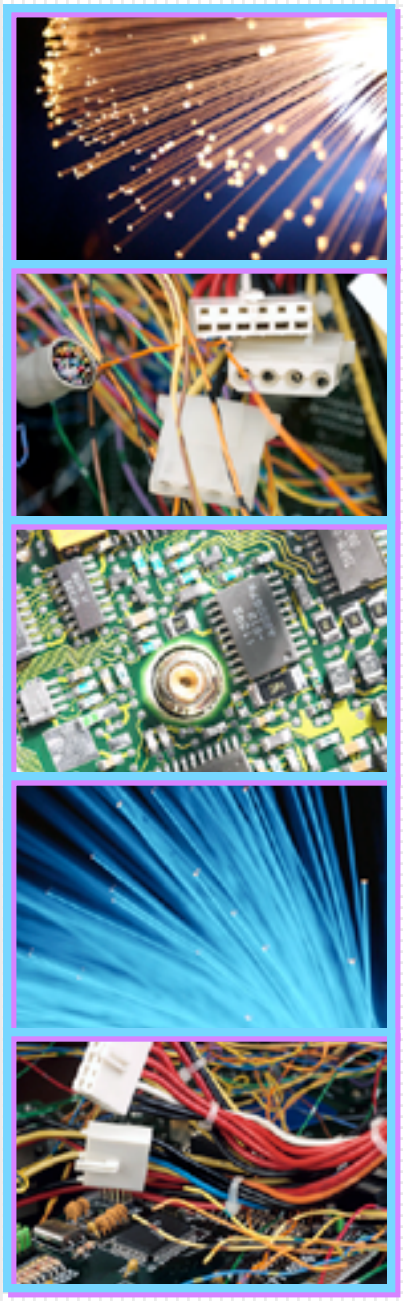

Evolution & Summative Evaluation of the

Alaska Federal Health Care Access Network

Telemedicine Project

University of Alaska Statewide Health Programs

University of Alaska Anchorage Center for Human Development

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November 2004

EVOLUTION & SUMMATIVE EVALUATION OF THE

ALASKA FEDERAL HEALTH CARE ACCESS NETWORK

TELEMEDICINE PROJECT

November 2004

University of Alaska Statewide Health Programs

www.alaska.edu/health

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PREFACE

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Evolution & Summative Evaluation of the Alaska Federal Health Care Access Network Telemedicine Project

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Evolution & Summative Evaluation of the Alaska Federal Health Care Access Network Telemedicine Project

Executive Summary

Providing healthcare and health programs for over 200,000 beneficiaries is a very expensive and daunting proposition under the conditions and challenges in Alaska including healthcare sites that are not connected to any road system; heavy reliance on air transportation for patients, physicians, and medical supplies; massive geographical barriers; as well as severe and often unpredictable weather. Moreover, many rural clinics and healthcare facilities are neither familiar with nor using current and unfolding technology. Isolation from other medical personnel, as well as education and training opportunities, contributes to major retention problems for many healthcare organizations. Under these conditions, federal beneficiaries living in rural Alaska have had limited access to healthcare and very little access to critical information about federal programs and benefits.

Recent advances in telemedicine technologies and support for advanced telehealth network systems opened the door for a dramatic improvement in the delivery of healthcare and health education to remote and rural healthcare settings in Alaska. This report includes the history of experience and knowledge stemming from over 25 years of telemedicine efforts, which positioned Alaska to develop and deploy the AFHCAN project, the largest telehealth endeavor to date in the world. With painstaking attention to every detail, the AFHCAN project created and deployed telemedicine "carts"—a combination of off-the-shelf hardware and specifically designed software, which utilized a web-based "store-and-forward" interface and data collection protocol. Assuming telecommunication resources were available, rural and remote clinics with carts could be networked with larger healthcare centers, which could provide them and their patients with access to physicians and specialists from more populated areas.

This report includes information from several evaluation activities:

- **Key Informant Interviews** were conducted with individuals who had leadership roles in the development of AFHCAN or were stakeholders in the field of telemedicine in Alaska. Interviews gathered information concerning the history and background of the project, gleaned the perspectives of key stakeholders on the effects and influences of the project on telemedicine in Alaska, and provided direction for other evaluation activities.

- **AFHCAN Project Use & Evaluation Data** incorporating two primary methods of data collection in its store-and-forward programming was used to evaluate the project's impact and effectiveness. This report includes an accounting of use data collected from sites using the AFHCAN carts and equipment, and user satisfaction data collected from both referring and consulting providers using the system.

- **Medicaid Data & Information** was used to examine Medicaid's role in reimbursement for telehealth claims in Alaska.

- **Health Organization Surveys** of health providers, business personnel, and technology personnel assessed if the project improved access to healthcare and health information in rural/remote areas and if the project improved the quality of care at the local village clinic and/or regional medical center. Surveys assessed the project's impact on provider skills and identified sustainability issues.

Key Informant Interviews

Initial Concerns

Key informant interviews identified four areas of concerns initially held by key stakeholders in the telemedicine field at the onset of the AFHCAN project.

- *Expense*
  - Cost of telecommunications and impact on providers
  - Access to funding
  - Complexity or user-friendliness of applications for funding
  - Length of delay between application for and receipt of funds
  - Usefulness of the Universal Service Fund
  - Whether or not there would be Medicaid reimbursement
- *Mental Health Applications*
  - Reliability of connectivity and quality of transmission
  - Utility of store-and-forward methodology
  - Acceptance by staff and people receiving services

- *Quality*
  - Lack of high quality, high bandwidth connections
  - Quality of health services delivered through telecommunication systems
- *Private Sector Access*
  - If resources available in the public sector would be available in the private sector
  - Misunderstandings due to operating differences between public and private systems

Critical Events

Stakeholders identified six critical events that occurred in the development of telemedicine in Alaska:

- Formation of the Alaska Telehealth Advisory Council
- Congressional support
- Funding from the Universal Service Fund
- Prior telemedicine experience
- Medicaid reimbursement
- Technology development

Future Issues

Stakeholders identified four major areas of future issues that would need to be addressed for the development of telemedicine in Alaska.

- *Regulatory Issues*
  - technical standards
  - subsidy funds
  - licensing, interstate
  - privacy and confidentiality
- *Sustainability Issues*
  - dependence on funding
  - availability of funding
  - manuals
  - training
- *Integration Issues*
  - private sector access
- *Expansion Issues*
  - increased applications
  - quality
  - capability of providers
  - increased users
  - increased connectivity

AFHCAN Project Use & Evaluation Data

Utilization of the AFHCAN System & Equipment

- 99% of telehealth events originated within the IHS-funded healthcare delivery system
- The video otoscope was the most widely used in the Western and Southcentral Regions, the only regions with full time audiologists, accounting for 47% of images taken with the video otoscope

Single Question/High Volume Data

- *Consulting Providers: Effect on Patient Travel*
  - 34% of consulting providers noted that telemendicine prevented patient travel
  - 8% noted it caused patient travel
  - 58% said it had no effect
- *Referring Providers:*
  - 88% of referring providers noted they were comfortable creating telemedicine cases
  - 92% reported it facilitated referrer/physician communication
  - 66% indicated it played a role in patient education
  - 79% noted it made work more fun
  - 80% indicated it improved patient satisfaction
  - 85% reported the quality of patient care had been improved
  - 77% noted satisfaction with AFHCAN equipment
  - 86% reported the software was easy to use
  - 73% disagreed telemedicine was a waste of their time
  - 73% had no problems creating telemedicine cases

Medicaid Data & Information

Medicaid had been consistently and reliably paying on telemedicine cases in Alaska since December 2002, but it appeared as if this resource was being under-utilized.

- As of September 2004, 322 claims were paid, 143 were denied, and a total of $24,083.01 had been paid on telemedicine (store-and-forward) claims
- 31% of claims were denied compared to a 30% denial rate for all claims for physician services in a two-month sample
- Reasons for denial had nothing to do with characteristics unique to telemedicine

Health Organization Surveys

Rural Health Provider Survey

- Surveys were received from 295 rural healthcare providers
- 85% were working in health centers or village clinics without a physician on site
- Nearly 55% were community health aides
- *Users:* 51% indicated they had used the AFHCAN software or cart/attachments
  - 62% of users used the software or cart/attachments within the last 30 days
  - 43% used both the otoscope and digital camera *Often*
  - 42% used the equipment for training or educational purposes
  - 41% used the equipment to increase quality of healthcare or to obtain patient information
  - 76% indicated they were comfortable using the equipment
  - 85% noted that AFHCAN resources worked *More than adequately* (50%) or *Adequately* (35%)
  - 57% experienced technical problems with either the software or cart/attachments
  - 78% of those who contacted AFHCAN and 89% of those who contacted ACES for technical assistance rated the support they received as *More than adequate* or *Adequate*
  - 79% noted AFHCAN resources positively changed the way they did healthcare
  - 70% stated clinical practice would be impacted if AFHCAN resources were no longer available
  - 25% used the computer *Somewhat more* to *More* since the introduction of AFHCAN resources
- *Nonusers:* 49% indicated they had not used the AFHCAN software or cart/attachments
  - 43% of nonusers indicated lack of training as a reason for nonuse
  - 36% stated equipment was not set up or not connected to the network.
- Training Issues:
  - 34% of all rural respondents reported they had not received any training in the use of either the AFHCAN software or cart/attachments
  - 43% of nonusers indicated a lack of training as a reason for nonuse
  - 60% of respondents who received training indicated they needed additional training
- 53% of those indicating they did not receive encouragement reported they would use software/cart/attachments more often if they had supervisor encouragement

Business Personnel Survey

- Surveys were received from 45 individuals representing the business side of the health organizations where they were employed
- 58% were involved at some level in the decision to deploy AFHCAN resources
- Across the state, there was little uniformity in who had final decision-making authority to deploy: 33% indicated the final decision was made at the executive and board levels
- The top organizational goals for telemedicine indicated by respondents were *Access to care* and *Quality of care*; the lowest ranked goal was *Cost/economics*
- 60% of business respondents offered narrative data regarding major concerns about sustainability
  - 57% indicated concerns about not having adequate financial resources to pay for connectivity, equipment maintenance, replacement, and technical support
  - Other concerns were related to inconsistent connectivity, Internet access, "buy-in" from providers, ongoing training needs, and integration with other databases
- 64% of business respondents reported the AFHCAN resources had been used by their organizations
  - 70% of these respondents used the AFHCAN resources to send data, educate a patient, or document a patient encounter
  - 50% used it within the last 30 days
- 58% of reasons for nonuse were related to equipment not being set up or not connected to the network
- 46% of business respondents indicated that the AFHCAN resources resulted in increased patient care
  - 25% indicated the AFHCAN resources allowed them to provide higher quality healthcare
  - 21% thought patients received more attention from providers
  - 10% noted it reduced patient travel
- 47% of business respondents reported that telemedicine had value to their organizations
- 76% indicated that AFHCAN telemedicine had resulted in changes to healthcare practices in their organization
- 40% reported that their organization was currently conducting an evaluation of AFHCAN telemedicine; another 40% indicated their organization was planning to do so
- 20% indicated that all the costs associated with AFHCAN telemedicine had been identified; 47% indicated that some, if not all, costs were identified
- 37% reported that telemedicine costs were included in the organization's budget

Technology Personnel Survey

- Surveys were received from 23 individuals representing the technology side of health organizations where they were employed
- 60% of technology respondents reported telemedicine was either *Valuable* or *Very valuable*
- 50% indicated the AFHCAN project had *Positive impact* on their organization's relationship with the private sector telecommunications industry
- 65% indicated the AFHCAN project resulted in *Significant change* or *Some change* in their organization's wide area network (WAN)
- Close to 73% of technology respondents identified three primary areas of network use:
  - 29% — store-and-forward
  - 24% — access to other health information systems
  - 20% — Internet
- 30% indicated their organization was currently evaluating AFHCAN telemedicine; another 13% indicated their organization was planning to do so
- 71% indicated areas of cost savings to their organization because of using the AFHCAN resources
- 80% of technology respondents indicated some uncertainty as to their organization's ability to sustain telemedicine without AFHCAN
- 25% indicated their organization was *Equipped* to provide ongoing orientation and training for new staff to use the AFHCAN system; 40% indicated their organization was *Somewhat equipped*

Conclusions & Discussion

Evaluation data demonstrated that telemedicine using the AFHCAN resources did increase rural and remote access to healthcare. It facilitated referrer-physician communication, enhanced patient education, improved quality of care for patients, and increased satisfaction of both providers and patients. The vast majority of providers indicated the equipment was easy to use and made their work more fun. These are not only factors that improved healthcare for patients, but also factors that should influence higher retention of healthcare personnel. It was expected that using the AFHCAN resources would reduce the need for travel, but in a small number of cases it caused travel. Informal reports from providers noted that travel in these cases was prompted by identification of conditions that might have been missed or delayed in traditional referral practices. It appeared that travel dollars were actually better distributed (i.e., identifying necessary travel while preventing unnecessary travel) and resulted in improved outcomes for patients.

Overall, evaluation data suggested that the AFHCAN project played a role in increasing the quality of healthcare for those in rural and remote areas of Alaska. Providers and key players in telemedicine efforts generally perceived that the AFHCAN project was successful. However, the expense and sustainability of telemedicine as well as lack of integration between the public and private sectors had been and continued to be primary concerns. Barriers to integration included inherent differences between public and private systems and regulatory issues, but the principal barrier to integration seemed to come down to the expense. For example, Alaskan providers in the public sector relied heavily on the Universal Services Fund (USF) to make videoconferencing more affordable and there were concerns about whether or not this funding would be available in the long term. The AFHCAN system, relying on store-and-forward technology up to this time had been less expensive in terms of transmission costs. However, even without videoconferencing, the future cost of equipment and software as well as ongoing

expenses for training, infrastructure, and maintenance were seen as prohibitive, particularly to providers in the private sector, but also to those in the public sector.

A critical event related to the expense of telemedicine and its sustainability was reimbursement from Medicaid and other payers for healthcare services. In September 2002, reimbursement regulations developed by the Alaska Medicaid program for telemedicine became effective. December 2002 was the first month of service for which claims could be submitted, and in May 2002, the first identifiable Medicaid payments for telehealth services in Alaska were distributed. Since then, Medicaid has been steadily and reliably paying on telehealth claims in Alaska, though it did not seem at the time of this report that telehealth providers had begun to fully utilize this resource. Premera Blue Cross Blue Shield of Alaska, which approved reimbursement for telehealth services around the same time as Medicaid, also appeared under-utilized. Informal reports from providers suggested that the way telehealth has been reimbursed may have been a disincentive to its use. More specifically, there may be too little financial incentive at the provider-level to take extra steps, both medical and administrative, to choose telemedicine as an option for reimbursable health care, in spite of its advantages and overall cost savings to the industry. Providers have expressed they have not received enough revenue in the process to maintain the necessary equipment and infrastructure to conduct telemedicine encounters. This potential disincentive only came to light in the process of preparing this report. The evaluation of the AFHCAN project reported here did not address the issue. It is certainly worth examining in a future study as reimbursement by third party payers is one of the critically important, fundamental needs for sustainability of telehealth services.

Although indicators from the evaluation activities in this report were positive, it was still too early to draw definitive conclusions regarding a complete picture of the efficacy and sustainability of telemedicine. That being said, the evidence in this evaluation and in a previous

study demonstrating significant time-saving in cases where children needed surgery to implant ear tubes[1] provided definitive pieces of evidence for the efficacy of the AFHCAN project.

It is important to point out that it takes time to create sustainable change at the systemic level. Based on the results of evaluation data, the promise for the AFHCAN to increase access to and quality of healthcare, particularly in rural and remote areas of Alaska, continues to be valid. The needs for continuing training for providers and technical assistance for operation and maintenance of equipment, as well as continued connectivity have been major financial and logistic challenges faced by health organizations, both in the public and private sectors. As telemedicine becomes more incorporated into healthcare delivery, one can expect there will also be increasing demands for new applications as well as continuing needs for upgraded equipment and software. Thus funding telemedicine has been the overwhelming concern of health organizations and key stakeholders in the telemedicine field. However, if healthcare providers find that telemedicine is an indispensable component of healthcare delivery in Alaska, health organizations will likely find the necessary financial resources to sustain it.

Note: The reader is encouraged to look at the Addendum of this report authored by current Director of the AFHCAN Stewart Ferguson for detailed information regarding the most recent activities of the AFHCAN. Evaluations, while extremely necessary and valuable, are still at best reflecting snapshots in time. A great deal has occurred recently, in part due to the findings of evaluation activities reported in this document.

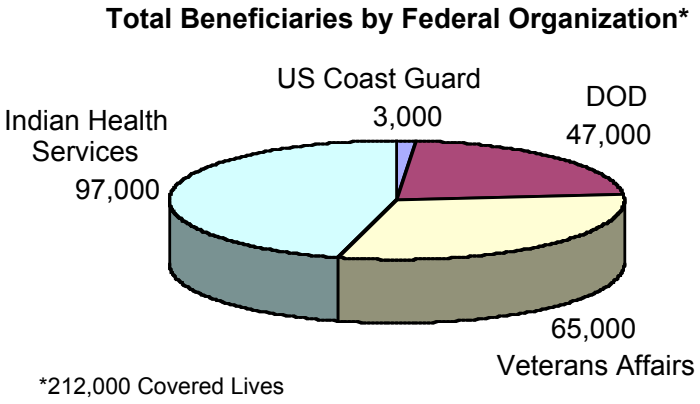
[1] A Comparision of In-Person Exmaination and Video Otoscope Imaging for Tympanostomy Tube Follow-Up, a study by Chris Patricoski, John Kokesh, A. Stewart Ferguson, Kathryn Koller, Greg Zwack, Ellen Provost, and Peter Holck, published in Telemedicine Journal and E-Health, Volume 9, Issue #4, Spring 2003. The study documented a reduction in wait time from 6 months to 3 days to turn around cases.

Evolution & Summative Evaluation of the Alaska Federal Health Care Access Network Telemedicine Project

Background & Introduction

The first chapter in this report is intended to provide a glimpse of the "telehealth territory" in Alaska, with a focus on the Alaska Federal Health Care Access Network (AFHCAN) project and the Alaska Telehealth Advisory Council (ATAC), both of which have been strongly supported by Alaska's senior senator, Ted Stevens. Due to that focus, it does not cover telehealth history in the private sector to the extent that it does in the public, federally supported system. This is the first time a history of this breadth has been gathered in one publication, but it is only a small part of a large evaluation of the AFHCAN project.

The main purpose of this report is to provide a summative evaluation of the four-year AFHCAN project. The mission of the AFHCAN project was to improve health care access for federal beneficiaries in the state of Alaska through a sustainable telemedicine system. By the end of the four-year project, the AFHCAN supported 43 member organizations that made up the Alaska Federal Health Care Partnership (AFHCP), representing 248 federal health care sites and impacting more than 200,000 Alaskans. Member organizations, all recipients of federal funding, included Indian Health Services Tribal Entities (36 with 200 sites), U.S. Department of Defense (4 with 9 sites), U.S. Coast Guard (1 with 8 sites), Department of Veterans Affairs (1 with 5 sites), and State of Alaska Department of Health and Social Services: Section of Nursing (formerly Public Health Nursing) (1 with 26 sites).



The AHFCAN project initially proposed to serve 235 sites. The first year (1999) was focused on project development and planning, the second year (2000) was concerned with software development. Both the third and fourth years (2001-2002) were focused on deployment of equipment, equipment utilization, training, and enhancement. In the fourth year, the AFHCAN Steering Board approved the addition of 13 new sites bringing the number up to 248. The AFHCAN telemedicine equipment was mounted on "carts." The AFHCAN specifically designed software utilized a web-based store-and-forward interface to gather data from the biomedical peripherals on the cart.

The primary focus of the evaluation of AFHCAN Telemedicine Project was to assess related activities from three separate, yet interrelated, perspectives: (1) a rural provider perspective, (2) a technological perspective, and (3) a policy and sustainability perspective. The evaluation was designed to answer the following questions:

1. What was the evolution of the AFHCAN telemedicine project?
2. What were the critical influences in shaping the development of telemedicine in Alaska?
3. What was the impact of the AFHCAN telemedicine project on health care delivery in rural Alaska?
4. What factors are related to sustainability?
5. To what extent was the technology effective in supporting utilization?

Methodology

The evaluation used both qualitative and quantitative methodologies to capture the history and outcomes of the AFHCAN project. Qualitative tools included multiple key informant interviews and a comprehensive review of source documents. Quantitative approaches included analysis of AFHCAN data, Alaska Department of Health and Social Services Division of Health Care Services (formerly Division of Medical Assistance) data, and health organization surveys targeting rural health providers, business personnel, and technology personnel. A multidisciplinary evaluation team, working through the University of Anchorage Statewide Office of Health, fleshed out key goals and constituent objectives.

Key Informant Interviews

From December 2002 through February 2003, interviews of personnel who had been leaders in the AFHCAN project and other telemedicine activities in Alaska were conducted to provide an ecological analysis of historical antecedents, identify current issues, and provide a focus for other evaluation activities.

Source Documents

A comprehensive list of source documents was constructed from information provided by key informants. These documents were reviewed and analyzed to complete a detailed history of telemedicine in Alaska, focused on the public sector.

Alaska Federal Health Care Access Network Data

Analysis of data collected by the AFHCAN project was conducted. Primarily the data described the type of encounter, the disposition of the case, and the level of provider satisfaction with the telemedicine application used. This information was produced electronically at the time of the telemedicine encounter. A Data Share Agreement was initiated on May 9, 2003, with the Alaska Native Tribal Health Consortium (ANTHC) to establish the parameters around the type, frequency, and duration of data sharing.

Medicaid Data

Data from the Division of Medical Assistance (currently Division of Health Care Services) were requested to analyze trends in telemedicine reimbursements. The division provided information related to the number, type, and payments for telehealth services reimbursement requests, information about claims on which payment was denied, and data for comparing this with denial of claims in general.

Health Organization Surveys

Three separate surveys were conducted to obtain information from rural health providers, business personnel, and technology personnel. Survey instruments were constructed from the key informant information and analysis of various source documents. The surveys were designed to collect data from targeted respondents from the original 235 sites.

Report Organization

- **Chapter I** includes a detailed history of telemedicine in Alaska, focused on the public sector, including a description of factors that influenced the shape and course of the AFHCAN project.
- **Chapter II** summarizes key informant interviews and key stakeholder perspectives of the critical events that shaped the AFHCAN project and future issues.
- **Chapter III** summarizes use and evaluation data as collected by AFHCAN over the four years of the project with special attention to federal partners.
- **Chapter IV** summarizes Medicaid claim and reimbursement patterns for telemedicine encounters in Alaska.
- **Chapter V** examines the impact of the AFHCAN project from a rural provider perspective and contains a summary of data obtained through surveys of health providers and business and technology personnel.
- An **Addendum** authored by Stewart Ferguson brings the activities of the AFHCAN up to date, since the end of the four-year project evaluated in this report.

CHAPTER I

Beginnings

In the early years of the Alaska Territory, very little expert medical care was available. Some private practitioners were located in the larger towns, but most locations were unserved. Missionaries provided basic care in some of the larger Native villages but most were without medical services of any kind. In the remote villages, the only medical care most people ever saw was when the Coast Guard cutter Bear made its annual visits along the coast.[2]

Telecommunications

By 1905 about 2,000 miles of submarine cables connected Alaska to the Lower 48 states. Approximately 1,500 miles of telegraph lines installed in the state provided a rudimentary communication system between military installations and some towns. Local telephone systems were installed in several larger communities, but there was no long-distance service. The only communication with the outside world was by telegraph or surface mail.

By 1915 the military had abandoned most of its landlines within Alaska in favor of radiotelegraphy. Maintenance costs were substantially reduced. Frequent line breakage caused by weather, moose, and vandalism had been a constant source of telegraph service outages.

The Beginning of Telemedicine in Alaska

On March 16, 1931, provision of education and healthcare services to Alaska Native populations was turned over to the Bureau of Indian Affairs (BIA). Hospitals were built in Mountain Village, Kotzebue, Unalaska, Barrow, Bethel, Kanakanak, and Tanana. All were provided with shortwave (high-frequency) radio equipment.

[2]The narrative in the first 12 pages of this chapter was written primarily by Howard Bonar.

As part of its program to improve healthcare, the BIA provided teachers heading for Native villages with a standard medical kit. It included drugs, first aid manuals, and a shortwave radio to communicate with hospital doctors when they needed help. We assume they received some sort of training. This was the beginning of organized telemedicine in Alaska.

The atmospheric conditions that make long-distance radio communications possible are also a major cause of problems in maintaining a reliable shortwave radio communication circuit. With powerful radio equipment, well-designed and properly installed antennas, and well-trained operators, it is possible to have a high degree of communications success. These ideals were seldom achieved in most villages. With all its faults, the radio systems and the volunteer providers did bring about a substantial improvement in the delivery of healthcare to Alaska Native populations. It was really only first aid, but it was far better than nothing.

On July 1, 1955, healthcare of Alaska Native populations was turned over to the U.S. Public Health Service (PHS). There was an agreement between the Department of the Interior and PHS for the joint use of radio frequencies. As a result of this sharing, schools, village clinics, and the Native hospitals could communicate with each other.

In 1964, the Alaska Indian Health Service (IHS) began a program to train volunteer Community Health Aides/Practitioners (CHA/Ps) to provide basic health services in their home villages. They worked out of their own homes or out of small clinics located in some of the village schools. They were allowed to use the school radios for consultations with doctors.

In 1967 PHS began building clinics in the villages of Alakanuk, Aniak, Norvik, Savoonga, Selawik, St. George, and St. Paul. Radios were installed at each location. Local volunteers were given training in delivering basic healthcare and operating radios.

Improving Communications

In September 1968 a two-day communications conference was held in Anchorage sponsored by the State of Alaska Department of Economic Development; Frank H. Murkowski was commissioner. A report given by the officer in charge of the Alaska Communications Service indicated that only 39 communities in Alaska had dial-up long-distance telephone communications. All others relied on radiotelephone or telegraph.

Also in 1968 the IHS received funding to hire 185 CHA/Ps for 157 communities. The need and pressure for better communications with the villages increased. This system of healthcare delivery required frequent exchanges of patient information between minimally trained CHA/Ps and doctors.

Daily schedules of radio calls were established in each service unit, and the doctor on duty called each village on his list to see if there were any patients to discuss. Each patient's case was handled in whatever amount of time was necessary and, as a result, all CHA/Ps had to stay near their radios until they had been called for their reports. It was time consuming and sometimes frustrating because of the nature of the high-frequency radio operation. At times, electrical interference at either end or atmospheric disturbances made reception extremely difficult if not impossible. It was often necessary for one village to relay messages for another because of poor reception.

ATS-1 Satellite Program

In 1968 United States Senator Mike Gravel learned about the ATS-1 satellite program and brought pressure to include Alaska in the experiments. He was successful, and when the installations were made, a number of communities in Alaska were included.

The original program was designed primarily for educational purposes, but there was a secondary medical component. The physical location of the transmission equipment in the villages was determined by the availability of electrical power. The project was deemed a great success by all accounts.

In the summer of 1971, ATS-1 earth stations were installed in 19 Alaska villages where high-frequency radio reception was particularly troublesome. They were: Allakaket, Arctic Village, Barrow, Barter Island, Chalkyitsik, Emmonak, Fort Yukon, Homer, Hooper Bay, Huslia, Kanakanak, Nulato, Ruby, Sand Point, Saint Paul, Stevens Village, Tanana, Venetie, and Anaktuvuk Pass. Some of these installations were later relocated to interior villages. More powerful base station transmitters were located at Juneau, Anchorage, Fairbanks, Nome, Kodiak, Kotzebue, and Bethel.

The official dedication of the system was held at the Alaska Native Medical Center (ANMC) in September 1971 with Governor Egan and Senator Stevens as guests of honor. The system worked very well in the villages, but in Anchorage local interference made it unusable. The transmission equipment was later relocated to the upper Hillside area, which cured the noise problem. A remote-control unit at ANMC provided good service for the life of the program.

