at the time although would have been early on. All of those involved in the grant administration felt the paperwork, keeping up with the grant requirements, and monitoring expenditures created problems in that they took away from staff time in working with users and sites. They did acknowledge that some of the trouble was based on inexperience as grant recipients. The university's Sponsored Programs office typically works with doctors and other researchers who are very experienced with grants systems and requirements and who generally need less assistance. The project director suspected that the assistance he received from the university is the same as what is usually provided, but that may not have been enough for his needs.

E. PROJECT ACCOMPLISHMENTS AND IMPACT

Technology-Related Accomplishments

The project director and the Computer Services Center director indicated they believed the project accomplished its purposes. There was not much by way of unanticipated accomplishment, but neither were there goals not reached.

During the grant period, 14 community health care centers were connected to MCHIN. The project staff installed 24 new personal computer systems in three federally qualified community health care centers. They also connected additional health care users who supplied their own computer systems. New data communication circuits and network equipment were installed at each of the community health care sites. A total of 132 health care users were connected to MCHIN. Project staff also connected 134 USA physicians and staff to MCHIN via direct-wired Ethernet or token ring adapters. Staff made network enhancements at several sites to accommodate more users. Most of the USA users received training in one-on-one contexts.

The increased use of e-mail led to the purchase of an e-mail server exclusively for the community health care users that is housed in the project director's office.

For the community health centers the frame-relay connections operate at 64KB, and the dial-up connections operate at 28.8KB. The token ring adapters used at USA hospitals connected at 16MB, and the Ethernet connections operated at 10MB. All users had access to the Internet through the USA Internet gateway, which provided a high-speed T-1 link.

Impact of Project on Direct End Users

The project brought major changes in how many of the physicians on the network access medical information and research; it provided physicians and staff with access to Internet information resources such as the National Library of Medicine. Several of the physicians interviewed during the site visit mentioned the importance of these resources in helping them communicate to patients and work more efficiently. For physicians at more remote sites, such as McIntosh, the network made a huge difference in how efficiently they could get medical information. The Mostellar Clinic in Bayou La Batre is using Internet services to find definitions, treatment plans, medication information, and patient information handouts in Spanish. It gave most users access to the mainframe-based Micromedex Computerized Clinical Information System available on the USA Hospital Information System.

The project also provided access to worldwide e-mail. One physician told of how he had a patient with a rare kidney disease. A nephrologist who was 150 miles away sent advice to the physician via e-mail.

Impact of the Project on Other Beneficiaries and/or the Overall Community

The technology of the MCHIN project ultimately benefited the patients of the physicians on the network. These people, served by the clinics, represent a part of the population that is poor and relatively underserved. Because of the network, physicians were able to work more efficiently and could provide easy-to-understand information about conditions. One of the rural clinics was able to enroll several cancer patients in research programs as a result of listings on the Internet.

The MCHIN network continues to operate and is funded by the participating community health organizations. Additional users are being added as they request to participate.

As a result of the MCHIN project, the health care community, especially that which serves poor and minority populations, perceives the possibilities provided by electronic communication. They are now not only users but committed to helping the system improve.

Impact of the Project on Grant Recipients and Project Partners

The technology played a role in the planning and operations of the Southwest Alabama Health Education Consortium. As a new organization pursuing the community-based and independent health care that rural populations want, the technology has allowed much needed contact with the USA hospital and other hospitals.

The MCHIN director developed an Internet home page for the project. The project also helped move the university toward the purchase of a multimillion dollar medical information system. The network leveraged a connection to the USA Biomedical Library and upgrading of computers at the USA Knollwood Park center.

Since the grant ended, the hospital system has secured \$3 million to continue networking health care providers and to improve the ability to transfer medical information, including patient records, electronically. The \$3 million direct appropriation from the U.S. Department of Health and Human Services, Health Resources and Services Administration is described more fully in Section H.

Because of the additional funding, the project is having an impact on the services provided by the USA Computer Services Center to health care providers and the role of the University of South Alabama Center for Health Information.

Project Goals Not Met

There were no project goals that were not met. The director expressed a wish that more of those on the network would be frequent users. In addition, patient information was one of the types of information that it was hoped to share on the network. At this time, patient records are not yet available on the network. However, information that patients can use and information that physicians can use to treat patients is available.