After completion of the scheduled experimental use of the system, the satellite was made available again for use by the IHS, which had use of it for about four hours every morning for scheduled medical traffic in the Tanana Chiefs Region. In case of a medical emergency, it could be used at other times. Afternoons and evenings the satellite was reserved for use by an educational consortium in Pacific Rim countries.

Medical consultants were available or on-call at the Tanana Hospital. In addition, the University of Alaska could be called in for special programs. In Anchorage, ANMC monitored the medical traffic and their doctors could be called on for consultation.

In an analysis of the program, the Tanana Chiefs reported a 400% increase in Doctor-to-Community Health Aide/Practitioner contacts. The clear and reliable voice communications encouraged CHA/Ps to use it more often than the high-frequency radios, and the frustration from poor reception was eliminated. Medical mistakes from misunderstood symptoms or treatment instructions were greatly reduced. This system continued in daily use until about 1980 when dial-up telephone systems were installed in nearly all village clinics.

Medical Records

In conjunction with the ATS-1 experiment, a task force was established to design a standard patient encounter form with all the data fields necessary for a comprehensive medical record. The task force was unable to realize its plan to have the form ready when the medical experiments started. What seemed like a simple project became a glaring example of resistance to change. The form design was finally completed and became an integral part of the IHS medical records system.

Once the patient encounter form fields were finalized, design of a new medical records system was started that would use mainframe computers in the major IHS medical centers for storage and retrieval of information. The Mumps programming language was chosen because of its ability to minimize the amount of disk space needed for each record.

Since that time there has been a program of continual upgrading and enhancing of the software and hardware to take advantage of new computer and communications technology. In Alaska, the goal is to put all patient encounters into the central database with minimal duplication of effort. The IHS medical records system in Alaska has been expanded to cover all IHS and State of Alaska clinics. The State clinics serve a lot of Native patients, and it makes good sense to have those encounters included in a single database.

ATS-6 Satellite Experiment

On May 30, 1974, the ATS-6 satellite was launched. The Washington-Alaska-Montana-Idaho (WAMI) Telemedicine/ Education experiments began. Several installations were made at schools across the state. The Tanana earth station installation was at the PHS hospital. Remote-control equipment was placed in the nearby Tanana School for their use. Galena and Fort Yukon clinics were equipped for telemedicine and two-way television broadcasting through the ATS-6 satellite. Biomedical telemetry included electrocardiogram and stethophone information.

The Galena clinic was a two-room log cabin on the bank of the Yukon River. These two locations were chosen for this part of the experiment because they had professional nurses on

staff. Encoding equipment was installed for television and voice transmissions. The coding equipment did not work properly so patient privacy was not well protected. Releases were obtained before transmission of any patient information.

The Public Health Service (PHS) Hospital at Tanana and the University of Alaska in Fairbanks had the receiving and recording equipment for processing telemedicine transmissions. The experiment did not last long, and not enough cases were presented to derive any meaningful statistics. What cases were presented over the system demonstrated that communications technology had great promise in improving the delivery of healthcare services to remote areas.

Village Telephone Systems

In May 1972 RCA turned on VHF radiotelephone systems in 19 villages. This was phase one of an expansion program that would eventually provide a single telephone in each of 118 villages. Completion was planned for 1974.

The system made extensive use of mountaintop repeaters. In many cases, service to several villages was routed through one repeater. When they worked, they worked well enough, but there was a serious problem. The provision of power supplies and channels was based on the number of calls that had been handled by the radiotelephone services. When a telephone became available in a village, the explosion in usage overwhelmed the equipment. It was not an acceptable system for emergency medical communications.

In 1976 RCA Alascom began installation of the planned 120 earth stations they would co-own with the State in remote Alaskan villages. Initially, each village received one commercial telephone installation. Most were installed in a community building. As with the VHF systems, the local community government was responsible for collecting the long-distance telephone call charges and paying the monthly bill.

In addition to the commercial telephone, the IHS contracted for private line phones to be installed in many village clinics. At the end of the installation phase, approximately 80 private line phones were installed in village clinics. Each phone had five channels, with Channel 1

assigned to the ANMC in Anchorage. Two IHS regional hospitals were assigned to each of the next three channels. The fifth channel was reserved for inter-hospital communications but was seldom used.

The system could have been adapted for biomedical telemetry, but there was no user demand at that time so it was not done. The ANMC phone was monitored 24 hours a day, 7 days a week at the telephone switchboard office. In case of a medical emergency, any one of five remote-control stations could be switched in for consultation. At the other hospitals, monitoring was less consistent at night and on weekends but very good during the day.

The dramatic improvement in voice communications with the remote village clinics brought immediate benefits. The scheduled medical traffic brought the village Community Health Aides/Practitioners (CHA/Ps) together at one time. Just as with the radio network, they listened to the case presentations of their peers and heard the doctors' diagnoses and treatment instructions. It was a valuable learning experience. It also helped them understand that they were not alone. Other CHA/Ps were experiencing the very same problems and concerns.

ATS-6 Satellite Experiment Revisited

After providing satellite TV broadcasting to India for a year, and then for several months to Africa, the ATS-6 satellite was relocated to once again deliver coverage to most of the North American continent. The limited success of the original experiment in telemedicine was sufficient to justify another trial of the technology. This time only four locations in Alaska would be involved.

The earth station at the Tanana Hospital was reactivated and new installations were made at the ANMC in Anchorage and at the PHS Hospital in Bethel. It was decided to place one station in a remote village clinic with only CHA/Ps on staff. The Huslia health aides had been enthusiastic participants in the ATS-1 experiments for both the telemedicine and educational programs. They were chosen to represent the villages in the experiment.

The clinic in Huslia was a two-room log cabin with a lean-to storeroom. The transmitter equipment was placed in the storeroom and the control rack and video camera in the waiting room. There was not sufficient space in the examination room for anything besides the examination table and a small side table. The system provided two-way black-and-white television transmission (not simultaneous) with an audio channel using the ATS-6 satellite. Voice control of the patient encounter process was provided using the Alascom clinic phone system or the ATS-1 clinic satellite phone.

Doctors in Tanana and Bethel were able to present patients and their X-rays to consultants at the ANMC in Anchorage. An X-ray picture was placed on the light box and the video camera focused on it. The picture received in Anchorage was good enough for many conditions to be examined by the orthopedic physician. It was not good enough for a radiologist to use for more critical examinations of soft tissue.

The health aides at Huslia received only one short day of instruction in using the video camera and the transmitting equipment. The next day they made their first case presentation with the technician present but not interfering or helping. Their case was a little girl with six fingers on each hand. The object was for the orthopedic physician to determine if she was a good candidate for surgery to give her normal hands. The presentation gave positive assurances that she was indeed a good candidate and should be sent in as soon as the operation could be scheduled.

Again, not enough cases were presented to provide any conclusive statistical data. The equipment worked well and the presenters had no problems dealing with the complex systems. It seemed to confirm the old adage that a picture is worth a thousand words. By early summer 1979 the satellite was running low on power used for positioning the antennas. As a result, the NASA control center used the gyroscopic motors for redirection. It worked but was not precise, so quite often reception was too poor to be useful. In August remaining fuel was used to boost the satellite out of its position in orbit to make room for later reuse of the space.

Dial-Up Telephone in the Clinics

Once the Alascom earth stations were in place in the villages, it became possible for the local exchange carriers to come in and install local telephone exchanges with long-distance dialing capabilities. The process started in earnest about 1980, and by 1984 nearly all villages of any size had a telephone system installed. With dial telephones in nearly all village clinics, IHS began turning off its private-line system because of its high cost. The health aides would lose their daily party-line conferences but the money saved would help pay for the expansion of other parts of Native health programs.

Slow-Scan Television

Around 1985 the North Slope Borough installed slow-scan television systems in their village clinics, in the hospitals at Barrow and Kotzebue, and at the Alaska Native Medical Center (ANMC) in Anchorage. It worked well for educational purposes and was useful in some consultations with orthopedic physicians. It provided some of the same benefits enjoyed by the ATS-6 experiment without the extremely high costs. It was excellent for low-grade X-ray but not as effective for displaying manipulation of joints and so forth. It continued in use for several years but then seemed to die out from lack of interest.

Facsimile Machines & Telemedicine

The use of the fax machine for sending patient medical information seemed to have come out of nowhere and burst full-grown into the IHS system. Bristol Bay Area Health Corporation is thought to be the originator of this phenomenon. Privacy rules called for the receiving equipment to be located in the medical records department, with restricted access.

The Community Health Aide prepared the patient encounter form with all the vital signs. The form was then faxed to the regional hospital. As it was convenient, a doctor examined the forms for the day, made a diagnosis, and wrote up instructions. At the time scheduled for medical calls the doctor called the health aide and gave directions for treatment of each case.

This system worked very well because most patients came to the clinic in the afternoon and medical traffic was usually handled in the morning. It was a great relief for the doctors because it eliminated most of the time wasted on basic questions about vital signs and descriptions of the patients. That information was all on the faxed sheet in front of the doctor.

When the telephone systems were first installed in the villages, residents could call each other at any time. With only one long-distance line per village, it soon became a major bottleneck for incoming and outgoing calls. Some of the phone companies installed multiplexing equipment that divided the single long-distance line into as many as four lines. As a result, the quality was still good enough for voice, but the use of computer modems and fax machines was severely impacted. Faxes could be scheduled in the middle of the night and would usually get through because they had all or most of the available bandwidth. What started out as a very positive improvement to healthcare delivery became a less reliable resource.

X-Ray Digitizer

In 1990 the Bristol Bay Area Health Corporation purchased a Discovery digitizer system. The plan was to send X-ray pictures over the telephone lines via dial-up modem to a monitor in the ANMC radiology department. The system worked, but it had the same problem of low bandwidth that slowed down fax transmissions. Radiologists declined to read the pictures because they felt the definition was not good enough for critical diagnosis.

NSHC Experiments with Picture Phone

By the mid-1990s the pressure was on to have a working telemedicine system in place in Alaska. Several conferences were held to discuss ways and means by which it could work. Regional Native health corporations were fully involved in the discussions and eager to get started. The Norton Sound Health Corporation worked with Alascom to put together a pilot project in one of their villages using a device called a picture phone. It was a display-type phone with jacks for plugging in digital medical devices and cameras. This system enabled users to

carry out several successful diagnostic procedures, including consultation with out-of-state specialists.

Several pluses were demonstrated by this experiment. Store-and-forward technology could provide useful telemedicine services to remote villages using existing poor-quality phone lines. Some off-the-shelf technology could be easily put into service immediately without extensive reworking. Community Health Aides were quite capable of operating complex diagnostic tools with a minimum of training.

The Alaska Telemedicine Testbed Project

In 1996 the National Library of Medicine (NLM) issued a request for proposals (RFP) for the purpose of determining, among other things, the impact of telemedicine on the healthcare system as a whole and on the cost, quality, and access to healthcare for specific populations. The Alaska Telemedicine Testbed Project[3] was proposed by a consortium of interested healthcare providers, telecommunications companies, the University of Alaska, and interested private citizens who had already been developing plans for just such a program.

A team was formed of IHS staff members including a biomedical engineer, communications coordinator, electronic medical records supervisor, and a representative of the Alaska Native Health Board (ANHB). They were able to put together a plan to accomplish the aims of the RFP and meet the needs of the remote Alaska villagers for improved healthcare. After substantial modification of the plan by university staff, the proposal was accepted by the NLM, and work began to acquire hardware and software for the project. This undertaking was slow to start. Progress was stalled in getting equipment to the villages, physicians and health aides were slow to begin using the equipment, and in many locations the connectivity could not support the transfer of images. However, eventually the project connected most of the initial 26

[3]More information about this project is presented later in this chapter (pages 29-32).

village clinics and the 4 regional hospitals of Western Alaska using a store-and-forward email solution. The majority of cases transferred via this technology were for training and testing.

The success of a few clinical telemedicine encounters from the ATTP were enough to suggest to other federal health organizations that with improvements this technology could be of benefit to remote Alaskan health providers. The original plans were expanded and carried forward to Senator Stevens' office with a request for funding to include all federal healthcare facilities in the state. Today's statewide network of telemedicine computers and diagnostic equipment are a direct result of that determination to find a way to improve the delivery of healthcare to remote Alaskan communities.

Telehealth Development in the 1990s[4]

Starting fairly early in the 1990s, Alaska experienced an almost explosive expansion of telehealth. It was aided by an equally rapid improvement in telecommunications capability and capacity, which had not been entirely expected.

Infrastructure

The Alaska 2001 Advisory Committee Alaska Public Utility Commission[5] (APUC), chaired by then Lieutenant Governor Fran Ulmer, issued a 1996 report that described the evolution of the telecommunications infrastructure in Alaska, including development of systems by the military and their transfer to the State of Alaska, privatization, and the emergence of local exchange carriers and competitive interexchange carriers. It did not, however, paint a very optimistic picture of a telecommunications future that could support a telehealth system in the state. In fact, in the report the advisory committee admonished the commission that its regulatory policies were closely linked to service quality in bush Alaska and could have negative consequences for rural economic development. The report stated:

[4] The narrative in the remainder of this chapter was written by Edward Deaux.
[5] In 1999 APUC became the Regulatory Commission of Alaska (RCA) under Title 42 Chapter 4 Section 10 of the Alaska State Code.

> As competition is introduced into telecommunications markets, monopoly firms are forced to become increasingly competitive and are facing new and different market incentives. Regulators need to be aware of those changing incentives and refocus their priorities if they wish to ensure a quality communications infrastructure.
>
> A case in point is the growing disparity in service between urban and rural areas of the state for interexchange service. In urban areas service is very good and getting better. Currently Anchorage is connected to the Lower 48 by fiber-optic cable and Fairbanks and Juneau are connected to Anchorage by digital microwave. The transmission facilities between Anchorage and Fairbanks may soon be upgraded to fiber and AT&T has announced its intentions of installing a $25 million switch in Anchorage. Interexchange services in the bush, as discussed in a previous section, are characterized by poor voice quality, slow data transmission speeds, and modem connections that spontaneously disconnect.
>
> Part of the problem in the bush has to do with investment incentives faced by Alascom. As noted previously, upgrading all bush earth stations from analog to digital was originally scheduled for completion FY 1994, but has been delayed to the 1997-2000 time period. As the state agency responsible for overseeing the quality of the state communications infrastructure, the APUC needs to be aware of the economic development implications of this delayed deployment and how it might be related to its regulatory policies.[6]

Also in 1996 Lieutenant Governor Fran Ulmer organized the Telecommunications Information Council (TIC) with task forces on telemedicine, education, information systems, economic development, emergency communications, and public broadcasting. The Telemedicine Task Force Report and others were summarized, and recommendations based on the task force reports and on hearings were published in the Telecommunications and Information Technology Plan of December 1996. The full Telemedicine Task Force Report included status reports and historical background on projects.

Computers continued to play an increasingly important role in healthcare delivery, administration, and public health services in the 1990s. Computer literacy increased statewide as it did nationwide. Computerization of medical records and encounter (visit/billing) data became increasingly common with the IHS, the regional Native health corporations, and the public health

[6] Report to the Alaska Public Utilities Commission, Alaska 2001 Advisory Committee, March 1996.

nurses, all coming online to use the Resource and Patient Management System (RPMS) to provide uniform data about patient encounters.

Since the early 1990s, the private hospitals, Native health corporations, ANMC, federal services, and State public health services have sought to capitalize on and to stimulate deployment of computer resources, know-how, and telecommunications infrastructure to improve healthcare throughout Alaska. Projects have obtained start-up funding primarily from federal sources including the National Telecommunications and Information Administration (NTIA), National Library of Medicine (NLM), Alaska Indian Health Service (IHS), Rural Utilities Service (RUS), Department of Defense (DOD), Department of Veterans Affairs (VA), the U.S. Coast Guard (USCG), and private sources (e.g., hospital investment). Roughly in order of appearance, these projects have included the following described in terms of three phases: (1) early prototype development, (2) general developmental, and (3) institutionalization.

Early Prototype Development (1992-1995)

The Community Health Aide Information Network (CHAIN), Nome/Norton Sound Health Corporation (starting about 1992) was the first prototype program. This was a rather customized system, designed by Mike Terry and others. The Alaska Telemedicine Project (ATP), a consortium of partners that initially included the University of Alaska Anchorage, AT&T Alascom, and Providence Health Systems, and later representatives from State, tribal, and private organizations, began meeting in Anchorage in 1994. Concurrently with the work of ATP, a federal partnership on radiology emerged—an orthopedist and a radiologist in the federal system obtained several slow digital scanners for X-rays and set up a three-hospital system. Assistance for this project was provided by Tripler Army Base in Hawaii. Barriers prevented the system from being used to maximum efficiency or from being fully utilized. Primarily, consultant radiologists were available only during certain hours—not full-time or around-the-clock, which was what the Community Health Aides needed for the resource to be dependable. Eventually, five rural hospitals were added to the system, but the larger clinics that expected to

be added (e.g., McGrath) were never tied in. Teleradiology was also initiated in the early 1990s in the private sector hospitals in Alaska.[7]

Representatives of the NLM and the Office for Rural Health Policy visited Nome and other sites in Alaska in 1994 at the invitation of the ATP. The CHAIN system used e-mail attachments of captured camcorder images and Picazo Phone for telemedicine, a database of patient visit/clinical information, online conference groups, and billing information. However, it went into decline when the Norton Sound Health Corporation failed to provide for adequate ongoing technical support. The system was designed to operate over low bandwidth. About 9600 baud was the maximum used, the average was about 300 to 2400 baud.

General Developmental Phase (1995-1998)

Multiple projects across the state got underway between 1995 and 1998. These included the Alaska Telemedicine Testbed Project (funded by NLM), the Wrangell-Petersburg-Bartlett Project (small NLM grant), several Native health corporation projects, and the North Slope Borough project.

The North Slope Borough successfully applied to NTIA for a grant to expand its Slope-wide AuroraNet project to include distance delivery health care (DDHC). The DDHC project hired consultants to expand the network to seven village clinics and added telemedicine workstations for multiple clinical applications. However, due to high turnover particularly at the Barrow hospital, the project never achieved full implementation.

In 1996 on behalf of the members of the ATP, the Applied Science Laboratory of the University of Alaska Anchorage was awarded a two million dollar contract from the NLM to evaluate the uses of narrow bandwidth telemedicine and telehealth applications and technologies in "frontier" Alaska. Frederick W. Pearce, Ph.D. was the principal investigator. The Alaska Telemedicine Testbed Project (ATTP) developed, deployed, and evaluated the use of narrow-bandwidth telemedicine for otolaryngology and dermatology. Twenty-six villages and four

[7] The teleradiology projects in Alaska are described later in this chapter (see pages 68-70).

regional medical hubs in Western Alaska (i.e., Bethel, Dillingham, Kotzebue, and Nome) were chosen from among 12 proposals for participation. Ear, nose, and throat (ENT) services were chosen for statistical reasons, because they exhibited no evaluation bias for gender and age. Moreover, otitis media was viewed as a serious clinical problem in rural Alaska.

The ATTP deployed an Alaska telemedicine workstation designed to work in villages and clinics and to be used as productive tools by Community Health Aides. A one-year delay in the customization of Medvison software was a major obstacle in deployment and evaluation timelines. The ATTP was designed to deliver a three-pronged evaluation to the NLM. Using 1996 air transportation records as baseline for the study, ATTP was designed to discover:

- If patients and providers perceived telemedicine encounters as good or better than current transportation-based models of health care delivery for ENT and dermatology
- If the use of advanced telecommunications and information technologies could mitigate "professional isolation," the most cited reason for the high turnover of health care professionals in rural Alaska

The ATTP also completed a cost and benefits study designed to (a) analyze the benefits of telemedicine and telehealth services, and (b) identify the cost per transaction of each telemedicine encounter.

The results of ATTP showed that both patients and providers perceived telemedicine to be *as good as* or *better than* transportation-based models of healthcare delivery, but the provider "survival" data suggested that telemedicine and telehealth applications did not increase the length of stay of healthcare providers in rural Alaska.[8] The cost analyses showed that the average telemedicine encounter cost less than $40 and that costs were falling.

Providence Health Systems installed digital X-ray scanners in several rural hospitals where adequate telecommunications support was available. For both Providence and Alaska Regional Hospitals and for private physicians and groups that had invested in telemedicine

[8] Pearce, Frederick W. Presentation to the 17th Annual Conference of the Caribbean Association of National Telecommunication Organizations, San Juan, Puerto Rico, May 30, 2001.

software and equipment, these efforts were made within the framework of organizational business plans to be supported by their capital and operational budgets for provision of health services (rather than supported by grants).

Passage of the 1996 Telecommunications Act stimulated new interest and activity in telemedicine deployment. Rule making began in 1997. The act provided for many changes to the telecommunications industry in America. One change proposed that schools, classrooms, healthcare providers, and libraries should have access to advanced telecommunications services. Section 254 of the act required the FCC to explore actions that would provide advanced telecommunications services to rural healthcare providers. The act required that:

> …a telecommunication carrier shall, upon receiving a bona fide request, provide telecommunications services which are necessary for the provision of health care services in a state, ... at rates that are reasonably comparable to rates charged for similar services in urban areas of that state.

On May 8, 1997 the FCC issued a report that outlined the approach it was adopting to implement the requirement. The FCC approach was for all rural and nonprofit healthcare providers to be able to obtain telecommunication services at rates comparable to those paid by similar services in the nearest urban area with more than 50,000 residents. Any telecommunications service with a bandwidth up to 1.544 Mbps that was necessary for the provision of healthcare services was eligible for financial support from a Universal Service Fund (USF). Additionally, telecommunications carriers could not charge a rate higher than the highest rate charged in the urban setting. To implement the program, the FCC established the Rural Health Care Corporation. About a year later this corporation and the Schools and Libraries Corporation joined the Universal Service Administration Company (USAC).

Institutionalization Phase (1998-1999)

Investment in a major project proposed by the Alaska Federal Health Care Partnership (AFHCP), the Alaska Federal Health Care Access Network (AFHCAN), was assured by the end of 1998 through legislative and budget initiatives of Senator Ted Stevens. Meanwhile, the ATTP was being implemented in the field at the Maniilaq sites (Northwest Arctic Borough), in the Yukon-Kuskokwim Delta, and at other planned sites. Alaska Native Health Board (ANHB) telemedicine staff developed expertise working on the ATTP / NLM project, and the Alaska Federal Health Care Partnership (AFHCP) selected the ANHB to serve as the first project office for the AFHCAN project.

Telecommunications infrastructure advanced during 1998 with new fiber-optic cable installation and satellite dish deployment. Unfortunately, an important satellite launch that would have provided more capacity for Alaska failed. State involvement was occurring through technical assistance from participation in AFHCAN by the Alaska Department of Health and Social Services, Division of Public Health and Public Health Nursing.

The Yukon-Kuskokwim Health Corporation (YKHC), Tanana Chiefs Conference (TCC), Providence Health Systems, Norton Sound Health Corporation, Council of Athabascan Tribal Governments, Maniilaq Health Center in Kotzebue, and others were making consistent progress in training, equipment deployment, and acquisition of software—trying to resolve telecommunications problems with greater access to bandwidth locally (WAN / LAN / wireless and traditional solutions) and regionally. The TCC, Ketchikan General Hospital, Maniilaq Health Center, and Bartlett Regional Hospital were pioneers in seeking completion of Universal Service Fund (USF) contracts with telecommunication service providers. Bartlett Hospital in Juneau was using services provided by AT&T for weekly grand rounds and for clinical consults with Virginia Mason Medical Center in Seattle for more than a year. The ATTP website was used by the UAA School of Nursing for web-enhanced distance education (e.g., assignments, “classroom discussion,” and peer as well as student/teacher conversations) and for clinical presentations.

The Alaska Department of Corrections initiated telemedicine for intake and follow-up of mental health patients in prisons using relatively low-cost and modest bandwidth videophones with television monitors for live videoconferencing between Anchorage and correctional facilities over "regular" phone lines (about 28.8 Kbps). In just a year and a half of experience, the psychiatric providers in Anchorage (one psychiatrist with part-time backup and one psychologist) found the system highly effective, reducing transportation and security costs, and provider travel while facilitating higher quality doctor-client relationships than telephone interviews. Video quality was adequate for observation except for fine motor skills, which they monitored in monthly visits to correctional facilities. Client acceptance was extremely high.[9]

Universal Service Funding (USF) for rural health clinics was delayed into 1999 with applications processed but funds not available in 1998. Response by rural healthcare providers eligible to apply for subsidized services was dramatic. As of early 1999 Alaska had 42 approved applications reflecting requests for services at 229 sites—a larger number of sites than in any other state. Late in 1997 the Alaska Department of Health and Social Services Division of Public Health assigned a half-time staff person to follow telemedicine developments, with particular attention to those that would affect Medicaid services for children. This staff person also served as the outreach, technical assistance person, and the policy analyst for the department on the Universal Service Fund.

The Arctic Council approved an arctic telemedicine project as part of its two-year agenda for 1999-2000. The University of Alaska Institute for Circumpolar Health Studies was awarded a State contract for conducting a survey of arctic nations' telehealth activities as part of that process. The survey was designed to lay groundwork for information sharing and planning for sustainable development initiatives involving telecommunications for the improvement of healthcare, dissemination of health information, and health workforce training in the arctic nations.

[9] More information about this project can be found on pages 70-74 of this report.

Internet-based information exchange through e-mail and web access also quickly spread in Alaska as elsewhere, especially in 1998 and 1999, as access to bandwidth improved dramatically. This was recognized by the public health system and the healthcare delivery system as a tool for improving service, providing training, and obtaining information for consumers and for health professionals (i.e., for distance learning).

Alaska Telehealth Advisory Commission (& Council)

The following personal account of Tom Nighswander, M.D., M.P.H. has been excerpted from the ATAC FY 2002-2003 Annual Report:

> The Alaska Telehealth Advisory Commission was formed at the request of Senator Ted Stevens. In November of 1998, I was with Karen Perdue, our former health commissioner, at a meeting with Senator Ted Stevens when he discussed the funding of the AFHCAN project. Given the challenges of Alaska, he saw the possibilities of what this technology could do not only for health care issues, but also education.
>
> His vision was that this initiative, although initially directed to the Federal Partners in Alaska, would have spin-offs that would be available to all Alaskans.
>
> To provide some level of coordination and cooperation, he asked Commissioner Perdue to organize an advisory body that consisted of the potential major players in Telemedicine in our state. He and his office had a direct hand in the membership of the Commission, which included representatives from the telecommunication industry, the major hospitals in our state, professional provider groups, and the University of Alaska.[10]

Commission Membership & Mission

The Alaska Telehealth Advisory Commission's membership involved key players in the healthcare and telecommunication systems in Alaska, including the Alaska Commissioner of Health and Social Services, chief executive officer of Providence Health Care Systems, a representative of Alaska Public Utilities Commission (APUC), a representative from the Alaska House of Representatives, the chief executive officer of GCI, the president of the University of

[10] FY 2002 - 2003 Annual Report, Alaska Telehealth Advisory Council, Anchorage Alaska, September 2003.

Alaska, a member from the Alaska State Medical Society, a member of the Alaska Federal Health Care Partnership (AFHCP), the chief executive officer of the Alaska Regional Hospital, the president of AT&T–Alascom, the president and chief executive officer of the Alaska Native Tribal Health Consortium (ANTHC), and the director of the Department of Veterans Affairs.

The mission of the Alaska Telehealth Advisory Commission was expressed in the charge that the chair made to the commission during its first meeting. The mission was to:

1. Explore and document the potential for and challenges to telehealth development and delivery in Alaska, using the best professional information available.

2. Propose a framework for rational development and deployment of statewide capacity for telehealth/telemedicine systems.

3. Establish core principles to ensure a coordinated, cost-effective, and integrated approach to telemedicine in Alaska.

4. Consider ways to assess effectiveness, efficiency, and the improvement through telemedicine, if any, in equity of access to health services for all Alaskans.

5. Recommend a long-term process for addressing issues as they emerge with changing technologies and practice patterns.

The commission met as a whole only five times, one full day each month from January through May 1999, and the interim report from the commission was published in June 1999. In addition to the meetings of the entire commission, five subgroups, including additional individuals and representatives who were not members of the commission, were to discuss separate topics: (a) legal issues, (b) fiscal issues, (c) communication policy, (d) professional development, and (e) oversight. The issues and recommendations they developed during the subgroup meetings were brought back to the commission and adopted as commission recommendations during the April meeting, and they were included in the Final Report of the Commission published in June 1999.

ATAC Core Principles

Although the commission was in existence for only six months, it accomplished a prodigious amount of work and produced principles and boundaries that are still guiding those who are involved in continuing development of telehealth in Alaska. Most important among those were the Telehealth Core Principles, articulated below:[11]

1. Any entity that becomes engaged in statewide telehealth in Alaska should ensure equal access, when financially realistic, to all Alaskans who would benefit from this technology.

2. All entities participating in telehealth must assure that their systems meet interconnectivity and interoperative standards and participate in the coordination of other telehealth efforts in the state of Alaska.

3. All telehealth applications should be acceptable to both the patient and the provider and be easy to use.

4. All entities that participate in telehealth must determine their financial viability for the long term, including the provision of professional capacity development and training as an ongoing component of operating expenses.

5. All participants in telehealth in Alaska should engage in a needs assessment and evaluation of services.

Although at first glance these principles seem relatively simple and obvious today, in 1999 they were not. Competition was high, individuals and organizations were scrambling to find the best technology to suit their needs, and telecommunications systems to support any type of statewide telehealth program were uneven at best, and nonexistent in some parts of the state.

The Commission's Vision

Given the context and environment in which the commission did its work, its accomplishments were not only influential but remarkably visionary. Commission members realized that the commission itself had a very short life, but its work could not be completed in that period of time. It was therefore decided that an Alaska Telehealth Advisory Council should

[11] Prepared for the Commission by Tom Nighswander, M.D., M.P.H., and included, with additional explanatory material, in the Final Report of the Commission, June 14, 1999.

be established to continue the commission's work, not only to refine principles, standards, and guidelines initially proffered by the commission, but also to expand the group's involvement in telehealth and monitor to the extent that it could, the development of a telehealth system in Alaska. Subgroup recommendations adopted by the commission would be pursued by the new council. Events that took place since that June 1999 report have in many cases resulted from the subgroup recommendations and principles summarized below.

Commission Recommendations

Fiscal Subgroup

The fiscal subgroup began its work on the premise that in Alaska in 1999, few mechanisms were in place to pay for telehealth practices, unless they were so embedded in other medical procedures they went unnoticed in the billing and payment process. Yet the only way telehealth could conceivably work in Alaska was if the payers (in both government and private sectors) established policies, procedures, schedules, and methods for covering telemedical consultations and the abundance of other telehealth procedures and events that could, in the long run, be eligible for reimbursement. Given that setting, the following observations and recommendations were presented to and adopted by the commission:

1. Medicare reimbursement for real-time teleconsultation was available only if it originated in a health profession shortage area. The commission recommended that this be changed and that Medicare cover the entire state of Alaska.
2. For Medicaid, the commission recommended that codes be modified to capture telemedical encounters and procedures, either through programmatic or regulatory change.
3. In order for telehealth technology to achieve sustainability in Alaska, reimbursement for telehealth services is fundamental. The commission recommended that Medicaid, a significant payer of medical services in Alaska, set the standard for reimbursement for telehealth services.
4. The commission recommended that the Alaska Telehealth Advisory Council (ATAC), proposed to continue the commission's work, complete appropriate research and make specific recommendations to the Health Care Finance Administration (HCFA) regarding the definition of an "encounter," to enable telemedicine encounters to be billable.

5. The commission also recommended that the continuing ATAC be charged with researching the fundamental issue of the predicted inequitable cost differential that would result from the implementation of telehealth in Alaska, with small, locally based clinics incurring increased costs and hub or urban hospitals incurring decreased costs.

Medicaid Telehealth Reimbursement Principles. In addition to these recommendations, the following principles related to Medicaid reimbursement originated from the fiscal subgroup meeting and were adopted by the commission:

- Patients should be served in the least restrictive environment. Care provided to patients should be as close to home as feasible.
- All telehealth care providers billing for Medicaid services must be enrolled with Medicaid.
- All reimbursable services must be covered in the current Medicaid benefit package.
- Payments will not be made for use of telemedicine technology (purchase, maintenance, or training).
- Technical and consultants' fees, both in store-and-forward, will be reimbursed by CPT4 according to the established fee schedule.
- Modifiers will be developed to identify telehealth services and to facilitate the collection of data.
- Remote monitoring services will be covered for established technologies (e.g., EKG, perinatal monitoring).
- There will be no geographic barriers to reimbursement—payment will be made whether the patient and/or provider are located in rural or urban sites.

Transfer of income and expenditures resulting from telehealth exchanges was a topic of frequent discussion and study by the commission, which predicted that as telehealth grew in Alaska costs would be assumed by the Alaska Native Medical Center (for consultations and time spent by physicians and medical specialists reviewing incoming telehealth transmissions) and that regional Native health corporations would experience savings due to lowered expenses for medivac and other transportation costs.

Legal Subgroup

The legal subgroup of the commission took a slightly different tack in its approach to reviewing actual and potential legal problems and proposing recommendations about ways to overcome those problems. Enabling telehealth was a high priority. The subgroup developed a list of legal issues and made the following observations:

1. Nothing is currently foreseen within the legal arena that should hamper or stifle the furtherance of telehealth/telemedicine in Alaska.
2. Legal matters are best left within the State's jurisdiction to resolve rather than being relegated to the federal level. They are also best left to professional practice.
3. No regulation currently exists in Alaska requiring a medical provider to produce or retain any medical record at all, including a record of telehealth activity.
4. The growth of telehealth in Alaska does not require federal or state "supervision or oversight."

Given the foregoing, the recommendation from the legal subgroup was basically a charge to the soon-to-follow advisory council. Existing groups (e.g., the Federation of State Medical Boards, State of Alaska Boards Commissions, and Associations) should be charged with the responsibility to study these legal issues and recommend solutions.

Communication Policy Subgroup

Issues related to telecommunications were, and continue to be potential hot spots for the growth of telehealth in Alaska because of the endemic competition among telecommunication providers. An example is the "last-mile problem." When a major long-distance carrier (LDC) (i.e., AT&T-Alascom and GCI) transmits complex telehealth information over their ground- and satellite-based system and that information reaches a rural destination, it must be carried over the "last mile" on the local exchange carriers' (LEC) equipment. In that setting provision of telehealth services requires the interconnection and cooperation of LDCs and LECs, a situation that grew in complexity when the USF was added to the scenario. Federal and state policies

prohibited the LDC from directly receiving federal support for telehealth services, although the LDC service is a critical and at times expensive component of telehealth service. To resolve this dilemma, which could have easily crippled Alaska's development of a statewide telehealth system, a stipulation was crafted jointly by the LDCs and most of the LECs and ultimately approved by the APUC (see U-97-173[4], 5/13/99). It permitted LDCs providing telehealth services in Alaska to receive USF indirectly through a Federal Communications Commission (FCC) waiver. This has come to be known as the "Alaska solution." Within this setting, the communication policy recommendations adopted by the commission were as follows (the sequence does not imply any priorities):

1. In general, regulatory agencies and organizations need to establish their goals and explain the purposes for regulations, but not prescribe the technology that must be used to achieve the goals. (In retrospect, the point the commission was making was important. Simply put, regulatory agencies should state *what* they want as an end product but not *how* it is to be produced.)
2. Initial and ongoing training must be supported as operational costs for any telehealth endeavor, or we will have another case of the "windmills of Shishmaref."[12] This must be considered an essential aspect of the sustainability of the overall telehealth system.
3. The majority on the commission recommended that the FCC should be requested to change its regulations regarding the definition of an "eligible telecommunications carrier" or take other action as necessary to give the rural health care providers (RHCPs) relief from any regulatory restraints that might prevent them from enjoying the benefits of better technology, service options, and pricing.
4. The commission supported the concept that the model that had been so effective in enabling the educational system of Alaska would likewise benefit the further development of the telehealth system.

Professional Development & Capacity Building Subgroup

Reflecting on recommendations of the communication policy subgroup, the professional development subgroup concentrated on the need for training, not only as telehealth equipment

[12] The worst-case scenario was likened to the situation that occurred in Shishmaref when electricity-generating windmills were constructed and used only briefly before they fell into disarray due to insufficient training of village residents in maintaining them and keeping them in good repair. This example was brought to the commission's attention by Mark Hamilton.

was deployed in Alaska, but for the long term, to ensure that new staff are able to receive the training they need quickly to prevent an erosion over time of the capability to utilize existing telehealth equipment. The following recommendations were adopted by the commission:

1. Expenses for both initial and ongoing training need to be built into the operating costs for the provision of telehealth/telemedicine, thereby to be covered in the reimbursement for that service.

2. Federal and state government funds coming into the system are helping to jump-start the training and education needed to initiate telehealth, but the continuation of professional development should not rely on these government subsidies.

3. Training and continuing education should be incorporated in the job descriptions of the end users of telehealth and telemedicine hardware and software.

4. Asynchronous training should be available to enable end users to learn at their own speed and to fit education into their work schedules.

5. Medical providers should be a key focus of professional development, and professional associates should play a key role in providing this training.

As will be seen, ongoing training is a major need and will continue to be so in the future, requiring sustained financial and professional support. For the AFHCAN project alone, the training demands related to maintaining and fully utilizing more than 200 telehealth units scattered all across Alaska were a challenge.

Transition to the Alaska Telehealth Advisory Council

When the sunset for the commission approached, its members voted to continue the work by transitioning into a council with a limited number of representatives added to the group.[13] The Alaska Telehealth Advisory Council (ATAC) has been in place ever since, holding four meetings between September 1999 and June 2000 and three meetings during every state fiscal year. When the ATAC held a planning retreat in October 1999, it revised its vision:

[13] The additional entities were the Mental Health Trust Authority, Primary Care Association, Nursing Association, Alaska Telephone Association, and a representative of private insurance.

> Telehealth systems would be accessible to all patients and providers, operate under effective voluntary standards, be easy to use and highly acceptable by both patients and providers, and importantly, be financially sustainable.[14]

In December 1999 the ATAC decided it would be helpful to conduct a survey to assess the state of readiness for telehealth in the private sector. At that time, coordinated information was scarce concerning the readiness of nonfederal rural healthcare providers for participation in telehealth programs. The firm Daniels, Tschannen, & Associates in Anchorage was selected to design and conduct a survey, and 132 questionnaires were sent to rural health clinics, rural hospitals, community mental health centers, rural physicians, and Pioneer Homes. Of those, 53 (40%) were completed and returned. Recommendations that resulted from the survey include:

- Sponsoring and promoting legislation at the state level
- Funding development of a working prototype telehealth model
- Sponsoring training programs
- Funding support for required hardware and software needs
- Sharing telehealth program information within the state
- Coordination of efforts with other agencies interested in advancing telehealth programs in the state

The survey also found that (a) a large percentage of providers were connected to the Internet, with primary use being e-mail; (b) numerous participants expressed an interest in participating in a telehealth program with proper safeguards and security in place; (c) there was a lack of training in computer use for purposes of telemedicine and handling medical information; and (d) there was a lack of easily available and affordable technical support for rural programs.

Telemedicine Efficacy & the Medicaid Telehealth Reimbursement Research Projects

A second endeavor initiated in FY 2000 was the Telemedicine Efficacy project, awarded to the firm of Kez'aani, LLC, also located in Anchorage. The focus of the project was to generate telehealth clinical encounters for the evaluation and development of reimbursement guidelines,

[14] Alaska Telehealth Advisory Council Final Report FY 2000, page iii.

demonstrate interoperability capabilities of several different delivery systems, and develop a telehealth consultation process that was easy to use and time efficient for busy practitioners.

A third research project was the Medicaid Telehealth Reimbursement Research Project, awarded to the firm of Myers and Stauffer. This project sought to research telehealth reimbursement, propose guidelines and regulations for Medicaid reimbursement, and recommend specific Medicaid payment and coverage policies related to telehealth services (e.g., provider service types, specialty restrictions, and guidelines to maximize in-state services).

In FY 2001 the Medicaid Telehealth Reimbursement Research Project produced two reports. The first summarized telehealth initiatives, current projects in other states, and reimbursement and coverage of services in other states. The second addressed Alaska-specific issues such as technological infrastructure to support a telehealth system, geographical challenges to healthcare delivery, actual and potential collaborative relationships, profiles of healthcare providers, and a description of patients who could benefit from telehealth technology. Beyond the project, an important advancement was made when congressional language was approved that provided an exception to Alaska (and Hawaii) and allowed for billing of store-and-forward telemedicine. This was, and still is particularly helpful because the most common telehealth methodology in Alaska is store-and-forward (sometimes called asynchronous transmission), and it was the method used in the AFHCAN project.

Among many different recommendations, the Medicaid Telehealth Reimbursement Research Project advocated that (a) Alaska adopt a policy by which Medicaid fees for telehealth services will reimburse a portion of the practitioners' start-up and ongoing costs for technical applications; (b) the amount of payment for teleconsultations not exceed the current fee schedule amount for the service rendered in the traditional manner; (c) at the initial consultation the referring provider be reimbursed for an office visit[15] and the consulting practitioner receive 100%

[15] At the time the Research Project was completed in September 2001, a minimum-level office visit was reimbursed by Alaska Medicaid at $31.44.

of a fee for services delivered during the consultation; and (d) telehealth services be restricted no more than those same services delivered via face-to-face, non-telehealth means.

On May 4, 2000, Senator James Jeffords[16] of Vermont introduced S. 2505, the Telehealth Improvement and Modernization Act of 2000,[17] which amended Title XVIII of the Social Security Act to permit telemedicine services to be reimbursed by Medicaid. The act also stated "in the case of any Federal telemedicine demonstration program in Alaska or Hawaii, the term 'telecommunications system' includes store-and-forward technologies that provide for the asynchronous transmission of healthcare information in single- or multi-media formats." A provision of the act mirrored precisely the recommendation from the Medicaid Telehealth Reimbursement Research Project that the originating site receive a "facility fee" and the physician at the distant site receive "an amount equal to the amount that such physician or provider would have been paid had the item or service been provided without the use of a telecommunications system." The act was passed by Congress and took effect on October 1, 2001. On September 6, 2002, the Alaska Department of Health and Social Services published a Notice of Proposed Changes, "Adoption of regulations for the reimbursement of Medicaid payments provided through a telemedicine mode or method of delivery,"[18] and, effective December 15, 2002, Alaska Medicaid began reimbursing for telemedicine services.[19]

Licensing

One issue that was initially raised and discussed at length during the commission's days was licensing for telehealth involvement, and this topic was revisited in FY 2001 by the Alaska Telehealth Advisory Council (ATAC). The Alaska State Medical Board established the requirement that one must have a medical license in Alaska to provide any telemedicine service.

[16] With Senators Rockefeller, Grassley, Breaux, Murkowski, Stevens, Bond, Inouye, Harkin, Roberts, Thomas, Bingaman, Conrad, Kerry, and Edwards.
[17] Available at www.muhealth.org/~telehealth/geninfo/s2505.pdf
[18] Alaska Statutes 47.05.010 and 47.07.030.
[19] In a report of the reimbursement workgroup to the ATAC in November, 2000, it was also mentioned that "Blue Cross has indicated that they will cover telehealth services, following Medicaid's lead."

In other words, a physician in Seattle providing a consult based on a telemedicine transmission from an Alaska site would need an Alaska medical license. The second aspect of licensing, which was not addressed, was the carrier of the telemedicine transmission. In 1999 the commission likened the situation to licensing Medivac providers. Possession of some form of license or credential was thought to be necessary—or at least prudent—because of the liability the telemedicine carrier would encounter if, due to some telecommunication error, an image that was received was sufficiently distorted during transmission to cause an incorrect diagnosis or prescription at the receiving site.

Continuation of the Alaska Telehealth Advisory Council

At the completion of the first year, council members agreed to continue the Alaska Telehealth Advisory Council (ATAC) for another year. In its April 2000 newsletter, Dr. Tom Nighswander wrote that continuation was due to a number of ongoing activities and issues:

- Workgroup projects implemented in 2000 needed to follow through to completion.
- The Medicaid Policy Analysis project would most likely generate regulatory, and perhaps even legislative, recommendations.
- Official council representation, collaboration, and coordination were needed for the Distance Education Technology Consortium.
- Strategy development was needed to promote the use of telemedicine applications in non-federally sponsored settings.

The final point is important because Senator Stevens' original vision for the commission (and subsequent council) was to ensure that the AFHCAN project, which he had been instrumental in funding, would expand over time to include private entities that were not a part of the federal partnership. There was also a consensus among the ATAC members that meeting regularly to share information and discuss both successes and new challenges was helpful to everyone and would clearly further telemedicine/telehealth development in Alaska.

The question of continuing the ATAC came up after completion of its second year and again at the end of its third. The ATAC became a permanent fixture on the telehealth landscape

of Alaska and continues to address new and growing issues related to the growth of AFHCAN and several other telehealth/telemedicine projects. Its workgroups take on major issues that actively or potentially impact participants in the telehealth system and offer a sounding board to other entities that are in some way involved, including state and federal regulatory agencies. The ATAC champions reimbursement for telemedicine encounters and provides systematic communication to Senator Stevens and the Alaska congressional delegation on telehealth issues and needs. As this report is being written, five years have passed since the first meeting of the Alaska Telehealth Advisory Commission. Amazing advancements took place in five short years. Both telecommunications and telehealth in Alaska expanded and grew exponentially.

In November 1998 Senator Stevens envisioned the creation of a statewide telehealth advisory group that (a) would ensure that federal funds coming to Alaska would help advance, not detract from, the development of a true statewide telehealth system and (b) would, in the end, involve nonfederal entities. His vision is being fulfilled through the ATAC, which continues to perform many valuable functions and will no doubt maintain that role far into the future. As AFHCAN and other telehealth/telemedicine programs and projects expand, they will no doubt incorporate nonfederal, private sector partners that will further Senator Stevens's vision.

The Alaska Federal Health Care Access Network

The Alaska Federal Health Care Partnership

In 1996 the DOD (Army and Air Force), VA, USCG, and the IHS formed the Alaska Federal Health Care Partnership (AFHCP) by a Memorandum of Agreement. This collaboration was intended to reduce duplication of service within the healthcare delivery systems of these entities, increase cost efficiency, and reduce travel costs, especially those incurred when beneficiaries would otherwise have to fly to Seattle or some other Lower 48 facility. When the tribes acquired all the IHS-funded facilities and programs, the Alaska Native Tribal Health Consortium became a member of the AFHCP. At the time of the AFHCP's creation, its members

served more than 200,000 beneficiaries in Alaska (nearly 40% of the state's population) with total expenditures exceeding $700,000,000 a year; and in the first 2 years of its existence the AFHCP saved more than $2,000,000 through economy of scale practices (e.g., joint purchasing and consolidated training).

The following list shows the distribution of federal beneficiaries in the mid-1990s. The categories are not discreet (e.g., a veteran who is Alaska Native could be counted as a veteran and IHS). The numbers have increased significantly since 1990.

- 3,000 U.S. Coast Guard (USCG) beneficiaries, including dependents
- 20,000 Department of Defense (DOD) military personnel (Army and Air Force)
- 27,000 DOD dependents
- 65,000 Department of Veterans Affairs (VA) beneficiaries
- 97,000 Indian Health Service (IHS) beneficiaries

The Statewide Telemedicine/Telehealth Vision

During the partnership's early years, plans were coming together both within the University of Alaska Anchorage and the Alaska Native Health Board (ANHB), which envisioned a statewide telemedicine network to connect the more than 200 health clinics and other facilities through which the partners were providing services. These activities resulted in a proposal, prepared by the AFHCP and submitted in March 1998, to fund development and deployment of a system named the Alaska Federal Health Care Access Network (AFHCAN). The following statement from the proposal set the stage:

> Recent advances in telemedicine technologies and in-state support for advanced telehealth network systems have opened the door for a dramatic improvement in the delivery of health care and health education to remote and rural environments. AFHCP sees these technology advances as a unique opportunity to reduce certain costs and greatly improve health service to all federal health care beneficiaries in Alaska.
>
> The emergence of new telecommunications technologies available to and being implemented in a more competitive environment in Alaska is making access to smaller communities more feasible. The establishment of the Federal

Communication Commission's Universal Services Fund makes these technologies more affordable in a state that is totally dependent upon telecommunications for access.

Finally, Alaska is reaching a critical mass of experience and knowledge resulting from a number of projects dealing with telemedicine, distance health, and distance learning over the last 25 years. The list of current projects includes the joint University of Alaska National Library of Medicine Telemedicine project, the Alaska Telemedicine Project, Bartlett Telemedicine Project, WAMI[20] Telemedicine Project, the Auroranet Project, and National Telecommunications and Information Administration (NTIA) telemedicine projects via the Yukon-Kuskokwim Health Corporation, North Slope Borough, and the Congress of Athabaskan Tribal Governments.

Using research and information gathered from other telemedicine projects, AFHCP partners have designed a telemedicine and telehealth system that will dramatically decrease the necessity of travel and at the same time extend the reach of VA, DOD, and IHS specialty and support services to more remote areas of Alaska.

AFHCP is therefore proposing to develop and install a comprehensive telemedicine and telehealth system called the Alaska Federal Health Care Access Network (AFHCAN) that will create a minimum set of telemedicine and telehealth standards to revolutionize the way federal health care is delivered in Alaska. The human and capital resources necessary to accomplish this ambitious project are large, but through the strength of the combined resources of the AFHCP partners, the State of Alaska, the Alaska Native Regional Health Corporations, and support from Alaska's congressional delegation, this health revolution is now entirely within reach.

The budget for the four-year AFHCAN project was proposed as follows: $8.07 million in FY 1999, $11.21 million in FY 2000, $10.08 in FY 2001, and $1.32 million in FY 2002 for a total of $30.68 million. With the help of Alaska's senior senator, Ted Stevens, the proposal was approved; and funding for the project began in FY 1999.

[20] The Washington, Alaska, Montana, Idaho medical program.

The AFHCAN Sites

The proposal outlined the extraordinarily high costs of providing healthcare to federal beneficiaries; transportation problems caused by the wide dispersion of clinics, most of them located in villages that are not connected to the road system; and uneven distribution of health practitioners in the state. It also described inadequate facilities, equipment, and communication that prevailed at the time. Most of Alaska's federally funded clinics and hospitals were understaffed and under-equipped, using 20-year-old medical technology and communication systems. Very few smaller facilities had computers or access to the Internet. With only a phone and a fax machine, remote clinics formed the front lines of healthcare. As a result, the proposal emphasized, the staff of most rural health facilities were not familiar with current and unfolding technology. Two other factors, professional isolation and beneficiary isolation, influenced the AFHCP to explore telehealth and seek to establish a statewide telehealth network.

At the time of the AFHCAN proposal, healthcare professionals in Alaska faced (and still face) a huge challenge. Often working in small, isolated clinics or remote hospitals, they are cut off from consultation, educational opportunities, and the ability to network with peers. Training and continuing education opportunities were expensive and limited. The isolation and limitations of working in rural Alaska created a major staff retention problem for healthcare organizations. At the time the new federal telemedicine project was envisioned, the average length of stay for healthcare providers in rural Alaska was only 11 to 13 months.

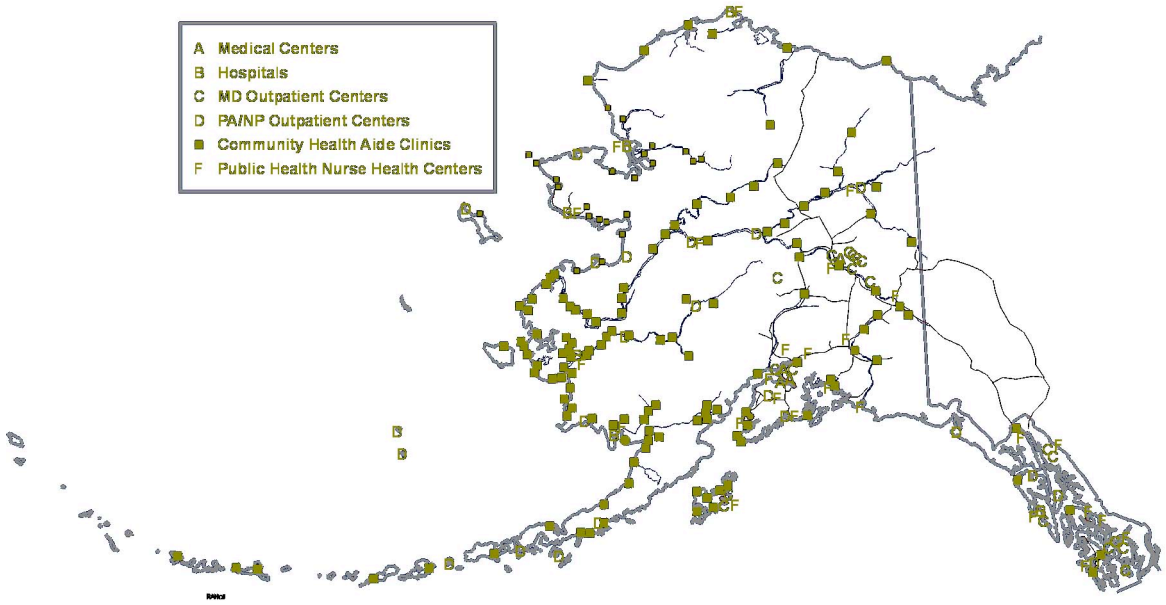
Federal beneficiaries also faced extreme isolation and limited access to critical information about federal programs and benefits. Veterans in rural Alaska often had little or no access to critical VA information. Beneficiaries throughout the state needed access to health-related information and communication with healthcare agencies.

The proposal focused on providing telehealth solutions at all IHS facilities, health centers, and Community Health Aide clinics, as well as U.S. Coast Guard, Veterans Affairs, Department of Defense, and Public Health Nursing facilities in Alaska. These were based on

store-and-forward imaging, interactive videoconferencing, and telehealth kiosks as mechanisms to improve healthcare and healthcare education. Later, the AFHCAN telehealth plan was broadened to include development of a statewide telehealth network. The initial plan was to equip and network 235 separate telemedicine healthcare sites located in 194 Alaska communities.[21] Membership agencies and organizations involved in the AFHCAN project included the following:

- IHS and tribal entities — 36 member organizations with 200 sites
- DOD — 4 member organizations, 9 sites
- VA — 1 member organization, 5 sites
- USCG —1 member organization, 8 sites
- PHN Alaska Dept. of Health and Social Services — 1 member organization, 26 sites

A Map Identifying the Type & Location of AFHCAN Sites.



[21] As mentioned later in this report, by December 2003 more than the originally planned 235 telemedicine workstations ("carts") were actually deployed.

Site-based Equipment

Each site was given a designation and amount of equipment based on workload, specialty services, and level of clinical care staff. Each site was equipped with at least one clinical telemedicine workstation and a patient telehealth kiosk. The workstation included a basic personal computer with the necessary hardware and software to allow healthcare providers to create, annotate, send, and receive computer files of whatever sort was needed to provide information to another provider. The most obvious and common files would contain a digital still picture created by a host of camera attachments for the various specialists. Software would also allow sending video clips, audio files, and specialty files. Radiology files were not anticipated because teleradiology is a regulated industry that was handled within another project.

The initial workstation design included file processing and annotating software, a foot switch, color camera, color printer, color scanner, otoscope probe, ophthalmoscope, dermascope, remote stethoscope, remote electrocardiograph, vital signs monitor with telemetry, culposcope, dentalscope, and pathology scope.[22] The kiosks, which would range from one to four per site depending on the size of the facility, were designed to enable provision of telehealth and educational services to federal beneficiaries. Each would offer online services, on-site health education through CD-ROMs, and eventually real-time interaction with other sites in Alaska.