Impact of TIIAP Support on the Initiative

If TIIAP funding had not been received, the network may not have been established or at least would have taken another two years. Physicians would still be struggling to obtain medical information. Departments that did not have the money to build their telecommunications infrastructure would not have made it a priority, as they did with the matching funds offered through the grant. The MCHIN project helped the Computer Services staff, the Center for Health Information staff, and the physicians in the clinics see the potential utility of the electronic network. Moreover, the director of the Computer Services Center indicated that the grant gave them knowledge of and experience with the frame-relay system. The additional funding from DHHS, HRSA and the project expansion are not likely to have occurred. Now the participants are asking for more – faster access and more types of information.

F. EVALUATION AND DISSEMINATION

Evaluation

The evaluation data for the project are limited. All of the targeted medical users were connected to the MCHIN network within the original project time of 12 months. Specific data on users and usage statistics are not available. The project director thinks most of the community health centers are using their computers largely for non-network uses, such as word processing. Most are not using it for e-mail, and it is difficult to track those using Internet resources. However, interviews with users at the clinics indicated that they are actually using the network for medical information and consultations.

Dissemination

The project published a monthly newsletter. The director prepared a project narrative handout and, with the applications specialist, developed an MCHIN User Reference Manual. The MCHIN web page was established to provide information to users and interested parties. A slide presentation was created to inform a range of audiences about the project. It is unlikely that any of these activities will continue to be updated.

G. LESSONS LEARNED

The primary lessons from the project were related to understanding the technology and the establishment of sites. For example, it became clear that the location of the computers was a critical factor. If computers were located in physicians' offices or near the workstations of clinic staff who used them, they—and the network—were used more frequently than if the computers were located in a less accessible or convenient place, such as central office shared locations.

It became evident that the frame-relay data communication circuits, while initially expensive, were cost effective in that they were speedy and resulted in frequent network use. The dial-up configuration was inexpensive at first but ultimately limited the expansion of workstations. In addition, some of the business analog lines in rural areas were unreliable and frame-relay circuits would have been a more effective approach.

The project also found that using standard technologies was best. Standard software, hardware, and operating systems are the most easily maintained and supported. MCHIN staff did very little experimentation with different technologies.

Some lessons about training methods were also learned. Training at sites was sometimes ineffective because the superusers identified by managers at the sites were not themselves highly familiar with the technology and did not view training and support of colleagues in technology as part of their primary responsibilities.

Training of physicians was limited because they seldom wanted to commit more than an hour to training but actually required more time to become proficient in using the technology and the network. Some of the physicians interviewed, who appeared to be the most avid network users, were already familiar with technology and Internet possibilities.

In establishing the culture for a network system, MCHIN users found that time is the limiting factor. Staff learned that they could not merely tell potential users about how the system can help them; until they use it themselves, they will not understand.

H. FUTURE PLANS

The project is continuing with the community medical organizations funding their participation. There are plans to add users. The MCHIN Internet web page continues to be updated and improved. The \$3 million direct appropriation from the U.S. Department of Health and Human Services, Health Resources and Services Administration, will help expand and upgrade the hardware, the software, and the types of information shared through the network. Because it is a direct appropriation and not a grant, the reporting and monitoring tasks will not be as burdensome as for the TIAP grant. Due to some internal politics, at the time of the site visit, it was not clear who would be administering the appropriation, but the MCHIN project director indicated that he was not interested. Plans to implement more telemedicine applications and interactive video are underway, as well as plans to upgrade all connections to frame-relay technology.

While coverage of network costs and indeed expansion of the network reach is certain, user support is not. Currently, the project director provides continued support and training and assistance with the technology and hardware on his own time, spending about 15 percent of his time on the project. At each site visited, he offered advice and help on ways to use the network as well as technical support for the hardware. He is no longer funded for these or other MCHIN activities, but believes them to be very important to the efficacy of the project. He feels he cannot walk away and should continue the relationship with non-USA users in order to keep the network going. This is clearly not a stable arrangement, and additional steps will need to be taken to ensure continued benefits of MCHIN for the community health centers.