Connectivity & Interfaces

Obviously, connectivity was needed to link individual workstations into the AFHCAN system. Personal computers at the sites needed a local area network (LAN), sites would need to be connected over a wide area network (WAN), and communication lines would need to be established between them. At the time of the initial implementation of the AFHCAN project, some sites and groups of sites had existing or developing LANs and WANs, especially the larger ones, and AFHCAN project funds were dedicated to upgrading the LANs and WANs and ensuring interoperability between existing LANs and AFHCAN.

[22] As the project developed, the workstation, as actually deployed, did not include all these peripheral instruments.

The Alaska Federal Health Care Partnership (AFHCP) acknowledged the importance of interfacing the new AFHCAN project with other existing telehealth and telemedicine projects in which all or some of the federal partners were involved. These included several teleradiology projects, each with multiple federal healthcare sites, and the network of sites still operating along the west coast after the Alaska Telemedicine Testbed Project.

The foundation of the AFHCAN project is what is known as store-and-forward telemedicine, whereby data that is acquired by a provider for a specific patient encounter (including for example, images or textual data) is stored and sent to a distant provider for viewing. This type of telemedicine is "asynchronous" and does not require both providers to be connected simultaneously as would be required with videoconferencing. Initially, patient information was acquired and stored at the Noatak Clinic and then forwarded via satellite to the Maniilaq Health Center in Kotzebue. The Maniilaq medical staff then determined that further consultation was needed and the stored data were forwarded, again via satellite from Kotzebue to the Alaska Native Medical Center (ANMC) in Anchorage.

This store-and-forward methodology has a number of distinct advantages for the Alaska rural healthcare system. First, it does not require high bandwidth. In fact, the store-and-forward processes can take place over a regular modem and telephone line. Second, it does not require medical staff to be online at both ends of the transmission, which would be the case with real-time transmissions. And third, it is less expensive than real-time transmissions. It should be noted that the AFHCAN project's long-term goals included videoconferencing throughout the network, which would require real-time transmission of data. As will be seen later in this chapter, the telepsychiatry project[23] growing along a path parallel to the AFHCAN project relied on real-time transmission.

[23] See pages 70-74.

Training Needs

Critical to the success of the AFHCAN project was having sufficient funds and resources to provide training to the hundreds of healthcare workers who would be using the new workstations and kiosks. This was understandably a massive undertaking. Initially $2.35 million was budgeted for training, and it was anticipated (and, of course, later realized) that the need for training would never end. The primary targets of the telehealth/telemedicine training were the Community Health Aides/Practitioners (CHA/Ps) who were employed by the P.L. 93-638 contractors of IHS funds.

Unique to Alaska, the CHA/Ps have had a long history of being local residents, usually Native providers of healthcare in villages.[24] The CHA/P program offers basic training to enable CHA/Ps to provide a variety of healthcare services. They are taught basic history taking, physical assessment, and diagnostic skills. They rely on communication with nurse practitioners, physician's assistants, and physicians at regional hospitals and the ANMC. This contact was originally made via radio but evolved to telephone once long-distance service was made available. CHA/Ps must have at least an eighth-grade education, and the median educational level is the eleventh grade, raising interesting challenges to AFHCAN's telehealth/telemedicine training program.

AFHCAN's Beginning

One of the first steps in the implementation of the AFHCAN project was the completion of a thorough needs assessment of the corporations and other organizations that were to be involved in the project. This occurred at about the same time the Alaska Telehealth Advisory Council (ATAC) was conducting its needs assessment under contract to Daniels, Tschannen, and

[24] See Berner, Barbara J. (1992). Provision of health care in a frontier setting: An Alaskan perspective. *Journal of the American Academy of Nurse Practitioners, 4*, 89-94.

Associates.[25] Each person receiving the AFHCAN survey was asked to rank its "key organizational goals for telehealth applications." Resulting priorities:

Goal	Average Priority*
Quality of care	5.3
Access to care	4.6
Patient satisfaction	4.1
Continuity of care	3.1
Information transfer	2.6
Cost of care/saving	1.7

*(A score of six represents the highest priority possible)

Not only did results of the assessment help set priorities for the AFHCAN project, but it also helped establish measures that needed to be included in the AFHCAN evaluation. It is interesting—and rewarding—to note that quality of care, access to care, and patient satisfaction were the clear winners in this prioritization process and that, although it is important, cost saving was rated very low.

Because the AFHCAN project was new, predictably costly, and exploring new arenas in a frontier setting that had never before been explored with a scope that Alaska required, the AFHCP developed a set of principles that were initially stated as part of AFHCAN's vision:

- Create "needs-based" solutions
- Build flexible and scaleable systems
- Build on existing capabilities
- Use open architecture (assuring interconnectivity)
- Use off-the-shelf proven technology where possible
- Ensure sustainability
- Evaluate solutions
- Coordinate efforts with all telehealth projects in Alaska

[25] The results from the ATAC survey were also helpful to the AFHCAN project, although the ATAC scope extended beyond that of AFHCAN, with the inclusion of Pioneer Homes and other, nonfederal hospitals.

Much of the first year of the AFHCAN project was spent planning and developing the project, using a steering board and six organized committees, as well as the AFHCAN Project Office (APO) staff. The purpose of the AFHCAN Steering Board was to act as a board of directors to the APO staff and to ensure compliance with the stated mission and goals of the AFHCAN project. The committees of the Steering Board were Business, Legal, Clinical, Informatics, Technology, and Training (the Legal committee was eventually dropped). Technical assistance was provided to member organizations in preparation for deployment. The software application was nearly completed, several intensive studies of hardware devices were underway, and the training manual, developed specifically for selected equipment, was also near completion. Network switchgear was successfully collocated at GCI, and a second collocation at AT&T was completed by July 2000. This demonstrated a commitment from the two major telecommunication companies in Alaska to create an efficient, cost effective, statewide telehealth network.

Because of the almost overwhelming complexity of designing, developing, and deploying a telemedicine project of this scope in a state as large as Alaska, progress was somewhat slower than was originally projected.[26] In October 2000 the AFHCAN Project Office (APO) in conjunction with the AFHCAN Steering Board completed the AFHCAN Master Operating Plan that outlined a process for establishing the six committees and a process whereby the APO would work with the committees to obtain recommendations on major decisions and policies. The plan also identified decisions and policies that needed to be addressed, described methodology for assigning these to single and multiple committees, and laid out specific roles and responsibilities for committee members, the APO, the AFHCAN Steering Board, and member organizations. In this detailed document, specific progress milestones, including step-by-step participant action items, were identified.

[26] The reader is reminded that the AFHCAN project was implementing the largest and most innovative telehealth system in the world.

The Master Operating Plan also included a section addressing sustainability of the AFHCAN project looking to the anticipated end of federal funding at the completion of the four-year project. This was an important topic that was raised often and has continued to be in the forefront of the APO's planning since the fourth year has come and gone.

Alaska Clinical Engineering Services

The AFHCAN Master Operating Plan outlined the responsibilities of the Alaska Clinical Engineering Services (ACES), to assist implementing the project and providing training during the deployment phase. ACES was a program of the Alaska Native Medical Center (ANMC) which had been providing project management and installation support for the Alaska Native Tribal Health Consortium (ANTHC) since 1997. The following ACES responsibilities are described in the AFHCAN Master Operating Plan:

- ACES will work in conjunction with APO and member organizations to develop equipment specifications and purchase acquisition and procurement documentation.
- An overall deployment outline will be developed for the project. Regional and site-specific deployment plans will follow.
- Equipment will be received, inventoried, assembled, and QA/QC-tested (Quality Assurance/Quality Control) prior to shipment to final sites.
- Following installation, systems will be acceptance-tested, QA performed on clinical applications, and staff will be trained.
- ACES will develop a technical support plan, telehealth WAN monitoring, a remote diagnostics system, and statewide help desk system.
- ACES will work closely with the training committee as training tools and procedures are developed.

Stewart Ferguson, Ph.D., has a background in Biomedical Engineering and was intensely involved in the development of the AFHCAN project and at the time of this writing, was its director. Discussing how ACES worked as the workstations were being assembled, he stated, "ACES has a warehouse, and we staged out of a fairly large facility. They had an L-shaped facility that had two levels of storage all the way around it, and then in the center they built a big, long workbench that had power and a connection to the network, and they marked off the floor. Each area had a cart, and they built ten frames and carts with the equipment, and every week they would unload ten computers and touch screens and otoscopes. They'd build ten carts on Monday and Tuesday, plug them in, load software, and burn them until Thursday, take all the equipment off, re-box them, repackage them, and ship them on Friday. They would repeat the process weekly. Everything was burned and tested and loaded, and they'd ship. It was a huge process. They were able to do about ten a week."

ACES reduced its involvement in many different aspects of the AFHCAN project as deployment was completed and more and more sites came online and began to use the workstations and kiosks. Deployment, training, and support became the responsibility of the AFHCAN office. The need for training will continue into the future as new hardware and software are added and as staff in the 248 sites continues to change. It bears repeating that training is absolutely essential to long-term utilization and success of AFHCAN and to prevent it from becoming another "Shishmaref windmill."

A Personal Perspective on Development of the AFHCAN Carts

In the very early days of AFHCAN the involvement of several individuals drove the project and influenced its direction. The following is from an interview UAA Center for Human Development staff conducted with Dr. Ferguson in December 2002. He was discussing how the concept of the "cart" became a reality.[27]

> The idea was that in Phase I we would design a simple kind of primary care system that—if we could all agree on what it should be—would be an entry level, but we could get it out there and start to do telemedicine with the intention that once people had experience we could look at a Phase II. We would reserve funds for Phase II so that if they are doing disease dermatology, for example, if someone wants to add echocardiology we could move into it. But we did not want to jump into the high end of the equipment right away. One of the problems that we faced was that organizations that hadn't done telemedicine didn't really know what they could do, and there was no point in getting too high into the equipment.
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> So that was the decision, and that was important. Then we could go to our statewide committees, and we went to the clinical committee meeting and presented this Phase I idea, that we wanted to look at something that is fairly simple. They agreed to that, and the training committee also agreed. We discussed stethoscopy, spirometry, dermatology, and a variety of options, and then, on January 15, 2000 the clinical committee met—a very large group of them met—and we looked at the equipment. We had varieties of equipment and peripherals. We had several vendors in the room, and we decided we wanted the digital camera, the scanner, the ECG, and video-otoscope. A consensus agreed on that. We were surprised. We thought stethoscopy would definitely be on the radar screen, but it wasn't.
>
> The scanner surprised us. I didn't expect to see a scanner incorporated, but they were saying that one of the biggest problems was getting relevant information, and if people would fill in the forms they get faxed but they can't read it. And as an aside, the scanner is used about 10% of the time on cases, and nine out of ten it's used as an adjunct for something else, because they have an otoscope and they usually scan, and you almost never use the scanner by itself.
>
> AFHCAN had six committees, and the steering board had a representative from each of those committees; it was a nicely designed system. The six committees were legal, business, training, clinical, informatics, and technology. The technology committee was designed with the concept that they would be mostly biomeds or people who could make decisions on things like otoscopes and

[27] Quoted comments from Dr. Ferguson come from an interview that UAA Center for Human Development staff conducted as part of the evaluation of the AFHCAN project initiated in the fall of 2002.

peripherals and computers and battery back-ups and carts. They said, 'We don't care if you use a Dell or a Gateway; use what's appropriate. We don't really care too much about the cart, but get a good cart.' When it came to peripherals, like otoscopes, the decision was really a clinical decision more than a biomed decision, and it should be clinical committee that makes that decision.

So the idea was that once we knew what we were doing on January 15, 2000 we knew that we were doing those four pieces of hardware, and we now had to figure out what pieces of hardware and build a system around them. At that time we did not have a network, we did not have software, and we didn't have a cart. But we had enough information to start to work on it, so we started to spread the load out a little bit. We had already looked at otoscopes for the NLM project, and that was the most expensive piece of equipment that we were going to buy. We had reviewed that and came again to the same otoscope decision, and what we did over the next 6 to 12 months was bring in different kinds of equipment and share it with both the clinical and training committees. We had review sessions, and we had survey forms. This all happened over a 12-month period, and that was basically the technical design.

Equipment Selection for the AFHCAN Cart

The chore of selecting all the correct pieces of equipment that would be finally assembled to make a complete workstation was exceedingly difficult and time-consuming. A case in point is described in the report *AFHCAN Technical Design: Phase 1 Store-and-Forward Hardware*, published by the Alaska Native Tribal Health Consortium (ANTHC) in 2001. It described in exceptional detail the requirements, preferences, tests, and choices related to practically every nut and bolt beginning with the actual mechanical cart that "must be sufficiently small to fit through doorways—often no more than 24 inches wide" with "large caster wheels...to move the cart over the uneven floors and door sills found in most clinics." A large number and variety of carts were tested most of which were unstable, welded as one unit, or too large. In the days of increasingly sophisticated Mars rovers, it was not too much of a stretch to compare the challenge faced by the APO and ACES with that of NASA scientists. Durability was an important criterion for both, as was the ability to overcome totally unknown hazards and situations. Recently, a representative from the U.S. Coast Guard described how important it was for a cart on one of

their cutters to have a sturdy cord connecting it to the wall socket—because it was the only thing that prevented the cart from crashing during rough seas.

From the evaluation of the cart itself, the Technical Design Phase assessed what hooks might hold the video otoscope and other attachments, ensuring that they were durable and provided ease of use and accessibility to instruments. A number of these instruments were worth several thousand dollars each, and a poorly designed or malfunctioning hook could easily cause such an instrument to be damaged or destroyed.

Cable management to reduce the chances for accidental dislodging and snagging on other equipment required careful assessment of the cables themselves and the way they were organized. Even the baskets attached to the cart, to hold instructions, patient files, and other documents were carefully reviewed. The systematic assessment of every single piece of the cart progressed from these seemingly simple objects into the complex internal workings of the computer system, the touch screen technology (a key element of the cart essential to the ability of the healthcare worker to interact easily with the computer), and the accuracy and consistency of the colors shown in the monitor.

The APO and ACES chose an LCD flat panel display, which was just beginning to become prevalent during the design phase of the AFHCAN project when both the technology and the market were changing daily. At one point, the AFHCAN project selected a specific LCD flat panel model only to discover that it had already been discontinued with fewer than 100 available nationwide. The fundamental constraint placed on the choice of an LCD display was that the display must provide a “diagnostic-quality” image over a wide viewing angle. It had to display true colors as provided by the graphics card and have excellent contrast. Many LCD displays at that time tended to have wide ranges in contrast when the viewing angle varied vertically or horizontally, causing the image of an eardrum, for example, to become very dark and red from one angle but washed out and white from another angle. The investigators and evaluators discovered they could not trust manufacturers’ specifications on viewing angles.

Often a manufacturer might claim a monitor had a 160° viewing angle, but upon inspection, it would have gross changes in contrast over a much narrower viewing angle. In the end, the Viewsonic VP150M display with a DVI interface was selected as the best option for the carts.

Once the LCD flat panel monitor was selected, the same methodical assessment process was launched for the touchscreen, which is a layer added to the front of the monitor to enable the user to touch the screen and mimic the function of a mouse. A large number of touchscreen technologies were evaluated by the AFHCAN technical staff and clinicians, including both resistive and capacitive systems. A new surface wave technology from ELO with a pure glass overlay without any coatings was chosen. It employed piezoelectric crystals that resonate the surface at 5 megaherz (Mhz).

The evaluation, judgments, and selections proceeded painstakingly through every other element of the cart: the trigger switches, foot pedal switch, microphone, and even the stool on which the healthcare worker would sit. The computer and server were selected, and then peripherals were evaluated. Images from a large number of digital cameras (i.e., Sony, Nikon, Olympus, Casio, and others) were compared for clarity, contrast, and quality. This proved to be a more difficult task than expected. Most software designed for image viewing allowed only a single image to be viewed at a time. This prevented the user from panning or zooming all the images together. As a result, AFHCAN project staff wrote new software to enable evaluators to see images from all cameras simultaneously and better compare the quality of the images they produced. Ease of camera operation was the next need to be addressed, given the fact that the healthcare providers, particularly in isolated rural clinics, had little or no experience using digital cameras. Two cameras were finally selected: the Sony Mavica MVC-FD90 and the Nikon Coolpix 990. Sites where workstations would be installed were allowed to choose one of the two cameras. The evaluation work related to the computer-related elements of the cart was concluded when a number of scanners were assessed and one was chosen, the Epson Perfection 1640SU.

Attention was turned to the peripheral medical equipment[28] which involved review, input, and feedback from specialized clinical and medical professionals who were familiar with not only the particular items of equipment but also their use in both telemedicine- and facility-based settings. As might be expected, the intensity of evaluation and analysis of medical peripherals was greater than that required for hooks and baskets, given the precise, and at times life and death nature of information these devices needed to obtain and transmit to the cart computer, and then transmit by store-and-forward technology to hub hospital specialty providers for consultation. Medical equipment evaluated included electrocardiograms (Brentwood by Midmark was selected) and video otoscopes[29] (AMD-Welch Allyn was selected). The workstation has several ports to add additional medical/sensor equipment as developed and needed on site. The first 263 clinical carts and 42 clinical servers cost approximately $6 million, not including development, shipping, or onsite installation costs.

Needs & Assets Assessment

In May 1999, shortly after the actual initiation of the AFHCAN project, the Institute for Circumpolar Studies and the Alaska Center for Rural Health, both at the University of Alaska Anchorage, signed a contract with the AFHCAN Project Office (APO) to assess human aspects and health priorities for one organization, the Southeast Alaska Regional Health Consortium (SEARHC). The basis for the human aspects part of this study was the concept of *telereadiness*, a term developed by the AFHCAN needs assessment task force to describe an individual's or organization's readiness to adopt new telehealth technologies. The concept of telereadiness stems from the theory that "adopters" are arrayed on a five-point continuum from *innovators* (able to cope with a high degree of uncertainty about an innovation) to *last adopters* (extremely cautious and the last to adopt an innovation).[30] Data collection for the human aspects component utilized

[28] Actually most of this work was taking place simultaneously, but it is easier to relate sequentially.
[29] Because of the importance and the anticipated wide use of the video otoscope in the rural Alaska clinics due to the prevalence of ear problems in children living in the bush, the evaluation of video otoscopes was particularly intense. A separate report, "Video 0toscope Testing: Final Report" by Stewart Ferguson, Ph.D., supported by a grant from the National Library of Medicine, contributed greatly to this evaluation.
[30] Rogers, E. (1995). *Diffusion of Innovations: Fourth Edition.* New York: Simon & Schuster.

several methods: a survey mailed to all SEARHC employees, review of relevant organizational materials and former grant proposals, focus groups with SEARHC staff at several sites, and key informant phone interviews with representative staff from all SEARHC clinic sites. In total, 664 surveys were mailed to SEARHC employees and 291 (44%) were completed and returned. While this is an acceptable return rate in survey research, it is artificially low because the survey was sent to all employees—including those for whom telemedicine was not necessarily relevant to their jobs. Ten focus groups were conducted ranging in size from 5 to 10 SEARHC staff; 13 key informant interviews were also conducted to assess attitudes toward telehealth, organizational interest in telehealth, sustainability, data discrepancies, and clinical work flow. The recommendations that came from the human aspects component were:

- Ensure sufficient and appropriate training throughout the project.
- Facilitate and ensure complete implementation of the Akamai Teleradiology Project.
- During the initial stages (of implementing AFHCAN) avoid integrating applications that require significant and immediate changes in physician work or information flow.
- Include rural providers in the development and implementation of applications to ensure the enhancement of services in remote areas.
- In the early stages of telehealth expansion, focus on selecting applications that have value to nursing staff and other groups with an expressed interest.
- Empirically demonstrate value to increase the likelihood of the project's continuation after AFHCAN funding ceases.

Data collection for the health priorities component of the study entailed identifying, collecting, reviewing, and analyzing secondary data sources, which included the Behavioral Risk Factor Surveillance System (BRFSS), Healthy People 2000, Resource and Patient Management System (IHS client data), Alaska Area Profile data, contract health data, and information from Planned Approach to Community Health (PATCH).

The health priorities component produced the following recommendations:

- Diagnostic categories that are likely candidates for telemedicine applications:
  - Upper respiratory problems
  - Lower respiratory problems
  - Orthopedics
  - Neurology
  - Ophthalmology
  - Urology
  - Ear, nose and throat (ENT)
  - Obstetrics
  - Gynecology
- Use the patient kiosks to address behavior-related illnesses
- Defer videoconferencing, such as telepsychiatry, until financially and technically feasible
- Develop and track indicators related to selected telehealth applications

Deployment: Two Sleds at a Time

The initiation of deployment of the hardware began December 15, 2000. As Stewart Ferguson described it:

> Actually it wasn't so much deployment, but we did on that date have six people from Maniilaq come down to Anchorage and go through all of the training, so we had to have training manuals and training procedures and the cart designed and built and all of the parts there. It was a scramble. We had about 161 different parts that went into a cart, like a custom nut and bolt and a custom piece of tubing to stop something from kinking and flexing. All of those pieces—a big long list—we had to make sure we had enough to do all the sites and we were pulling it together at the last minute.
>
> That was December 15, and we shipped the stuff, but they didn't do anything with it at Maniilaq right away. We were still missing parts, and we had to train them on some pieces. It was still a little bit ad hoc, so on January 15, 2001, two or three people and I flew to Kotzebue and provided training at the site, built the first carts in the hospital and the public health nurse's office, and then flew out to all the villages—three or four simultaneously. I went to Selawik and built the first carts. This was my first recognition that we were defining a system, not just a cart,

because when I went into Selawik it actually took two of those really long sleds. If you want a definition of a "system," it was actually two sleds instead of one.

I don't know if you've been to Selawik, but you go through some gullies and bounce along. We got to the clinic, and we unboxed, when we took all the stuff out and we noticed a little hole in one of the boxes. We found out that it was this bar that we use to hold the top shelf of our cart. It's white, and that cardboard was single-cardboard thickness, and from bouncing it had broken through and shot out. It was white and was in the snow and we never found it. So we had to wait 24 hours just to get the piece of metal in, and it had to be flown from Anchorage, go through Kotzebue, and out to Selawik. So we spent a whole day waiting for it, and one of the things that we did when we came back was we started to use double cardboard on any box that had been single cardboard, with reinforced corners, and repackaged things, putting in a lot of quality control.

Deployment Status

There has been some confusion about the status of the AFHCAN project in terms of how many carts were deployed at any given time. A common assumption was that deployed meant, "ready to use and connected to the network," but this was not always the situation. The following were all possible initial events:

- Equipment delivered by AFHCAN to individual sites, carts assembled on site by AFHCAN (and connected to the network if possible).
- Equipment delivered by AFHCAN and training received from ACES for organizational staff to assemble carts (and connect them to the network if possible).
- Equipment delivered by AFHCAN to a central location to be distributed, assembled, and connected to the network at a later time.
- Sites with equipment, but without connectivity engaged in training and began using carts internally (possibly to be connected to the network at a later time).

Essentially, once equipment was delivered according to any one of these scenarios, it was deployed in terms of the operational definition of the term under the AFHCAN project. AFHCAN would assist people to use connectivity they had available, but it was not the function of AFHCAN to provide funding or make arrangements for connectivity at the site level. Ultimately, it was the responsibility of member organizations to provide for ongoing

connectivity and user training within their organizations, which were both considered expenses to be included in their operating budgets. This was necessary for sustainability.

The goal of the original proposal to have carts deployed to 235 sites was accomplished by September 30, 2002. At the end of the four-year project, the numbers had increased to 248 approved sites and 252 deployed carts. Sixty-one of the deployed carts were not connected to the statewide network. Of these, 36 were being stored by the Yukon-Kuskokwim Health Corporation; 24 were connected to their own individual servers and presumably being used within Public Health Nursing clinics; 1 cart was on an Air Force Base.

A Case Study

Numbers, statistics, graphs, and figures often do not really speak to the heart of an important change in a system, and that is certainly true for AFHCAN's implementation of a statewide telehealth system in Alaska. The following is excerpted from "Telemedicine Helps Save a Woman's Life," an article from *The Mukluk Telegraph — The Voice of the Alaska Native Tribal Health Consortium.*[31]

> In June 2003, a new use of telemedicine technology helped save the life of a woman receiving care at Maniilaq Health Center in Kotzebue. The woman came to the hospital with an ectopic pregnancy, a dangerous situation requiring surgery. Worse, the pregnancy had ruptured arterial blood vessels. The patient was hemorrhaging, and her condition deteriorated rapidly. She needed immediate surgery, but the Maniilaq Health Center doesn't have an operating room, nor a surgeon—nor anesthesia.
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> "Due to heavy fog, there was no way we could medevac her to a larger facility with an operating room," said Dr. Michael Orms. "There was a high possibility that she would have died even in transport to Anchorage. Using my surgical skill to stop the bleeding was the only choice we had. Being a family practitioner with some surgical skills—but not a surgeon—I needed some assistance."
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> Doctor Orms called Daniel R. Szekely, MD, Medical Director, Women's Health at the Anchorage Native Primary Care Center (PCC) at Alaska Native Medical Center for guidance on how to do a laparotomy using local anesthesia.

[31] *The Mukluk Telegraph.* September/October 2003, Volume 6, Number 5. Anchorage, Alaska: Alaska Native Tribal Health Consortium.

Dr. Robb Reeg, a family physician at PCC Family Medical Services, contacted staff at the AFHCAN office and asked if equipment designed for video teleconferencing could be used for this clinical emergency.

"This was an excellent example of how our project staff can work collaboratively with clinical staff to solve urgent clinical needs," said AFHCAN director Stewart Ferguson, Ph.D. "Robb's experience with our office was based on our 'store-and-forward' solution and not with videoconferencing. But he recognized the possibility with the network and the technology. Without his foresight this might not have happened."

AFHCAN staff set up a monitor and Szekely asked Kotzebue staff to bring its Polycom videoconferencing equipment into the room so he could observe the surgery from Anchorage.

Dr. Stephanie Eklund, of the PCC Women's Clinic, talked with Dr. Orms on the telephone while Dr. Szekely watched in the conference room at AFHCAN. Doctors Eklund and Szekely were able to offer Dr. Orms reassurance as well as guidance based on real-time images transmitted via satellite. The videoconferencing, said Dr. Eklund, "was an incredible addition to the care of this patient. And Dr. Orms in Kotzebue did a remarkable job."

"From my perspective, being one of those primary care providers who is on the frontier, in bush Alaska," Dr. Orms said, "the technology was a vital part of providing appropriate care for that patient. We were able to conduct an exploratory surgery that was a life-saving procedure for that patient."

This remotely guided abdominal surgery may be a first in Alaskan telemedicine. It points to the possible benefits specialists can offer in support of doctors in remote sites under emergency conditions.

Shortly after surgery, the patient was doing well and stable. When the weather improved, she was transported to Anchorage for postoperative recovery. This episode was similar to an experience at the Women's Health Clinic a few months earlier. The earlier patient also did very well.

"Both of these were serious, life-threatening events," said Dr. Szekely, "and underscore the need to use every possible resource to support our bush docs, including this expanded use of telemedicine."

"We are honestly at the point where we can begin to explore and expand the ways in which the AFHCAN technologies (network, software, hardware) can solve health care needs," said Ferguson. "Clinical input is the most crucial part of this endeavor. The AFHCAN Office would like to encourage providers who have needs, solutions, or ideas to actively work with us to improve the delivery of health care through telemedicine.

There is no question that there will continue to be many stories such as this one. It is hoped they will be documented and shared, not only within the state, but also nationally and internationally. The impact of the AFHCAN in terms of individual lives is only now beginning to be realized, and some form of systematic documentation of these oral histories, traditional to communicating important events in Alaska Native culture, need to be recorded. However, the AFHCAN did not exist in a vacuum. There were other groundbreaking telehealth efforts in the state. Following are accounts of the most influential of these efforts in the areas of teleradiology and telepsychiatry.

Teleradiology

Teleradiology was one of the first telemedicine applications to grow in popularity, at least partially because it was one of the first services the Health Care Finance Administration agreed to reimburse. As early as 1985, the American College of Radiology in cooperation with the National Electrical Manufacturers Association developed standards[32] for transferring radiological images that specified a hardware interface, a minimum set of software commands, and a consistent set of data formats. The standards evolved are now known as Digital Imaging and Communications in Medicine (DICOM).[33]

There are several teleradiology efforts in Alaska, some of which involved one or more Alaska Federal Health Care Partnership (AFHCP) partners. The first was the Akamai project of the Department of Defense (DOD), funded by Congress to implement digital medical imaging and telemedicine in the Pacific Rim and Alaska regions. The program management office located in Honolulu, Hawaii, was responsible for managing all implementation and proliferation efforts. The Akamai project determined it was necessary to continue to develop the high-performance medical systems' infrastructure that supports both the Picture Archival and Communications

[32] www. acr.org/departments/stand_accred/standards.html
[33] www.dclunie.com/dicom-status/status.html

Systems (PACS) and the open architecture teleradiology clinical operations. That infrastructure includes digital imaging archives, retrieval, and display of local and remote radiology exams; improved access to medical care at remote geographical locations; expert clinical consultation on a real-time basis; on-the-job medical training; and an improved quality of care for all sites as well as cost savings and increased efficiencies.

The Elmendorf Air Force Base (EAFB) Hospital in Anchorage was included in Phase I of the PACS, with plans to expand the teleradiology program to other Alaskan sites.[34] The connection enabled providers at the EAFB to transmit radiology images to the Tripler Army Medical Center in Hawaii, where radiologists reviewed the images and transmitted or telephoned diagnostic information back to EAFB. In the late 1990s, PACS was established at Bassett Army Community Hospital (BACH) at Fort Wainwright, Fairbanks, the VA Medical and Regional Office Center in Anchorage,[35] and the Alaska Native Medical Center (ANMC). The project was also tied into the AFHCAN project.

Soon after its formation in 1995, the AFHCP initiated establishment of an Alaska Teleradiology statewide network. At that time 38 Indian Health Service hospitals and health centers and 6 federally operated clinics throughout the state were included in the project's plans. Through the use of telecommunications and digital imaging support, timely primary and specialty care was extended to rural beneficiaries. The innovation associated with this teleradiology project was transition from a film environment to a filmless one. Although this technology was not new, the decision to embrace it in the federal sector was significant; and the civilian community was similarly influenced. The synergy created enhanced the quality of care for a group of citizens who previously had limited access to radiologists' expertise. The mission statement of the teleradiology project was "to improve patient care by establishing a 'virtual radiology department in Alaska that will extend timely primary and specialty care found in the

[34] This information was obtained from MIS Laboratories (www.quasar.org).
[35] The VA was also networked to the Lower 48 (i.e., Washington, Oregon, Idaho) for teleradiology transmission. It was known as the VA Northwest Network (VISN 20) Telehealth Initiative.

larger facilities out to the smaller rural clinics." The goal of the project was to improve patient care by installing telemedicine and teleradiology capabilities in Alaska and connecting the facilities of the AFHCP. The plan was to establish hubs in large medical facilities in Fairbanks and Anchorage between 1998 and 1999, establish teleradiology/telemedicine capabilities in nine area hospitals in 1999, and to extend teleradiology support to 30 more clinics dispersed throughout the state in 2000.

After the EAFB was networked through the Akamai project and BACH, the VA and ANMC were added, teleradiology capabilities further expanded to hospitals in Barrow, Bethel, Dillingham, Juneau, Ketchikan, Kodiak, Kotzebue, Nome, and Sitka, which were linked to the radiology department of the ANMC. Teleradiology systems were then installed at the Kodiak and Ketchikan Coast Guard clinics, which were supported by EAFB. By the end of 2000 St. Paul and Klawock were added to the network.[36] Occurring simultaneously with the federally oriented teleradiology project, Providence Health Care System's radiology service was networked with private hospitals and health centers in Cordova, Dutch Harbor/Unalaska, Homer, Kodiak, Seward, and Valdez.[37]

Telepsychiatry

Alaska Department of Corrections

The most successful telepsychiatry project in Alaska was launched statewide by the Alaska Department of Corrections (DOC) in December 1997. The system used Plain Old Telephone Service (POTS) lines and 8x8 videoconferencing equipment (videophone) that usually connected at about 19.2 kilobauds. The bandwidth was limited to 33 K, with typical connections in the 18-24 K range. Each site was equipped at a cost of less than $600. The only additional operating cost was the long-distance charge for the standard telephone.

[36] Source: "AFHCP Teleradiology Project," Pacific Telehealth & Technology Hui, Tripler AMC, Hawaii (www.pacifichui.org).
[37] "ATAC Final Report FY 2000," p. 12.

The primary objective of the project was to supplement existing on-site psychiatric services and to assess the effectiveness of low-technology equipment. The target audience was incarcerated men and women with illnesses that needed psychiatric assessment and treatment. The project was designed to enable psychiatrists in Anchorage to assess the condition and stability of inmates without flying out to visit the facilities or having the inmate fly to Anchorage, saving the department money and expanding psychiatric services to facilities that would otherwise have no access to them. By mid-1999 the telepsychiatry network included Anchorage, Bethel, Fairbanks, Juneau, Kenai, Ketchikan, Nome, Palmer, and Seward. It was enabling 15 or more consults a week. The types of services provided via videoconferencing included emergency examinations, follow-up psychotropic medication consultations, discharge planning examinations, clinical staff supervision, and a civil commitment examination (*ex parte*) of a dangerous mentally ill inmate who was being released.

The DOC acknowledged that, because of transmission speed, the system was not adequate for psychotherapy and was of limited use for assessing movement disorders.[38] However, because telecommunication capabilities and capacities increased since the DOC telepsychiatry program began, the ability to include examinations of movement disorders improved. A number of benefits were realized as a result of the program:

- A doctor-patient relationship was more often established, which improved patient compliance.
- Follow-up telepsychiatric examinations allowed for more timely fine-tuning of psychotropic medication than was previously possible, which in turn helped to improve patient compliance.
- Patients and staff reacted favorably to the system. Patients looked forward to telepsychiatric visits. The staff appreciated the backup provided by this system. They could quickly have patients seen by a psychiatrist when they had concerns.
- Utilizing telepsychiatry enabled the DOC to hold down transportation costs associated with flying inmates into Anchorage to be seen by a psychiatrist, while at the same time improving quality of care and patient compliance.

[38] Final report of the Alaska Telehealth Advisory Commission, 1999.

The DOC routinely presented progress reports to the Alaska Telehealth Advisory Council (ATAC) during its meetings, and these were summarized in the annual ATAC reports. In the FY 2000 annual report, DOC had completed more than 1,300 consultations using the telepsychiatry system. At that time DOC reported that equipment and connectivity were adequate "for most decisions that need to be made by a psychiatrist assessing patients for psychotropic management and emergency, but most likely would be inadequate in other settings for the range of services they provide."[39]

Quoting from the 2002 Annual Report of the ATAC, "Telepsychiatry applications have been one of the more surprisingly effective applications of telemedicine pioneered in this state by a very creative psychiatrist in the DOC.[40] The infrastructure has varied from the initial successful use of videophones by the DOC to the high-bandwidth, sophisticated child and adolescent telepsychiatry clinic conducted by the child psychiatrist at Bartlett Memorial [Hospital] in Juneau to the community of Metlakatla. The child psychiatry project organized by the Gateway Mental Health Center in Ketchikan was holding weekly clinics providing child and adolescent care to an isolated community at a level beyond everyone's imagination only a few years ago." However, the visions of success for these latter projects were soon to dissipate.

High- & Low-Bandwidth Telepsychiatry

To advance and evaluate the effectiveness of telepsychiatry in Alaska, in FY 2000 the ATAC sponsored two grants, one for high-bandwidth telepsychiatry and another for low-bandwidth telepsychiatry. The Gateway Center for Human Services in Ketchikan was awarded the high-bandwidth project, which was to focus on child and adolescent populations in Ketchikan and eventually expand to the Metlakatla Indian community on the Annette Island Reservation. The higher bandwidth (>128 kbps) was intended to enable observation of playgroups and other high motor activity of children, which could not be transmitted effectively with lower bandwidth.

[39] Material for this section came from the Alaska Telehealth Advisory Commission report and the FY 2000 ATAC final report.

[40] Bill Worrall, M.D. has been the individual who has shepherded the DOC telepsychiatry program to its current successful state.

The low-bandwidth project, using videophones and POTS, was awarded to Eastern Aleutian Tribes, Inc. (EAT), for services to Sand Point and King Cove. The plan was for a psychiatrist in Anchorage to provide weekly telepsychiatric services to these communities via a videophone and to fly out and visit the two communities once every two months. A third, locally funded telepsychiatry project was taking place in Kotzebue. It was designed to use T-1 connections, which were not yet installed in the participating villages. The plan was for weekly telepsychiatric consultations interspersed with on-site visits by a mental health specialist.

High-Bandwidth. The high-bandwidth telepsychiatry project, which involved the Gateway Center for Human Services in Ketchikan, focused on child telepsychiatry. In the fall of 2000, the Gateway Center filed for Universal Service Funding for its Alascom T-1 line, and approval was received in June. In its original proposal, the Gateway Center planned to rely on a psychiatrist in the Lower 48; but as the project progressed a child psychiatrist from Bartlett Hospital in Juneau became available and was placed under contract to provide telepsychiatric services. Unfortunately, this project had its problems. The FY 2002–2003 Annual Report of the ATAC stated: "In Southeast Alaska, the Metlakatla/Bartlett high-bandwidth Telepsychiatry project sponsored by Gateway Mental Health Services has stumbled. As of July 30, 2003, there is no longer a contract between the Bartlett Mental Health Services and the community of Metlakatla. When the original champion of this project accepted the position of Director of the Alaska Psychiatric Institute, there were changes in administration in Metlakatla, and the support for this project disappeared."

Low-Bandwidth. The low-bandwidth project conducted with Eastern Aleutian Tribes, Inc. (intended for King Cove and Sand Point) was even less successful. Five videophones acquired for the project passed tests conducted in Anchorage, but when they were subjected to 10 tests in the King Cove clinic, usable connections occurred only 50% of the time over a two-day period. Tests conducted between Anchorage and Sand Point had even worse results: only 3 connections out of 15 attempts carried out over several days.

In December 2000 EAT established a new area wide network with T1 dedicated satellite data circuits between each of their village clinics and their Anchorage office, but with this new communications system they were still unable to establish a video connection. With the help of AT&T/Alascom engineers, the problem was traced to the videophone which was unable to lock into a fixed baud rate. The videophone's modem automatically attempted to increase the baud rate when a higher bandwidth was available. According to the manufacturer, there was no way to turn off that feature. When a higher baud rate was negotiated, connection failed in the satellite. At that point EAT opted to expand its network to include T1 satellite circuits between all its village clinics and the Anchorage office, and they abandoned the POTS videoconferencing pilot.

Telepsychiatry in the Future

With the exception of the DOC program, results of attempts to conduct telepsychiatric sessions in Alaska, even minimally, have been disappointing. There is little doubt that as the technology advances and the capability of remote sites to acquire high-bandwidth transmission improves, real-time interactive communication will become more common, and telepsychiatry will take hold. The need for psychiatric services in bush Alaska, the dispersion and isolation of villages, and the limited number of psychiatrists and other mental health specialists in the state creates an environment in which telepsychiatry should ultimately thrive.

Conclusions & Discussion

Providing healthcare and health programs for over 200,000 beneficiaries is a very expensive proposition. Blue Cross has estimated that the general cost of operating a hospital or clinic is 300% more expensive in Alaska than in the continental United States. A majority of the 200 sites operated by the Indian Health Services system are not connected to any road system. These sites depend on air transportation to carry patients to care at a regional hospital or tertiary facility in Anchorage or to bring a doctor out to the patient. Adding to the hardship of providing necessary care is the severe and often unpredictable weather.

Many rural clinics and healthcare facilities are neither familiar with nor using current and unfolding technology. Often understaffed and severely under-equipped, many sites were and still are forced to use 20-year-old medical technology and communications systems. Often using only a phone and a fax machine, remote clinics provide the first point of care for beneficiaries.

Healthcare professionals working in small, isolated clinics or remote hospitals are isolated from accessible consultation, education and training opportunities, as well as the ability to network with their peers. This isolation contributes to a major retention problem for many healthcare organizations. Likewise, federal beneficiaries living in isolation in rural Alaska have had limited access to critical information about federal programs and benefits.

Recent advances in telemedicine technologies and in-state support for advanced telehealth network systems opened the door for a dramatic improvement in the delivery of healthcare and health education to remote and rural environments. Based on experience and knowledge stemming from over 25 years of telemedicine projects, Alaska was well positioned to develop and deploy the AFHCAN project, the largest telehealth effort in the world. This project became the cornerstone of a variety of AFHCP technology initiatives that were designed using modern technology in order to improve healthcare for federal beneficiaries in Alaska. The AFHCAN resources provided access to health services for patients who lived in rural locations throughout the state.

It was only fitting that Alaska hosted an International Telehealth Conference in March 2004 with representatives from 25 states, 4 Canadian provinces, and 11 countries attending to learn about Alaska's systems and to share their own ideas and experiences in this rapidly expanding arena of healthcare delivery. There are many lessons to be learned of course, and as telecommunications advances continue and as reimbursement for telemedicine services becomes more institutionalized, there is no doubt that the field will expand, not only to reach more locations but to include more health and medical services. The VA's plan to initiate home telehealth care is an excellent example of what the near future may hold, and expansion in the long term is potentially limitless, including international telehealth and telemedicine ventures. Russia-Alaska telemedicine has already been established. Given the similarities of arctic and sub-arctic nations and communities, and the common health and behavioral health issues they face, there is no question that new international telehealth relationships will emerge.

CHAPTER II

Key Informant Interviews

Introduction

Interviews were conducted with individuals who had leadership roles in the development of the Alaska Federal Health Care Access Network (AFHCAN) project and key stakeholders in telemedicine in Alaska to gather information concerning the history and background of the project, to obtain the perspective of key stakeholders on the effects and influences of the project on telemedicine in Alaska, and to provide direction for evaluation activities.

Two levels of key informant interviews were conducted. Level 1 interviewees included individuals who were directly involved in the AFHCAN project since its inception and played key roles in its development. Level 2 interviews were conducted with individuals who, although not directly involved in the AFHCAN project, were key stakeholders in telemedicine in Alaska.

Methodology

Level 1 Key Informant Interviews

In the months from December 2002 through February 2003, Level 1 key-informant interviews were conducted. The three primary purposes of these interviews were to: (1) gather information concerning the history and background of the project, (2) identify additional informants who played a significant role in telemedicine in the state, and (3) provide direction concerning the fundamental issues and questions to be answered by the evaluation.

Eight Level 1 interviews were conducted with individuals who had a direct role and vested interest in the development of the AFHCAN project. Their perspectives provided the framework for Level 2 interviews and guidance to identify source documents. Level 1 key informants included leaders from AFHCAN, Alaska Native Tribal Health Consortium

(ANTHC), Alaska Department of Veterans Affairs (VA), GCI, U. S. Coast Guard (USCG), Senator Ted Stevens' staff, Alaska Federal Health Care Partnership (AFHCP), and the National Library of Medicine Alaska Telehealth Testbed Project (ATTP).

Interview questions were sent to each interviewee prior to the actual interview. This protocol ensured sufficient time for the individual to prepare and collect supporting documentation, thus minimizing the need to follow up. All except one of the interviews were recorded and transcribed. Each of the interviews was analyzed for survey instrument development and to identify additional sources of information and data. A matrix based upon the interviews catalogued all data sources and documents to be reviewed (Appendix A). Level 1 key informants also identified other individuals to be interviewed.

Level 1- Key Informant Interview Items

1. From your perspective, describe the chronology of the telemedicine project and your organization's role.
2. How would you describe the current status of the project?
3. What are the issues that need to be addressed or resolved for the future of the project?
4. Who are other people we should talk to about the history and current status of the project?
5. Do you know of any documents that would be useful to review?

Level 2 Key Informant Interviews

Based on the information gathered in Level 1, seven Level 2 key informants were identified. These individuals were not directly associated with AFHCAN implementation, but were leaders and stakeholders in telemedicine efforts in Alaska. Their perspectives were important to complete the discussion of AFHCAN and identify the ripple effects of the project on other telemedicine projects in Alaska. Level 2 key informants included individuals from the Alaska Mental Health Trust Authority, Alaska Department of Corrections, Community Mental Health, Regulatory Commission of Alaska, Division of Medical Assistance (currently the

Division of Health Care Services), Alaska Healthcare Partnership, Providence Health System in Alaska, and a physician.

Following the same procedures developed in Level 1, including prior preview of questions, Level 2 interviews were conducted in person or by telephone.

Level 2- Key Informant Interview Items

1. What was your role in telehealth in Alaska?
   - What was the role of your organization in telehealth?

2. When you came to the process, what were the issues you were most concerned with?
3. Did other issues arise that you were interested in?
   - Were they addressed?
   - Why not?

4. What are the critical incidents that occurred to get us here?
   a. Describe critical decisions, activities, events, outside influences that shaped the project development.
      - When
      - Who
      - Specific circumstances
      - Results
   b. What are the three most critical decisions that were made?

5. Do you think the AFHCAN process has been successful?
   a. Why?
   b. Why not?

6. What are the future issues to be addressed?

Results

Initial Concerns

Interviewees were asked to identify the issues that first concerned them as they became involved with telemedicine development in Alaska. Four categories of issues emerged from their responses: expense, mental health applications, quality, and private sector access.

Expense. A major initial concern mentioned by five interviewees was the cost of telecommunications and the impact it would have on providers, particularly in the private sector. The known technology was expensive, as were transmission and maintenance costs. Two interviewees noted they had concerns about funding issues including access to funding, the complexity or user-friendliness of applications for funding, and the length of the delay between the application for and receipt of funds. The Universal Service Fund was established in 1996, but had encountered problems processing applications and awarding subsidies. Consequently, two interviewees were initially concerned about the usefulness of the fund. Another factor was that it was initially unknown if there would be Medicaid reimbursement for telehealth services and one interviewee mentioned a concern about Medicaid reimbursement policy.

Mental Health Applications. Three respondents were concerned about using telemedicine to expand mental health services in Alaska. Because of Alaska's geography and its population distribution, it is very difficult to provide professional psychiatric or psychological services statewide. Mental health professionals perceived that telemedicine (telepsychiatry) offered an opportunity to expand services to areas of the state that are currently underserved. The Department of Corrections was hoping the technology would assist with suicide prevention and medication management for prison inmates. Initial concerns that were mentioned included: if connectivity and quality of transmission would be reliable enough for mental health applications, if store-and-forward would work well enough, and if telepsychiatry would be accepted by staff and people receiving services.

As the AFHCAN project was proceeding, the State of Alaska Department of Corrections (DOC) was on a parallel course, using telepsychiatry to expand mental health services in the corrections system. Due to budget cuts, DOC was experimenting with alternative methods to deliver mental health services to inmates. Because telepsychiatry looked very promising in the DOC project, mental health professionals were interested in enhancing its visibility and expanding the application to other mental health providers in the AFHCAN system.

Quality. In addition to the concerns mentioned about quality of technology and transmission in mental health applications, two people brought up other initial concerns regarding quality. One concern was the lack of high quality, high bandwidth connections, and the other was whether or not the health services delivered through telecommunication systems would be of high quality.

Private Sector Access. The fourth area of initial concerns specifically noted by two interviewees, but linked with issues mentioned by others, was if the resources developed by the AFHCAN project would be available to all providers of services. Misunderstandings between the telecommunication and health care industries based on operating differences was a factor mentioned by another interviewee as well as a concern about the relationship between public and private providers.

Critical Events

Interviewees were asked to identify the critical events that occurred in the development of telemedicine in Alaska. Critical events identified were the formation of the Alaska Telehealth Advisory Council (ATAC), Congressional support, the Universal Service Fund (USF), prior telemedicine experience, Medicaid reimbursement, and technology development.

Alaska Telehealth Advisory Council. Four interviewees indicated that the formation of the ATAC was either a critical event or was instrumental in addressing initial concerns (e.g., Medicaid reimbursement, funding for expanded application through pilot projects, sustainability, accessibility, and recognition for telemedicine). As one person noted, the ATAC "was able to

push along the issue of Medicaid reimbursement which will be very important to future sustainability and use among practitioners; [it] created a centralized group to focus on telemedicine issues and to develop telemedicine initiatives."

Congressional Support. Four interviewees specifically mentioned the support of Senator Stevens. As one interviewee summed it up, "Senator Stevens' involvement – his leadership on the issue, his insistence that the telemedicine systems be integrated and his appropriations for the equipment and to manage the development." Without Senator Stevens' appropriation to develop telemedicine technology, there would not have been an AFHCAN project. His vision was for telemedicine systems to be integrated and inclusive. He supported the concept that all providers, not just the federal partners, should benefit from telemedicine development. This vision led directly to the formation of the ATAC.

Universal Service Fund. A third critical event, mentioned by four interviewees, was the availability of funding from the Universal Service Fund. Coordinated by the FCC, this fund gives a subsidy to telecommunication providers to allow more affordable telecommunication rates in rural areas of the state. As stated by one interviewee, "Without it, the costs…would be prohibitively high."

Prior Telemedicine Experience. Three interviewees mentioned that prior experiences with telemedicine, including the National Library of Medicine project (Alaska Telemedicine Testbed Project) and the Department of Corrections telepsychiatry project, were critical events. In addition to the lessons learned, these projects brought attention to and increased interest in telemedicine in Alaska.

Medicaid Reimbursement. Two interviewees identified critical events enabling Medicaid reimbursement for telemedicine applications. One comment highlighted the role of the ATAC in "providing funds and direction to hire a contractor to work on the Medicaid reimbursement issue." Another was a law change that allowed Medicaid to reimburse providers in Hawaii and Alaska for interactive telemedicine encounters (i.e., in addition to store-and-forward).

Technology Development. Two interviewees noted the importance of technology developments that allowed specific applications critical to telemedicine. Specific technologies mentioned were touch screens, scopes, durable equipment, and technologies that allowed for the transmission of high quality pictures.

AFHCAN Success

Interviewees were asked if they thought the AFHCAN project was successful. All but one respondent perceived AFHCAN had been successful because it accomplished its basic purposes: (1) to create telemedicine software and equipment, and (2) to distribute the equipment to serve federal beneficiaries. However, none of the interviewees were directly connected to the AFHCAN project and six of the seven commented on ATAC activities (e.g., pilot projects and Medicaid reimbursement) in their perceptions of AFHCAN's success.

Six of the respondents specifically mentioned that in the larger context of maintaining the AFHCAN system and expanding this system to non-federal users it had not been as successful. The most often mentioned barrier to accomplishing this end was the expense of telemedicine. All interviewees commented at some time during their interviews that significant work remained to make telemedicine affordable and accessible by all providers in Alaska.

Future Issues

Interviewees were asked to identify future issues that would need to be addressed for the development of telemedicine in Alaska. Four categories of issues emerged: regulatory, sustainability, integration, and expansion.

Regulatory Issues. Six interviewees noted issues that relate to regulatory practices. These issues included technical standards for telehealth applications, rules that restrict use of subsidy dollars (USF), licensing and interstate issues, and privacy and confidentiality issues.

Sustainability Issues. Five interviewees noted that financial sustainability was a critical issue that needed to be addressed for the future. Concerns expressed included continuing dependence on the USF, if other resources will be necessary, and if Medicaid will be a resource

of funds for development and maintenance of telemedicine infrastructure. Other issues related to sustainability that were identified included the need for written manuals to make it easier for future users and the need for ongoing training to increase the number of users and their comfort with the technology.

Integration Issues. The need to address barriers to the integration of the public and private sectors was mentioned by five interviewees. It was pointed out that the current system was designed around federal partners, but the "private sector is characterized by many small relationships," and the current system is "not affordable for most small, private practitioners." It was also noted that one barrier to integration is the USF rules that inhibit private access to funding from the USF. Two interviewees felt that the lack of integration was related to higher costs. Another noted the "politics of connectivity" as a barrier and that "battles among the providers sometimes make developing partnerships difficult."

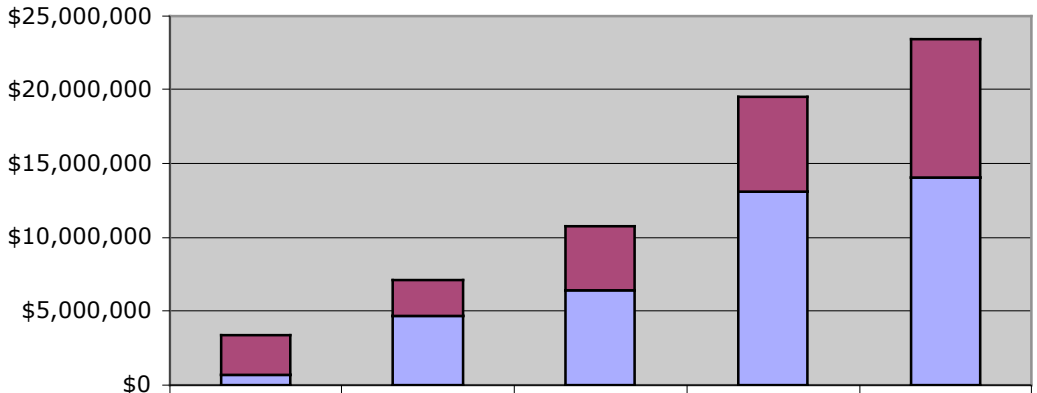
Expansion Issues. Five interviewees mentioned expansion of telemedicine to more applications, expanding quality within the telecommunication system, and/or expanding the capability of providers using the technology. As one interviewee put it, there is a "need to move telemedicine from a communication tool to a clinical tool." There were two suggestions for promoting the technology to an increased number of users: "produce data that shows the uses and benefits of telemedicine applications," and "continue to develop provider Internet to hook all providers together and provide them with an introduction to the potential for telemedicine."

It is worth noting that interviewees focused attention on the USF in several of the above categories of responses, which only applies to high bandwidth videoconferencing. It had little to do with the AFHCAN project as it had relied on a low bandwidth store-and-forward methodology up to the time of this evaluation. However, real-time, interactive, video communication was the target goal for several interviewees who saw it as a higher quality methodology, particularly for mental health applications. The cost of a T-1 line, or a fractional

T1 line in rural Alaska can exceed $12,000 per month. The USF subsidy lowers the monthly cost of the line to about $900 per month for health organizations. Because of the lack of a telecommunication infrastructure in rural Alaska and the cost of its development, it is not surprising that Alaskan health care providers have used the USF extensively.

The following chart shows the extent to which Alaska has used the USF to subsidize telecommunications, compared to use of the fund by other states. As it indicates, funds allocated for use in Alaska increased from $629,582 in 1998 to $14,008,346 in 2002. Alaska's share of the USF in relation to that of other states also increased from 19% of committed funds in 1998 to 60% of committed funds in 2002.

Universal Service Fund Commitments



	1998	1999	2000	2001	2002
All other states	$2,768,636	$2,435,808	$4,374,904	$6,452,117	$9,378,153
Alaska allotment	$629,582	$4,684,910	$6,379,537	$13,083,014	$14,008,346

Conclusions & Discussion

These results are based on the perceptions of key stakeholders in the telemedicine industry in Alaska. They are not based on solid business models, pricing structures, or any highly objective analysis. Perceptions may or may not be valid in actual reality. Regardless, they are extremely important because perceptions can ultimately effect and even shape reality. People take action based on their beliefs.

The cost of telemedicine and its impact on the issues of sustainability and integration between the public and private sectors, even with the less expensive resources developed in the AFHCAN project, had been and continued to be the primary concern of these respondents. As one interviewee noted, "…it has concentrated too much on the development of technology that is too expensive to be replicated in the private sector and too expensive to be maintained in the public sector."

Though not directly influenced by the AFHCAN project, a critical event in terms of the expense of telemedicine and its sustainability was implementation of Medicaid Reimbursement regulations developed by the Alaska Medicaid Program that became effective September 2002. The importance of this event was twofold. First, it was hoped that the regulations would offer an incentive for providers to use telemedicine; and second, that other payers for health care services might follow the Medicaid lead and begin to reimburse. Indeed, Premera Blue Cross Blue Shield of Alaska approved reimbursement for telehealth claims around the same time as Medicaid.

It was generally assumed by interviewees that significantly fewer federal dollars would be available to fund telemedicine in the future. As the federal subsidies go away, the users of telemedicine will be expected to maintain their own systems. In addition to the ongoing costs of connectivity already absorbed by organizations using AFHCAN resources, this will include replacement and repair of existing equipment and other operating costs associated with telemedicine activity. Much of the development of the current AFHCAN system was centralized and then distributed to users. A question that remains to be seen is if organizations will develop and maintain the internal capacity to sustain and increase the functionality of telemedicine.

Interviewees generally perceived that the AFHCAN project was successful in terms of meeting its basic objectives, although the positive image of the project was enhanced by the success of concurrent efforts. The one area where interviewees perceived that the project had failed was integration between the public and private sectors. Providers outside the federal partnership expressed a desire for a private-public sector partnership, but were concerned from

the beginning that the telemedicine technology to be developed would exclude them, which appeared to be the situation at the end of the project from their point of view. Ironically, expanded access to telehealth resources was integral to Senator Stevens' original vision that inspired the AFHCAN project. Barriers to integration mentioned by interviewees included inherent differences between public and private systems and regulatory issues, particularly around confidentiality and federal subsidies, but the biggest perceived barrier to integration seemed to be the expense including the cost of the technology, transmission, and maintenance.

Stewart Ferguson offered some reasons from his perspective to account for why the expansion of AFHCAN solutions beyond the federal AFHCAN sites had not yet occurred as of November 2004:

- The AFHCAN project has really taken 6-7 years to complete, leaving the Office with few resources to accommodate requests from outside organizations. While most carts were deployed in the first 4 years, activity has focused on developing ancillary services (training and support), deploying other telehealth equipment, and finalizing connectivity at the last sites.
- Deployment outside of the Federal sector required a complex business case analysis to be conducted by an outside consultant, and raised many legal and regulatory issues for the Alaska Native Tribal Health Consortium. One example is the need for liability insurance for AFHCAN staff when operating outside of the Federal sector.
- One of the outcomes of the business analysis was a decision to develop a commercially viable product line for telehealth consistent with FDA, CE, and UL regulations. This entailed a major 18-month development effort on the software which has also addressed improvements in performance, security, functionality, and scalability. This product line is only now becoming available.
- AFHCAN / ANTCH needed to develop a strategic plan and a cost structure for goods and services, to be able to approach customers with pricing and Service Level Agreements.

CHAPTER III

AFHCAN Project Use & Evaluation Data

Utilization of the AFHCAN System

On November 30, 2003 a thorough analysis of cases recorded and archived by the Alaska Federal Health Care Access Network (AFHCAN) was completed.

Number of Cases by Customer

Customer	Sites	Carts	Connected Servers	Unique Providers	Archived Real Cases
DOD	9	14	3	26	36
IHS	200	215	31	652	11,187
PHN	26	24	0	-----data not available-----	
USCG	8	7	8	44	45
VA	5	0	0	-----data not available-----	
TOTALS	248	260	42	722	11,268

Note: DOD = Dept. of Defense; IHS = Indian Health Services; PHN = Public Health Nursing; USCG = U. S. Coast Guard; VA = Veterans Affairs (Alaska)

It is obvious that the overwhelming majority of telehealth events originated within the IHS-funded health care delivery system. The IHS sites with 218 carts archived 11,187 real cases. DOD and USGC with fewer carts archived fewer real cases. The State of Alaska PHN clinics were not connected to the AFHCAN network and no data were available regarding usage of the equipment. They had a server at each site and had the capability to use the equipment within their own clinics. Ultimately, the VA chose to purchase videoconferencing equipment rather than carts to participate in national VA-related telehealth activities and the AFHCAN does not track the data on that network. A list of transmissions on the AFHCAN from November 2001 to November 2003 showing sites, number of cases, as well as the number and types of images produced can be found in Appendix B.

That use of the AFHCAN continued to increase over time was evidenced by comparing the 22-week periods from April to August in 2002 and in 2003. There were 1,317 cases in 2002 and 2,741 cases in 2003, an increase of 108% due to both an increase in the number of workstations coming online and an increase in the volume of usage on established workstations. It is possible this trend will continue for a time beyond this report, but if the number of sites does not increase and if the size of rural populations does not significantly increase, the markets being served will eventually become saturated and usage will tend to level out.

AFHCAN incorporated two primary methods of data collection in its store-and-forward programming to evaluate the project's impact and effectiveness. The first was an accounting of *use data* collected from sites using telemedicine carts and equipment, and the second was *user satisfaction data* collected from both referring and consulting providers using the system.

Use data was collected from 42 separate AFHCAN servers. Data was submitted automatically from the servers to the AFHCAN Project Office and provided a snapshot of how the carts and equipment were being used. Data showed how, and how often the telemedicine system was used, which sites were using the system, and for what purposes. Using this data, it was possible to determine:

- Which pieces of equipment on the telemedicine carts were being used most
- If some regions of the state were using the system more than others
- If certain regions of the state were using some equipment more than other regions, indicating special needs

The more subjective user satisfaction data reflected the opinions of health care providers using the AFHCAN telemedicine system on how useful they perceived the system to be on a per-case basis. This data provided insight into both the level of satisfaction with the system as it was currently structured, and areas of potential improvement. Satisfaction data, in part, provided direction to improve (1) access to health care services and information in rural/remote areas and (2) the quality of care available at local clinic or regional medical centers.

AFHCAN Telemedicine Use Data

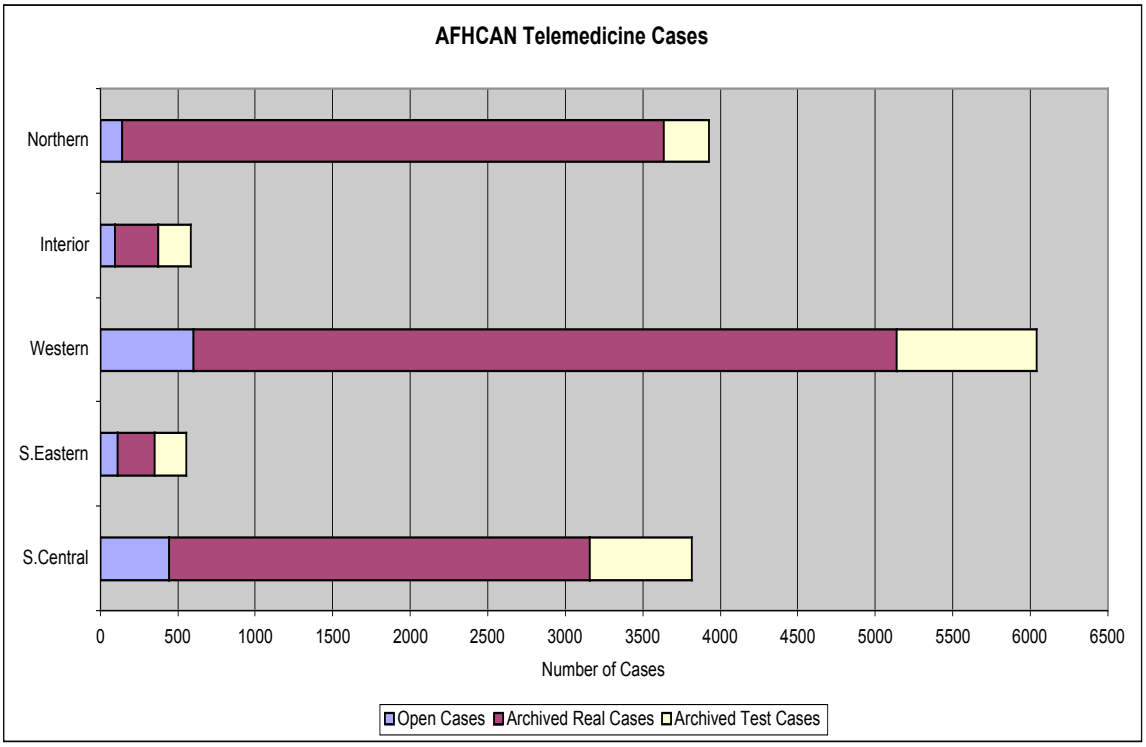
Most health care sites in the AFHCAN project had a telemedicine cart typically outfitted with a computer monitor, keyboard, digital camera, ECG, scanner, and a video otoscope. Health care providers used this equipment when examining a patient and stored the patient's information electronically. The provider was then able to electronically send the patient's examination data to a specialist for review and diagnostic support. The consulting specialist viewed data on a computer using the AFHCAN software.

When a consultant opened a telemedicine case, the first window was a comments section where the referring provider may have written a narrative of the problem. After reading the referring provider's comments, the consulting provider could choose to review electronic case records, forms, and pictures in any order. The consultant was able to send an assessment of the case back to the referring provider electronically. Each case was archived electronically by either the referring or consulting provider.

Commencing in October 2001, 42 servers with the system began transmitting weekly reports to the AFHCAN office. The AFHCAN software was designed so these reports were generated and submitted automatically without involvement by site-based staff. These reports contained data on the frequency of telemedicine cart usage as well as the number and types of cases created and archived. This data has been summarized by regions of the state. Though it makes the information manageable, there is always a caveat to any aggregated summary of data: diverse characteristics exist within regions as well as between regions. Characteristics that likely impacted data included the size of organizations, number of sites connected to the network, when carts were received and when they were put into use, corporate and ethnic cultures, previous telemedicine experience, and whether or not there were strong local advocates for telemedicine.

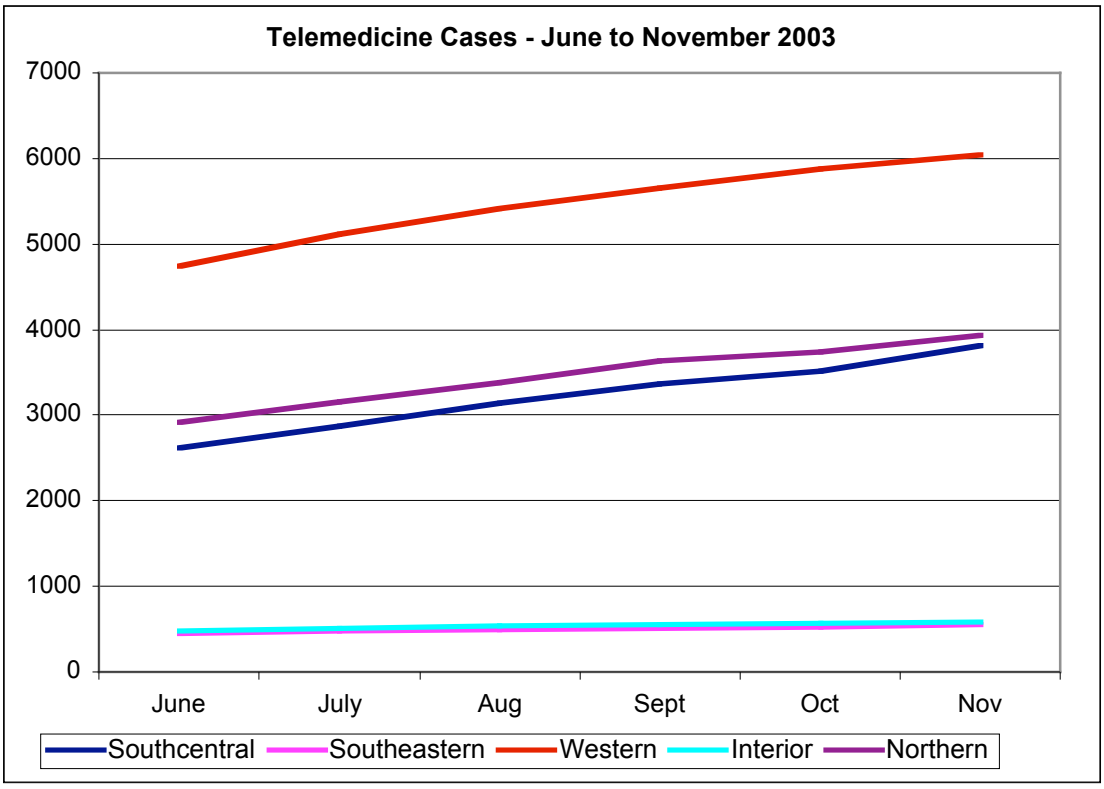
Frequency & Types of Cases. The frequency and types of cases were compiled by AFHCAN into three categories: *archived real cases, archived test cases,* and *open cases.* In real cases, actual patients received services. Test cases with fictional patients were used for training

purposes. Open cases were those that had been created using the telemedicine software and had not yet been archived—they could be either real or test cases. Once a real or test case was closed, it became an archived case. The total number of cases reported here includes all open, archived, real and test cases. Across the state as of November 2003, AFHCAN participants generated a total of 14,924 telemedicine cases. This included 11,268 archived real cases, 2,261 archived test cases, and 1,395 open cases. Archived real cases accounted for 83% of the total number of archived telemedicine cases.



The Western Region, reported 6,039 cases with 75% archived real cases, followed by the The Northern Region reporting 3,929 cases with 89% archived real cases. The Southcentral Region reported 3,815 cases with 71% archived real cases; the Interior Region, 586 cases with 48% archived real cases; and the Southeastern Region, 555 cases with 43% archived real cases.

An indication of provider use can be gleaned from the pattern of use over a discrete six-month period. By exploring the cumulative (i.e., running total) of cases per month, which is the *total number of telemedicine cases*, another indication of regional usage can be observed.

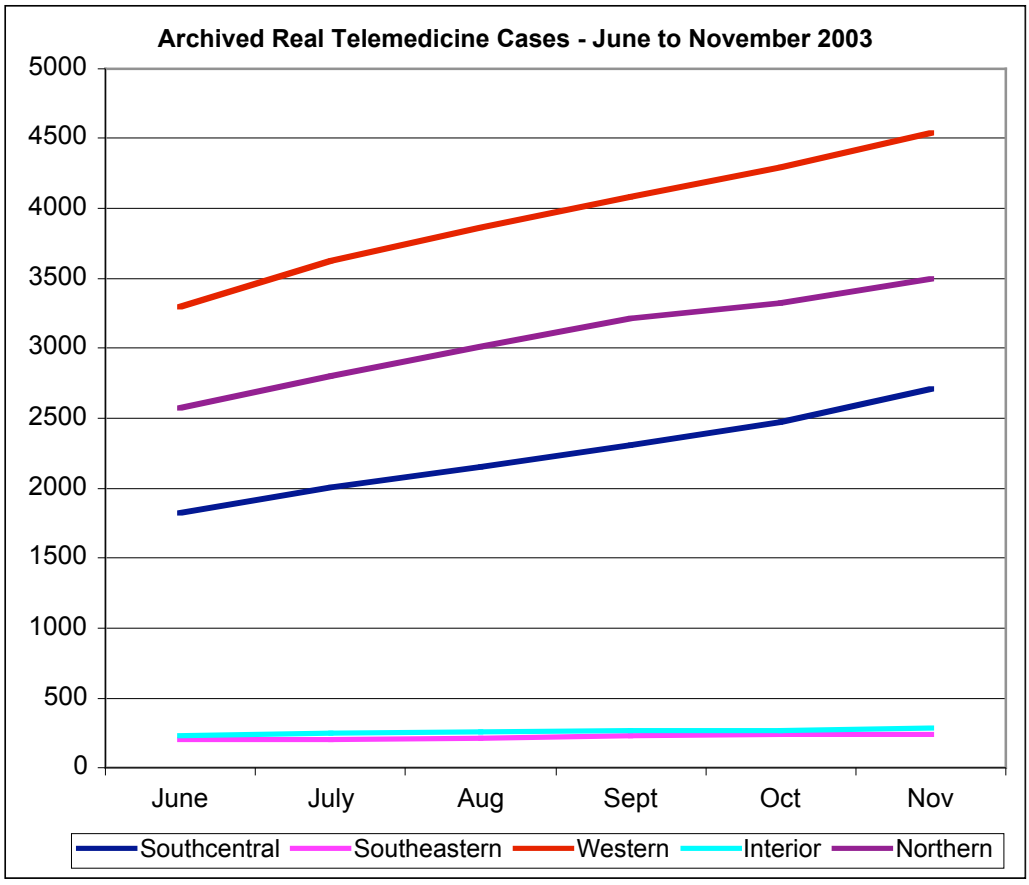


The Western, Northern, and Southcentral Regions appeared to be using the telemedicine system at fairly steady rates. Over the six-month period of June through November 2003, the total number of telemedicine cases from the Southcentral Region increased by 46% with an average of 241 new cases per month (1,203 cases). The Northern and the Western Regions increased cases by 34% (1,006 cases) and 28% (1,304 cases) respectively. The average number of new cases per month was 201 in the Northern Region and 261 in the Western Region.

Sites within the Western and Northern Regions with previously established and well-developed networks, as well as prior experience and strong telemedicine advocates, were poised to be early adaptors and heavy users in this project. Both the Interior and Southeastern Regions clearly used the AFHCAN system less often. However, the Interior Region increased its number

of cases by 21% (101 cases), adding an average of 20 cases per month. The Southeastern Region increased by 23% (104 cases), adding an average of 21 cases per month during this time period.

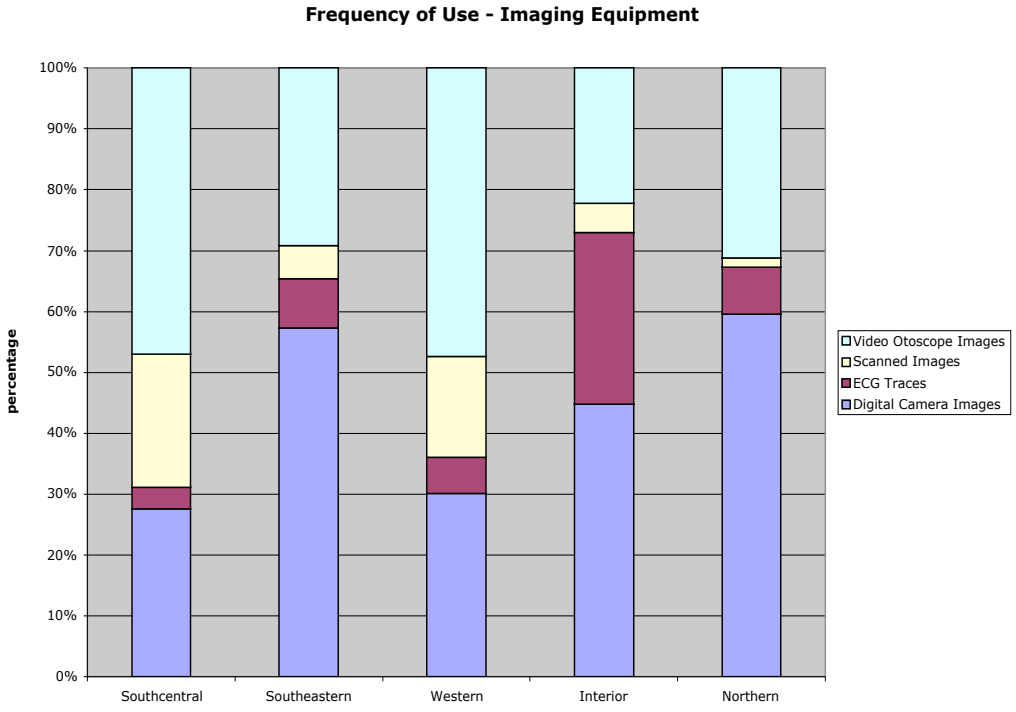
It is also instructive to explore the trend among archived real telemedicine cases occurring over the same six-month period. Again, the number of cases represented is a cumulative month-to-month count. The following chart displays a larger difference between the Northern and Southcentral Regions than was displayed in the previous chart. While these two regions reported similar numbers of total cases, the Northern Region consistently reported more archived real telemedicine cases than the Southcentral Region. The Northern Region created an average of 184 archived real cases per month from June to November, whereas the Southcentral Region created an average of 178 archived real cases per month during the same time period.



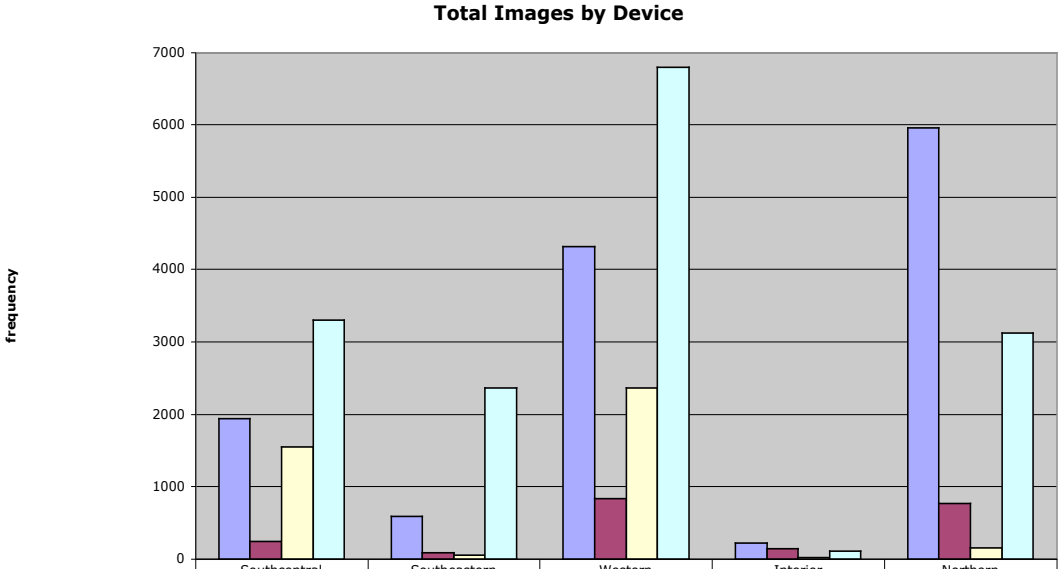
The Western Region appeared to be the most prolific, producing 40% of all archived real telemedicine cases and an average of 248 archived real cases per month from June to November. The Interior and Southeastern Regions accounted for only 2% each of all archived real cases.

Use of Specific Equipment

During November 2001, AFHCAN began producing reports that recorded the number of images taken with each piece of equipment. As of November 2003, 42 servers reported image frequency data to AFHCAN, but intermittent local email system failures interrupted receiving all the weekly reports. Thus the total number of cases reported here (9,404) is lower than the cumulative case numbers reported elsewhere and the number of images taken per week was actually higher. The 42 servers spread across the five regions reported frequency data on four types of imaging equipment: digital camera, ECG, scanner, and video otoscope. As the following chart demonstrates, sites from the Western and Northern Regions created more images than the other regions.



Regarding the equipment, the video otoscope and the digital camera account for 81% of the total images produced. The video otoscope was the most widely used piece of imaging equipment for both the Western and Southcentral Regions, which accounted for 47% of images taken with the video otoscope. They were also the only regions with full-time audiologists. The digital camera appeared to be the most widely used for the Northern, Interior, and Southeast Regions. Digital camera imaging produced 60% of all images taken in the Northern Region, 57% of all images taken in Southeast, and 45% of all images taken in the Interior.



	Southcentral	Southeastern	Western	Interior	Northern
Digital Camera Images	1945	585	4317	226	5958
ECG Traces	244	82	838	142	766
Scanned Imges	1544	55	2369	24	152
Video Otoscope Images	3306	2369	6791	112	3124

The Western Region produced more scanned images (57% of total scanned images), video otoscope images (50% of total otoscope images), and ECG traces (40% of total ECG traces) than any other region. However, the Northern Region produced more digital camera images than any other region (46% of all camera images). It is also instructive to compare the total images taken by each region to the total number of cases. As reported earlier, the total number of cases reported is lower than the cumulative case numbers reported elsewhere because of email problems.

Though the Western Region produced the highest number of images, the Southcentral Region averaged slightly more images per case (x = 3.9) than the Western Region (x = 3.6). The Southeastern Region created an average of 2.8 images per case, which was the lowest.

The AFHCAN equipment could be used alone; however, many cases required the use of multiple pieces of equipment. Data for the following table were extracted from 11,268 archived real telemedicine cases.

	Cases USING this equipment		Cases ONLY using this equipment		Cases using this AND other equipment	
ECG	754	7%	701	6%	53	1%
Digital Camera	4788	42%	4316	38%	472	4%
Video Images	5385	48%	3194	28%	2191	19%
Scanned Images	2568	23%	216	2%	2352	21%
None	374	3%				

Ninety-one percent of the cases in which the scanner was used also involved other pieces of telemedicine equipment, as did 40% of cases in which the video imaging was used. Three percent of archived real telemedicine cases used none of these pieces of equipment, relying solely on the comments or electronic forms functions. It is worth noting that there were cases that would never use images due to the nature of the case itself.

The AFHCAN telemedicine system provided two options for referring providers to convey text information to consulting providers. One option was a library of electronic patient forms, including multiple dermatology, ENT, and general-purpose examination forms. The second option was a comments function where providers could freely type in information, questions, and responses. The electronic forms function was used much less than the comments function by providers. Only 8% (951) of archived real cases were accompanied by electronic forms and 52% (5,853) used the comments function.

Federal Partner Usage

As noted previously, the overwhelming majority of the telehealth events recorded originated within the IHS-funded health care delivery system. The IHS accounted for 99% of the archived real cases, which invites the question of why the other AFHCAN federal partners seemed to be under-using the telehealth system. Other federal Partners included:

U.S. Coast Guard
- Kodiak
- Ketchikan
- Juneau
- Sitka

U.S. Department of Defense

U.S. Air Force
- Elmendorf Air Force Base Hospital
- Eielson Air Force Base
- Clear Air Force Base

U.S. Army
- Basset Army Hospital, KAMISH/DMIS 1229-FW
- Fort Richardson HC 6th Infantry Div-FW
- Fort Greely HC Aviation Med/DMIS -FW

Veterans Affairs (Alaska Department)

In an effort to identify reasons for the low level of telehealth use by these AFHCAN federal partners, a series of interviews were conducted during the first quarter of 2004. Nine key informants, identified by the AFHCAN Evaluation Committee, were interviewed:

1. Third Medical Group, Elmendorf: Commander, Col. Peter Walsh
2. Third Medical Group, Elmendorf: Col. Kerry Dexter (Planning Committee)
3. 354 Medical Group, Eielson: Commander, Col. Jay Neubauer
4. 354 Medical Group, Eielson: Lt. Col. Mike Menning (Planning Committee)
5. VA: Director, Alex Spector
6. VA: Hal Blair (Planning Committee)
7. Bassett Army Hospital: Commander, Col. William B. Gamble
8. Basset Army Hospital: Maj. K.C. Bolton (Planning Committee)
9. Coast Guard: Jay Brudzinski (Planning Committee)

Interviews consisted of three questions:

- What are the reasons or barriers that resulted in low use of the AFHCAN telemedicine system?
- What are your organization's plans for future use?
- Is there anything you want to add?

Interview Results

Department of Defense (DOD). The need for consultation with patient cases was simply not as high as the need in the rural/remote areas (i.e., areas referred to as "the bush" in Alaska). DOD sites had board-certified physicians and/or specialists on staff, thus many of the routine cases were handled in-house. "The carts work well out in villages where there may be a Nurse Practitioner or a Physicians Assistant but no physician. They may need to send primary care cases to a physician. Also, they can't refer a patient out to a specialist as easily as we can because of their remoteness."

For DOD sites with physicians on staff, the AFHCAN system was perceived to be less useful in cases where specialists were needed. One respondent described the problem: "For … cart [use] to be efficient, the response from specialists has to be immediate in real time. Since this is problematic, it is easier and more efficient to refer patients out to specialists. Patients then get a continuity of care and we have spots open to see other primary care patients. When we refer patients out to a specialist we don't meet with the patient again after that."

Several DOD respondents noted that there was a lack of a referral network of specialists who had agreed to receive cases using the AFHCAN system: "… there is no directory or 'phone book' of specialists who have agreed to accept cases being sent to them using AFHCAN Telemedicine." However, these respondents indicated they would use the AFHCAN system more if referral patterns and agreements with specialists were developed.

Workflow issues were also problematic for DOD when using the AFHCAN carts. The AFHCAN cart was a separate system from the sites' already existing automated systems. Providers were accustomed to a desktop workflow, and the cart was outside of that norm. The

AFHCAN cart was in a room that provided connectivity, but might not be suitable for patient exams. The issue of time and proper scheduling to use the cart was mentioned as well. Physicians' use of the cart depended on patient flow and their schedules. It is possible that physicians had to line up to use the cart because appointment times ran ahead of or behind schedule.

Another issue raised by DOD was that they believed they had no access to their use data once it was archived. Respondents noted that they would have liked to conduct outcomes research with their own data to determine how useful the cart was to them, but felt they were unable to do so because they were under the impression that data regarding the carts belonged exclusively to the Alaska Native Tribal Health Consortium (ANTHC).

There was general consensus that the AFHCAN system had great utility for rural and remote areas of Alaska, but less utility for sites with easy access to primary-care physicians and specialists. Respondents indicated that the system would have greater utility for DOD if the carts had more capability by adding more peripherals (e.g., ultrasound was the most frequent request).

Veterans Administration (VA). One of the major issues for the VA was the absence of an interface between the cart and their medical records systems. Consultations produced by a cart could not be embedded in their established record system. The creation of an interface as a solution was mentioned but had not been completed. The VA also commented they had limited clinical needs. On the other hand, they noted that the AFHCAN project resulted in other benefits besides the carts, including improved connectivity, reduction in connectivity costs, and formation of business partnerships with villages.

Coast Guard. The issues for the Coast Guard were a bit different from those of the DOD and VA. The low use rates were more a function of the number of federal beneficiaries served. In other words, the number of beneficiaries served by the IHS was significantly larger than those served by the Coast Guard. On the other hand, the Coast Guard commented that using the cart for a single case to provide immediate medical care justified the AFHCAN system.

The Coast Guard was actively promoting cart use and incorporation of the cart into the standard workflow. They stated that they were at the "crawling phase" with respect to the AFHCAN telemedicine system. "We have just now had enough time to get to a point where providers are comfortable with the new workflows. We have also just now had time to get referral relationships established."

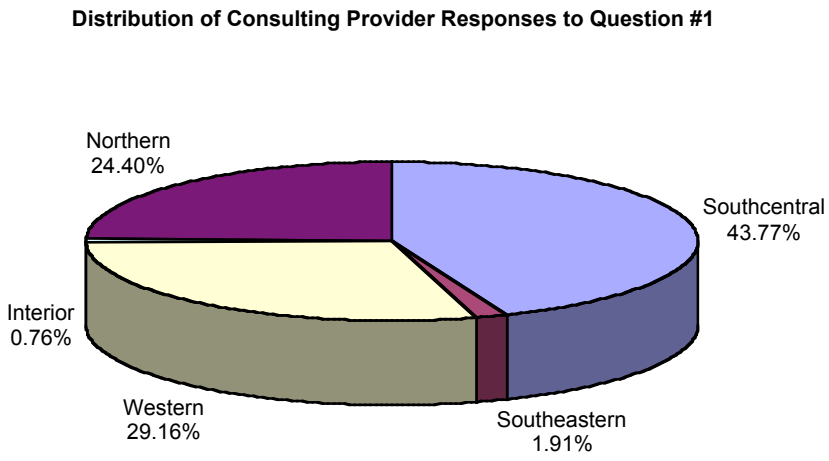
AFHCAN Telemedicine Project Survey Data

Single Question/High Volume (SQHV) data were collected from health care providers as they used the AFHCAN telemedicine equipment. The AFHCAN software was programmed to present a question to providers when cases were created, sent, and archived. Providers were asked to evaluate the impact of the telemedicine system on a variety of factors including travel, provider and patient satisfaction, quality of care, access to care, and cost of care (SQHV questions are listed in Appendix C). The data presented here are for the time period from October 15, 2001 through October 26, 2003. Servers began reporting data as the sites began creating or receiving telemedicine cases.

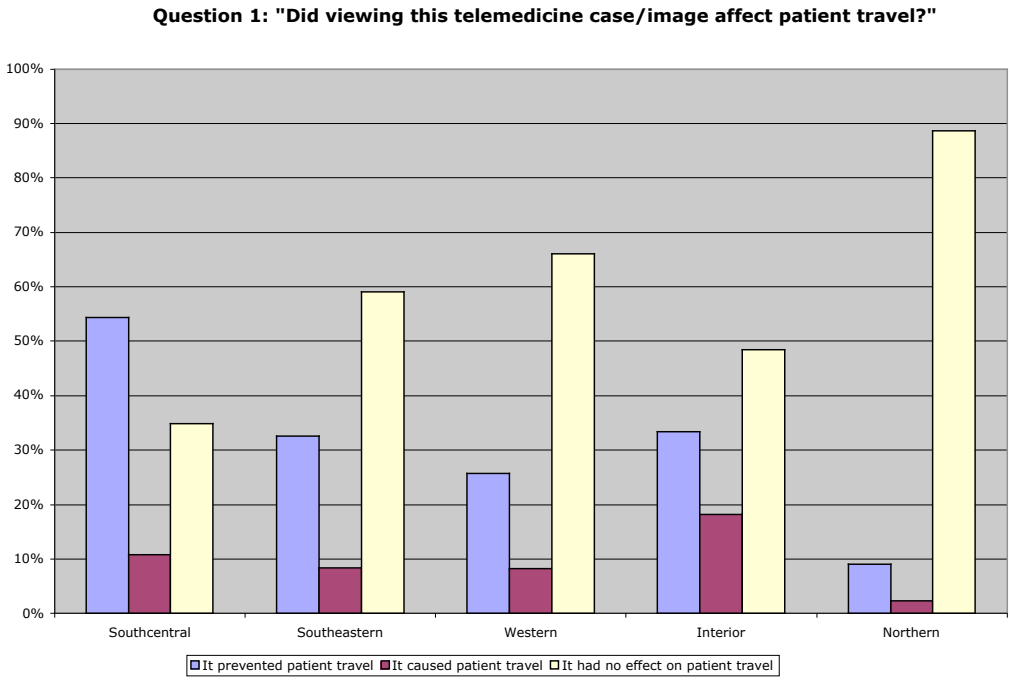
The AFHCAN software was designed to pose a single question to providers working on "real" telemedicine cases. No questions were asked when working on "test" cases. Participation was voluntary and providers had the option to skip the question. Providers that consulted on cases (i.e., reviewed the case and responded or archived the case) were asked the same question on every case (Question 1) regarding travel. As referring providers created a case they received one question from a programmed bank of 10 different questions (Questions 2-11). Each time a provider created another case, the next question in the sequence was generated, looping back to Question 2 after 10 cases and proceeding again through the sequence on subsequent cases.

Consulting Providers: Patient Travel

The question presented to all consulting providers concerned the effect of telemedicine on patient travel. The following chart demonstrates the regional distribution of consulting providers who responded to Question 1. The largest proportion of responses came from consulting providers in the Southcentral Region (44%), whereas the remaining 56% were divided among the other four regions: Western 29%, Northern 24%, Southeastern 2%, and the Interior 1%. This distribution makes sense when considering that 99% of the real archived cases originated at Native/Tribal sites, and the Alaska Native Medical Center providing tertiary care for the IHS is located in the Southcentral Region.



During the two-year (October 2001–October 2003) period, 4,341 consulting providers responded to Question 1. Overall, 34% indicated telemedicine prevented patient travel, 8% indicated it caused patient travel, and 58% reported it had no effect. The majority of respondents within the Southcentral Region (54%) reported telemedicine prevented patient travel. The majority of responses from all other regions indicated that telemedicine had no effect on patient travel.



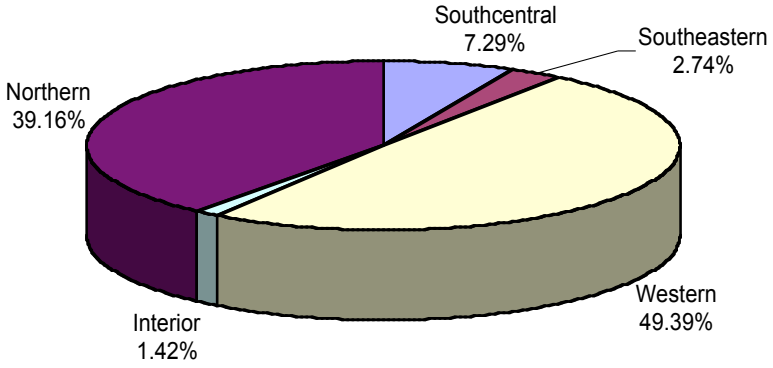
A Chi-Square analysis on the overall responses revealed that there were significantly more ($X^2 = 37.91$, df = 2, $p < 0.0001$) *it had no effect* responses (58%) than *it prevented travel* (34%), and there were significantly fewer *it caused travel* (8%) responses than the other two responses. Chi-Square analyses for each region revealed that in the Southcentral Region there were significantly more ($X^2 = 541$, df = 2, $p < 0.0001$) *prevented patient travel* responses, followed by *it had no effect*, with *it caused travel* receiving significantly fewer responses than either of the other responses. In the Southeastern Region there were significantly more ($X^2 = 32$, df = 2, $p < 0.0001$) *no effect* responses, followed by *it prevented travel*, with *it caused travel* receiving significantly fewer responses than either of the other responses. In the Western Region there were significantly more ($X^2 = 667$, df = 2, $p < 0.0001$) *no effect* responses, followed by *it prevented travel*, with *it caused travel* receiving significantly fewer responses than either of the other responses. For the Interior Region there was no significant difference in the distribution of the 3 responses ($X^2 = 5$, df = 2, $P > 0.05$). In the Northern Region there were significantly more ($X^2 = 1466$, df = 2, $p < 0.0001$) *no effect* responses, followed by *it prevented travel*, with *it caused travel* receiving significantly fewer responses than either of the other responses.

Referring Providers: Patient & Provider Satisfaction

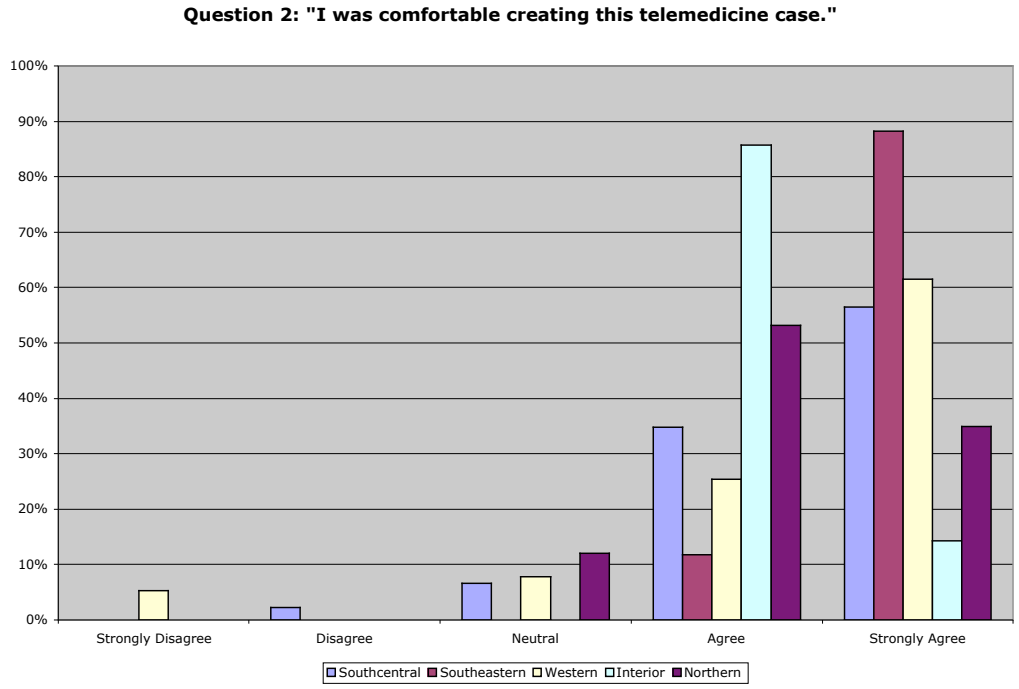
The remaining 10 questions were presented to referring providers in consecutive order of one per case created. Providers were queried only when they created and sent a real telemedicine case (not test cases). These questions were concerned with the level of provider and patient satisfaction with the equipment and services provided by the AFHCAN telemedicine project. Questions 2-10 were rated on a Likert Scale with a 1 to 5 metric: *1–Strongly Disagree; 2–Disagree; 3– Neutral; 4–Agree;* and *5–Strongly Agree*. Question 11 did not use the Likert Scale, but rather asked the provider to identify specific areas of difficulty.

Half the responses to Questions 2 through 11 were from referring providers in the Western Region and nearly 40% were from providers in the Northern Region. Very few referring provider responses were contributed by the Southcentral, Southeastern, and Interior Regions. These latter areas combined contributed only 11% of total responses. This is consistent with the observation that most cases in the Southcentral Region are at the Alaska Native Medical Center (ANMC), the tertiary facility for Native/Tribal sites, where few cases are created. The distribution of answers among the other four regions is consistent with the distribution of archived real cases reported earlier.

Distribution of Referring Providers Responding to Questions #2 - #11



Comfort with Software. Referring providers were asked to assess their comfort level with using the telemedicine software to create a case. Data here were based on 618 referring provider responses.

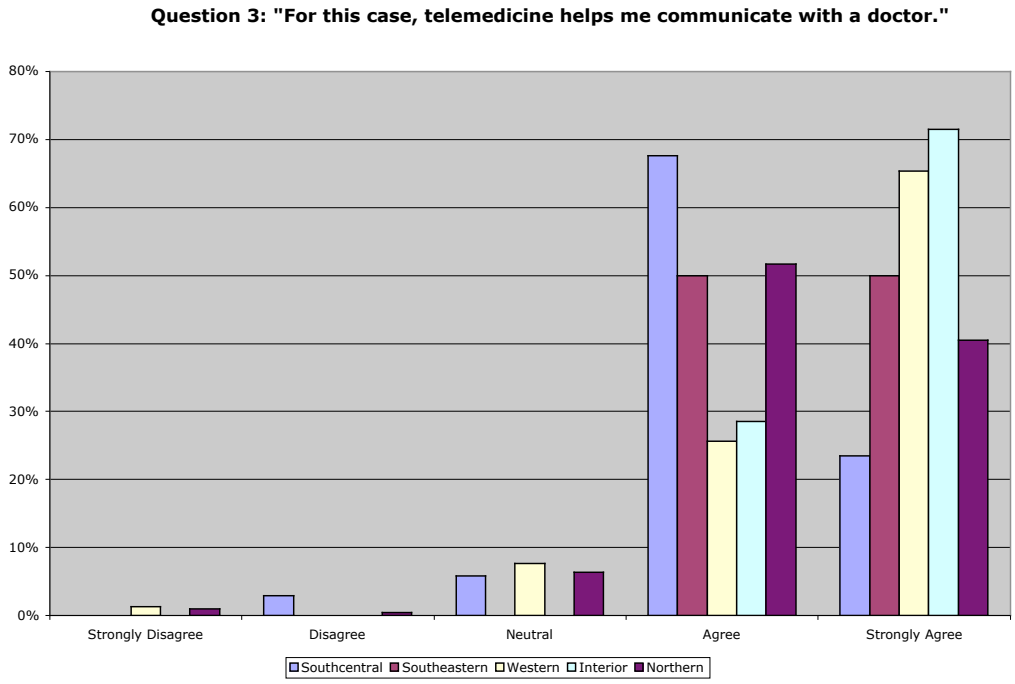


A Chi-Square analysis on the overall responses revealed there were significantly more ($X^2 = 111$, df = 4, $p < 0.0001$) *Strongly Agree* (52%) than *Agree* (38%) than *Neutral* (9%) than *Disagree* (1%) than *Strongly Disagree* (0%) responses. The same pattern was observed for three regions: Southcentral ($X^2 = 56$, df = 4, $p < 0.0001$); Southeastern ($X^2 = 50$, df = 4, $p < 0.0001$); and Western ($X^2 = 390$, df = 4, $p < 0.0001$). The Interior ($X^2 = 19$, df = 4, $p < 0.0001$) and Northern ($X^2 = 264$, df = 4, $p < 0.0001$) Regions had significantly more *Agree* responses followed by *Strongly Agree*, *Neutral*, *Disagree,* and *Strongly Disagree*.

Comfort levels appear to be fairly high across all regions of the state. Most responses indicated providers were comfortable creating telemedicine cases. Out of 618 responses, 545 (88%) of respondents indicated agreement or strong agreement with the statement, "I was comfortable creating this telemedicine case." A small segment of respondents within the Western

Region (16 responses or less than 3%) indicated a strong degree of uneasiness with creating telemedicine cases.

Provider-Doctor Communication. A total of 476 referring providers responded to a question asking them to assess telemedicine's role in provider-doctor communication.

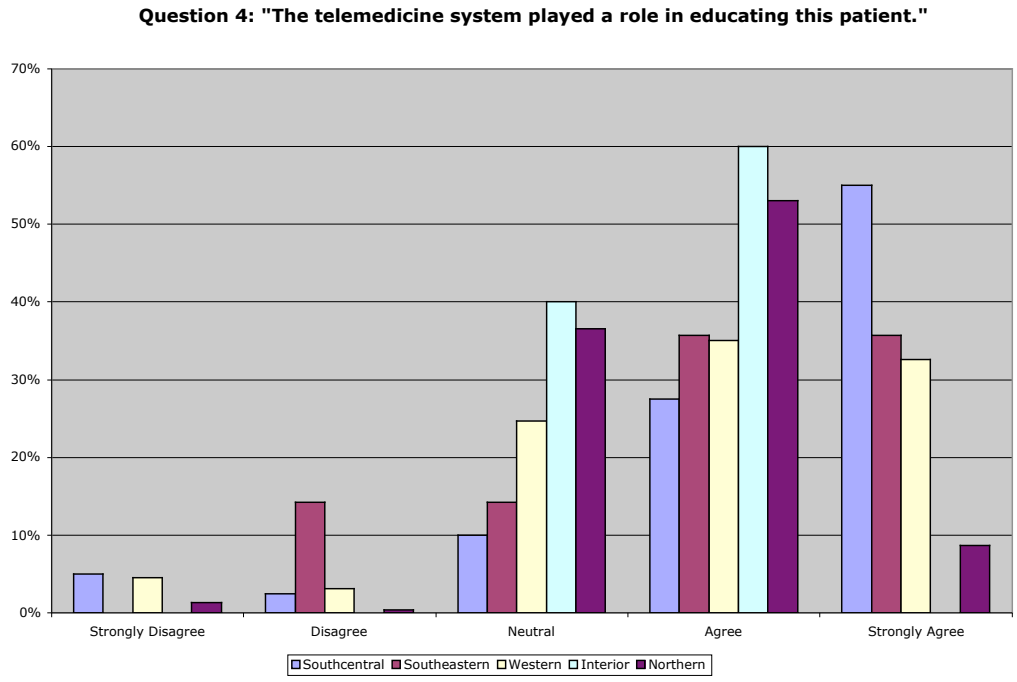


A Chi-Square analysis on the overall responses revealed that there were significantly more ($X^2 = 108$, df = 4, $p < 0.0001$) *Strongly Agree* (50%) than *Agree* (40%) than *Neutral* (8%) than *Disagree* (1%) than *Strongly Disagree* (1%) responses. The same pattern was observed for two regions: Western ($X^2 = 334$, df = 4, $p < 0.0001$) and Interior ($X^2 = 14$, df = 4, $p < 0.01$). For Southcentral ($X^2 = 52$, df = 4, $p < 0.0001$) and Northern ($X^2 = 241$, df = 4, $p < 0.0001$) Regions there were more *Agree*, *Strongly Agree*, *Neutral*, *Disagree*, and *Strongly Disagree* respectively. The Southeastern Region ($X^2 = 10$, df = 4, $p < 0.05$) had more *Strongly Agree* and *Agree* responses than any other category.

These data demonstrate telemedicine did help providers communicate with doctors. Out of the 476 total responses, 437 (92%) indicated telemedicine did facilitate referrer-physician

communication. On a regional level, there was a degree of variation in whether they simply agreed or strongly agreed with the lead-in statement.

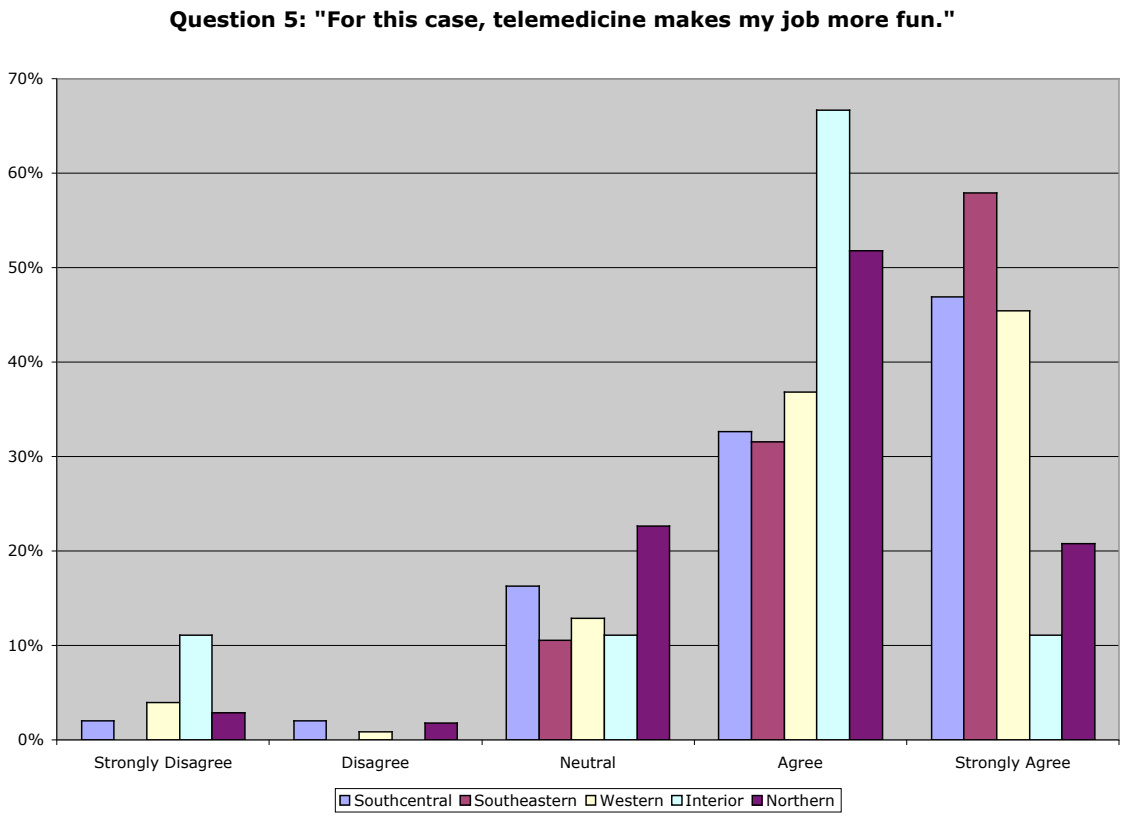
Patient Education. Question 4 asked referring providers to what degree the telemedicine system played a role in educating patients. In total, 577 providers responded to this question.



A Chi-Square analysis on the overall responses revealed that there were significantly more ($X^2 = 59$, df = 4, $p < 0.0001$) *Agree* (42%) than *Strongly Agree* (25%) than *Neutral* (28%) than *Strongly Disagree* (3%) than *Disagree* (2%) responses. The same pattern was observed for two regions: Western ($X^2 = 132$, df = 4, $p < 0.0001$) and Northern ($X^2 = 526$, df = 4, $p < 0.01$). For the Southcentral Region ($X^2 = 48$, df = 4, $p < 0.0001$) there were significantly more *Strongly Agree* than *Agree*, *Neutral*, *Disagree*, and *Strongly Disagree* responses. For the Southeastern ($X^2 = 6$, df = 4, $p > 0.05$) and Interior ($X^2 = 8$, df = 4, $p > 0.05$) Regions, there were no significant differences.

Out of 577 responses, the majority indicated agreement or strong agreement (42% and 24% respectively) that the telemedicine system played a role in patient education. More than one-quarter of respondents (28%) were neutral on the educational influence of telemedicine, and 5% indicated the telemedicine system played no role. Just looking at the Southeast Region, respondents were mixed in their opinion, and 14% indicated disagreement with the statement that telemedicine played a role in educating their patients. Small groups of respondents within the Western and Southcentral Regions also indicated disagreement with the statement (8% each).

Impact on Providers' Jobs. A total of 701 referring providers responded to a question concerning the impact of telemedicine on their job.

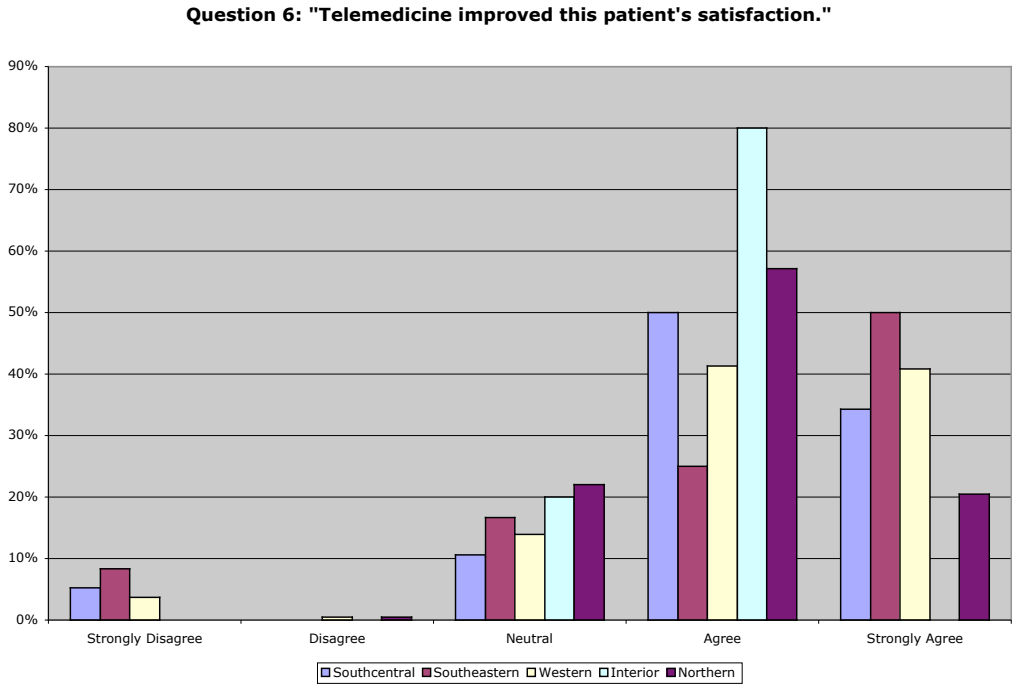


A Chi-Square analysis on the overall responses revealed that there were significantly more ($X^2 = 72$, df = 4, $p < 0.0001$) *Agree* (43%) than *Strongly Agree* (36%) than *Neutral* (17%) than *Strongly Disagree* (3%) than *Disagree* (1%) responses. The same pattern was observed for two regions: Northern ($X^2 = 124$, df = 4, $p < 0.0001$) and Interior ($X^2 = 11$, df = 4, $p < 0.05$). For Southcentral ($X^2 = 37$, df = 4, $p < 0.0001$), Southeastern ($X^2 = 22$, df = 4, $p < 0.0001$) and Western ($X^2 = 281$, df = 4, $p < 0.0001$) Regions there were more *Strongly Agree*, *Agree*, *Neutral*, *Disagree*, and *Strongly Disagree* respectively.

For the most part, respondents from every region (79%) indicated agreement that telemedicine made work more fun. Eighty percent of respondents from the Southcentral Region indicated they either agreed or strongly agreed with the statement as did 89% of those from within the Southeastern Region, 82% from within the Western Region, 78% from within the Interior Region and, 73% from within the Northern Region.

Small groups of respondents indicated strong disagreement with the statement that telemedicine made their job more fun (4% each within the Western and Southcentral Regions and 3% within the Northern Region).

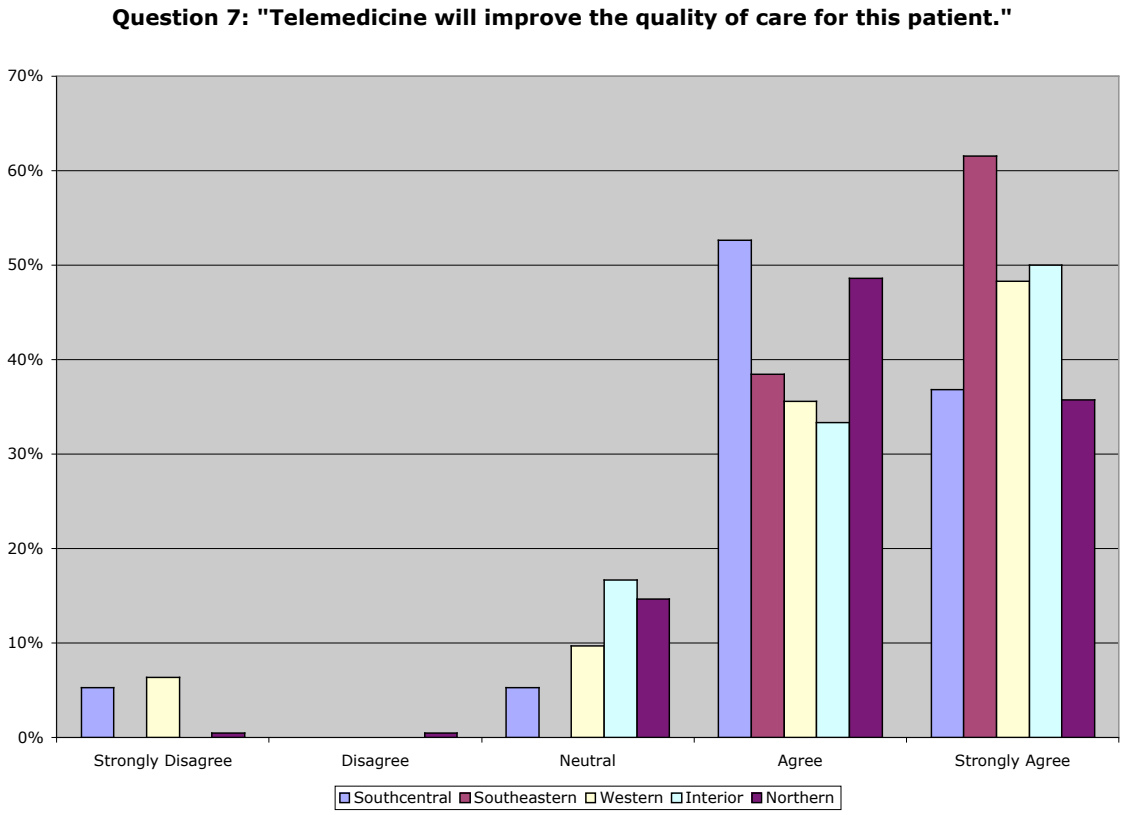
Patient Satisfaction. Referring providers were asked if telemedicine improved patient satisfaction. In total, 505 referring providers responded to this question.



A Chi-Square analysis on the overall responses revealed that there were significantly more ($X^2 = 81$, df = 4, $p < 0.0001$) *Agree* (48%) than *Strongly Agree* (32%) than *Neutral* (17%) than *Strongly Disagree* (2%) than *Disagree* (1%) responses. The same pattern was observed for four regions: Northern ($X^2 = 221$, df = 4, $p < 0.0001$), Western ($X^2 = 193$, df = 4, $p < 0.0001$), Interior ($X^2 = 12$, df = 4, $p < 0.02$) and Southcentral ($X^2 = 33$, df = 4, $p < 0.0001$). For Southeastern Region ($X^2 = 11$, df = 4, $p < 0.05$) there were more *Strongly Agree* than *Agree*, *Neutral*, *Disagree,* and *Strongly Disagree* respectively.

For the majority of respondents, telemedicine did improve patient satisfaction. Out of 505 total responses, 405 (80%) indicated at least some level of agreement with the statement. Only 4% of respondents within the Western Region, 8% within the Southeastern Region, and 5% within the Southcentral Region indicated a level of disagreement with the statement.

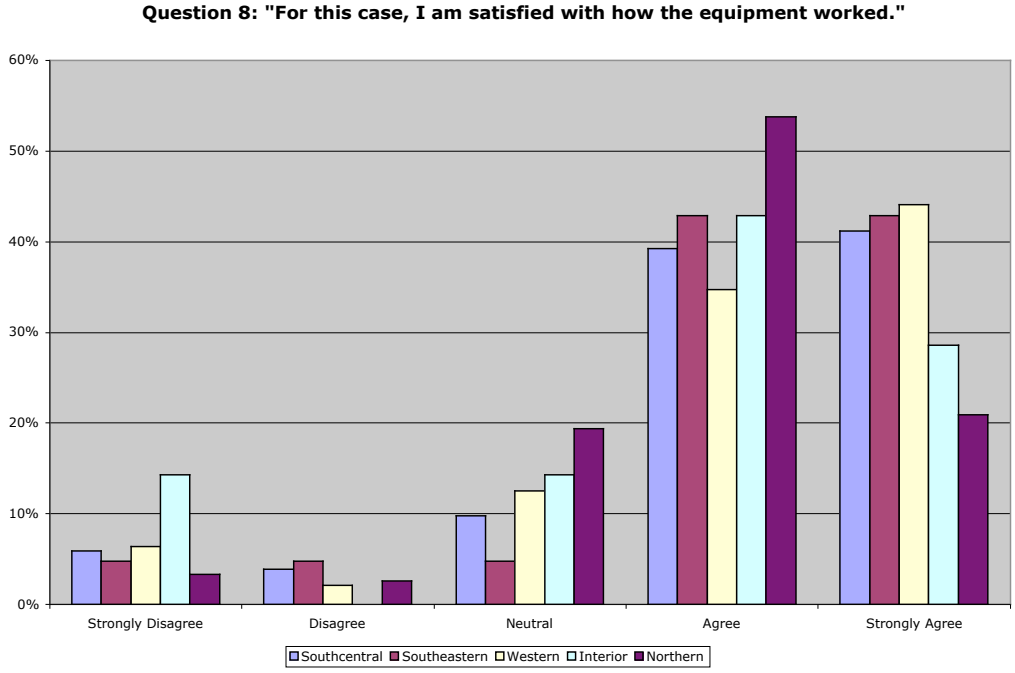
Quality of Care. Referring providers were asked to address the issue of telemedicine effects on patient quality of care. In total, 542 referring providers responded to this question.



A Chi-Square analysis on the overall responses revealed that there were significantly more ($X^2 = 84$, df = 4, $p < 0.0001$) *Strongly Agree* (43%) than *Agree* (42%) than *Neutral* (11%) than *Strongly Disagree* (3%) than *Disagree* (1%) responses. The same pattern was observed for three regions: Western ($X^2 = 234$, df = 4, $p < 0.0001$), Southeastern ($X^2 = 19$, df = 4, $p < 0.0001$) and Interior ($X^2 = 7$, df = 4, $p > 0.05$). For the Southcentral ($X^2 = 40$, df = 4, $p < 0.0001$) and Northern ($X^2 = 201$, df = 4, $p > 0.05$) Regions there were more *Agree*, *Strongly Agree*, *Neutral*, *Disagree,* and *Strongly Disagree* respectively.

The majority of respondents (85%) indicated that the quality of patient care had been improved by the use of telemedicine. Only 5% of respondents within the Southcentral Region and 6% within the Western Region indicated strong disagreement with the statement.

Equipment Performance. Respondents were asked to provide an assessment of how well the AFHCAN telemedicine equipment worked. A total of 721 referring providers responded to this question.

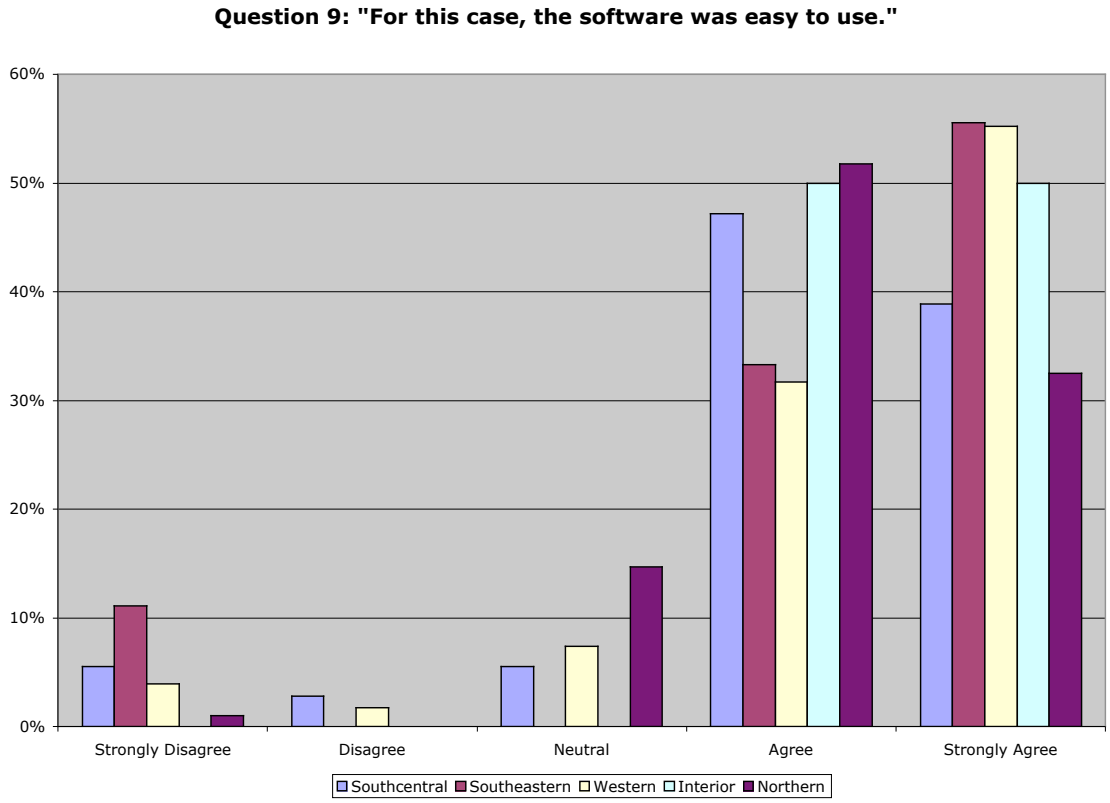


A Chi-Square analysis on the overall responses revealed that there were significantly more ($X^2 = 63$, df = 4, $p < 0.0001$) *Agree* (42%) than *Strongly Agree* (35%) than *Neutral* (15%) than *Strongly Disagree* (5%) than *Disagree* (3%) responses. The same pattern was observed for two regions: Northern ($X^2 = 731$, df = 4, $p < 0.0001$) and Interior ($X^2 = 6$, df = 4, $p > 0.05$). For the Southcentral ($X^2 = 36$, df = 4, $p < 0.0001$) and Western ($X^2 = 253$, df = 4, $p < 0.0001$) Regions there were more *Strongly Agree*, *Agree*, *Neutral*, *Disagree*, and *Strongly Disagree* respectively. The Southeastern Region ($X^2 = 20$, df = 4, $p < 0.05$) had more *Strongly Agree* and *Agree* responses than any other category.

The majority of respondents indicated they either agreed (42%) or strongly agreed (35%) that they were satisfied with the AFHCAN equipment. Overall, only 8% of the respondents indicated some level of dissatisfaction with the equipment: 14% of Interior Region respondents,

10% each of Southcentral and Southeastern Region respondents, 9% of Western Region respondents, and 6% of Northern Region respondents.

Ease of Use. Referring providers were asked to assess the degree of ease in using the AFHCAN telemedicine software. In total, 476 referring providers responded.



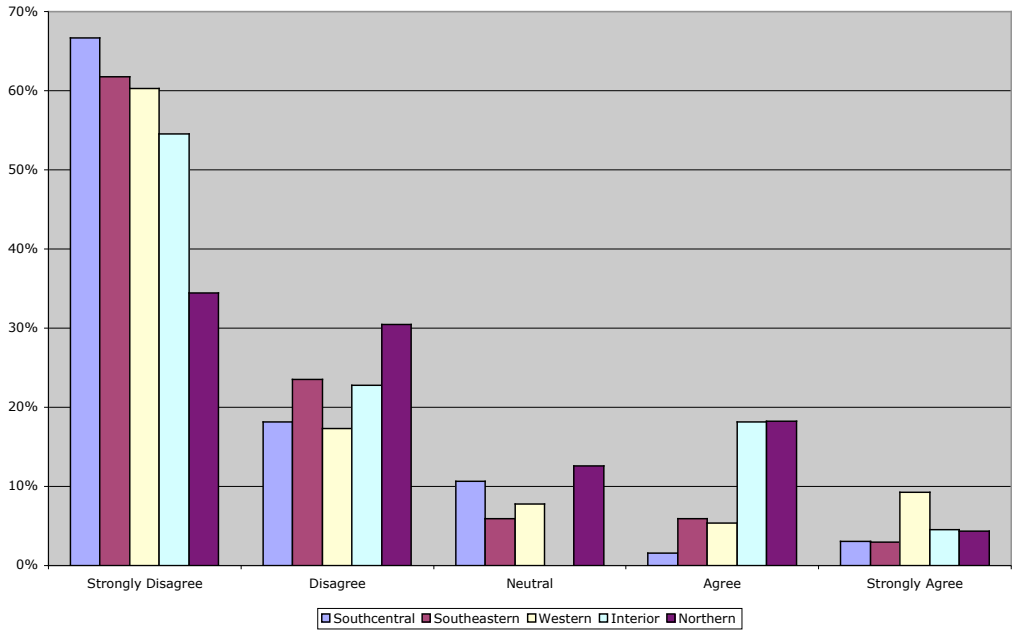
A Chi-Square analysis on the overall responses revealed that there were significantly more ($X^2 = 91$, df = 4, $p < 0.0001$) *Strongly Agree* (45%) than *Agree* (41%) than *Neutral* (10%) than *Strongly Disagree* (3%) than *Disagree* (1%) responses. The same pattern was observed for two regions: Western ($X^2 = 245$, df = 4, $p < 0.0001$) and Southeastern ($X^2 = 10$, df = 4, $p < 0.05$). For the Southcentral ($X^2 = 34$, df = 4, $p < 0.0001$) and Northern ($X^2 = 218$, df = 4, $p < 0.0001$) Regions there were more *Agree*, *Strongly Agree*, *Neutral*, *Disagree*, and *Strongly Disagree*

respectively. The Interior Region ($X^2 = 5$, df = 4, $p < 0.05$) had more *Strongly Agree* and *Agree* responses than any other category.

Most respondents indicated they either agreed or strongly agreed that the software is easy to use (86%). Overall, only 4% of respondents disagreed at least somewhat with the statement. These included 6% of Western Region respondents and 8% of Southcentral Region respondents.

Efficiency. Respondents were asked to assess a statement that telemedicine is a waste of time. In total, 835 referring providers responded to this statement.

Question 10: "Telemedicine was a waste of time for me and this patient."

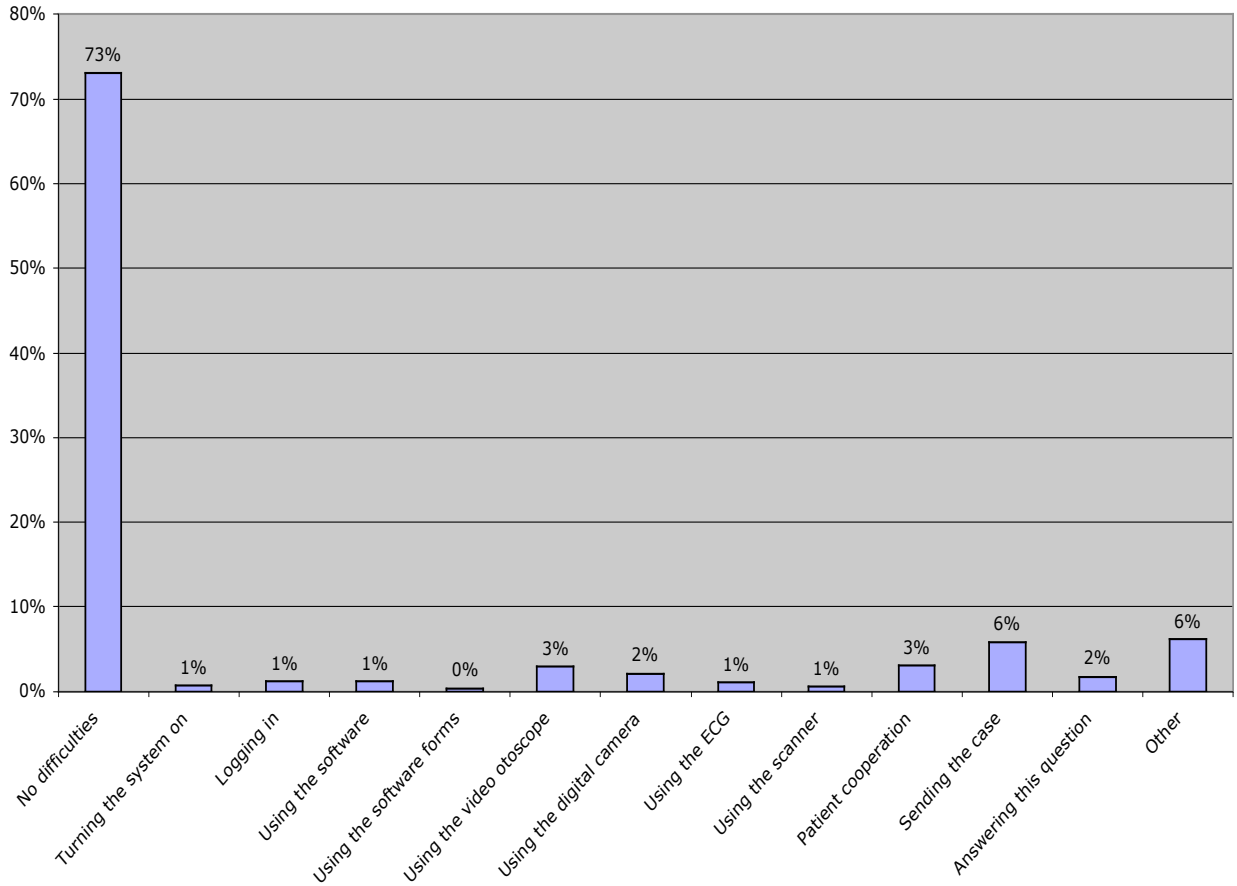


A Chi-Square analysis on the overall responses revealed that there were significantly more ($X^2 = 68$, df = 4, $p < 0.0001$) *Strongly Disagree* (51%) than *Disagree* (23%) than *Neutral* (9%) than *Agree* (10%) than *Strongly Agree* (7%) responses. A similar pattern was observed for all regions: Western ($X^2 = 436$, df = 4, $p < 0.0001$); Northern ($X^2 = 167$, df = 4, $p < 0.0001$); Southcentral ($X^2 = 98$, df = 4, $p < 0.0001$); Southeastern ($X^2 = 40$, df = 4, $p < 0.0001$); and Interior ($X^2 = 23$, df = 4, $p < 0.0001$).

Overall, 73% of the respondents disagreed that telemedicine was a waste of their time (23% disagreed and 50% strongly disagreed). Seventeen percent indicated that telemedicine was a waste of time (agreed and strongly agreed): 23% of respondents within both the Northern and the Interior Regions, 15% within the Western Region, 9% within the Southeastern Region, and 5% within the Southcentral Region.

Areas of Difficulty. The final question in the series of assessment items was to identify an area that provided the most difficulty in creating a case using the AFHCAN telemedicine system. In total, 749 referring providers responded to this question.

Question 11: "In creating this case, what did you have the most difficulty with?"



The majority of respondents reported they experienced no problems when creating a telemedicine case (73%). Significantly more ($X^2 = 4515$, df = 12, $p < 0.0001$) responses were in the *No Difficulties* category than any other category. Of the problems indicated, the most common was *Sending the Case* (6%). The responses indicating problems *Sending the Case* came early in the assessment, and as a result, modifications were made to the software to resolve the difficulties of sending cases. The next most frequently reported categories of difficulties were *Patient Cooperation* and *Video Otoscope* (3% each).

The 42 organizations that use the AFHCAN telemedicine cart and attachments reported use data on four types of telemedicine imaging equipment: digital camera, ECG, scanner, and video otoscope. Although there was variation across regions, this equipment was being used at an impressive rate.

Conclusions & Discussion

Overall, AFHCAN evaluation data from providers suggested that telemedicine did play a role in improving access to higher quality health care for those in rural/remote areas, although it should be noted that these data are subjective in nature, relying on the perceptions of providers, as opposed to purely objective outcome data. Within the more urban areas with readily accessible medical resources, use of telemedicine did not appear to be as prevalent as in the more remote areas of the state. It is worth mentioning again that overall the data largely represented the perspectives of providers in the Western and Northern Regions, which when combined, contributed almost 90% of the total number of responses. These two regions contained many remote areas and represented the most prolific users of AFHCAN telemedicine equipment and software. They contained the first deployed sites in the project and they had prior experience with telemedicine (e.g., the National Library of Medicine Alaska Telemedicine Testbed Project), which probably accounted somewhat for why they used AFHCAN resources much more than rural health care providers in the Interior and Southeast Regions.

As the data demonstrated, use of the AFHCAN network continued to increase over time. Comparing 22-week periods from April to August in 2002 and in 2003, the number of cases went from 1,317 to 2,741—an increase of 108%. As of November 2003, a total of 14,924 telemedicine cases were generated by AFHCAN telemedicine project participants. This number included 11,268 archived real cases, 1,395 open cases, and 2,261 archived test cases. Archived real cases accounted for 76% of the total number of telemedicine cases. These trends were likely to continue for some time since the deployment of carts was staggered and some sites did not have the equipment as long as others.

It was expected that using the AFHCAN resources would reduce the need for travel. Thirty-four percent of the consulting providers reported that telemedicine prevented patient travel. This represents a large cost savings given the expense of travel in Alaska. In some cases (8%) consulting providers indicated that patient travel was caused as a result of a telemedicine encounter. Informal reports from providers noted that travel in these cases was prompted by identification of conditions that might have been missed or delayed in traditional referral practices. It appeared that AFHCAN resources contributed to better distribution of travel dollars (i.e., identifying necessary travel while preventing unnecessary travel) and resulted in improved outcomes for patients.

The data indicated that the AFHCAN telemedicine resources facilitated referrer/physician communication. Patient education was reportedly enhanced by telemedicine in 213 of the cases reported. When asked if telemedicine improved patient satisfaction, four-fifths of respondents indicated that patient satisfaction with medical services was improved. To a related question, slightly more of the respondents indicated that the quality of patient care had been improved by the use of telemedicine. In addition, most respondents from every region indicated agreement that telemedicine makes work more fun. These are all factors in whether or not providers will be inspired to continue using the resource and to participate in training to expand their skills.

The majority of respondents (approximately three-fourths) indicated that they did not experience problems when creating a telemedicine case and that they were satisfied with the AFHCAN equipment. An even larger proportion of respondents indicated that the telemedicine software was easy to use and most providers indicated they were comfortable creating telemedicine cases. The AFHCAN system was designed to be "user friendly" and the data suggested that end was achieved. Overall, the AFHCAN equipment was not only easy for rural providers to use, but it appeared they were satisfied with their increased capacity to better serve their patients who were in turn more satisfied with their health care.

The issues and barriers related to use of the AFHCAN Telemedicine resources were unique to each partner's organizational structure and the location of their health care delivery system. Compared to IHS, the other federal partners used the AFHCAN system dramatically less often. In summary, interviews with nine representatives of the federal partners uncovered the following obstacles to system integration:

- In instances where specialists were locally available, the AFHCAN system was not as useful as it was in rural and remote locations without physicians or specialists on site.
- There was a lack of a designated network of specialists who had formally agreed to receive cases.
- Scheduling and workflow involving use of an AFHCAN cart could create conflicts.
- The AFHCAN cart used a system separate from the sites' automated systems and lacked necessary interface with the established computerized medical records system.
- The AFHCAN cart was in a room that provided connectivity but may not have been suited for patient exams.
- There was some confusion about access to and ownership of data.

CHAPTER IV

Medicaid's Role in Reimbursement for Telehealth

For telehealth technology to achieve sustainability in Alaska, reimbursement for telehealth services is fundamental. Changes to Medicaid, a significant payer for medical services in Alaska, were needed to set the standard for reimbursement for telehealth services. It was hoped that when Medicaid began paying for telehealth services, other payers for medical care would follow their example.

Until fairly recently, the U.S. Centers for Medicare and Medicaid Services (CMS) had not formally defined telemedicine for the Medicaid program. Further, the federal Medicaid law did not recognize telemedicine as a distinct service. Despite this, Medicaid reimbursement for services furnished through telemedicine was, and is, permissible "at the State's option as a cost-effective alternative to the more traditional ways of providing medical care (e.g., face-to-face consultations or examinations)."[41]

CMS has noted that as a jointly funded cooperative venture between federal and state governments, each state establishes its own eligibility standards; determines the type, amount, duration, and scope of services; sets the rate of payment for services; and administers its own program. CMS has further defined telemedicine as:

> …the use of medical information exchanged from one site to another using electronic communications for the health and education of patients or providers and to improve patient care. … It is generally described as the use of communication equipment to link health care practitioners and patients in different locations. This technology is used by health care providers for many reasons, including increased cost efficiency, reduced transportation expenses, improved patient access to specialists and mental health providers, improved quality of care, and better communication among providers.[42]

[41] CMS Website: http://cms.hhs.gov/states/telemed.asp
[42] Ibid.

In September 2002 Alaska Medicaid regulations defining reimbursement parameters for telemedicine were adopted. They specified types of telemedicine encounters, including store-and-forward methods. The promulgation of Alaska Medicaid regulations to cover telemedicine was seen as an important incentive for providers to use the technology. Medicaid reimbursement for telemedicine claims was authorized for services rendered beginning in December 2002.

To test the efficacy of this resource for payment of telemedicine claims, from February to July 2003 the Alaska Native Medical Center, using AFHCAN telemedicine equipment for store-and-forward cases, submitted ENT (ear-nose-throat) telemedicine cases to Medicaid for reimbursement. In June 2003 Medicaid data was obtained from the State of Alaska Department of Health and Social Services Division of Medical Assistance (currently Division of Health Care Services) to assess the rate and amount of payment on telemedicine claims submitted for dates of service since December 2002. All Medicaid claims from Alaska that could be identified as telemedicine cases were submitted under physician Medicaid provider ID numbers with the modifier *GQ* which indicated they used the store-and-forward method.

In May 2003, the first payments on telemedicine claims were paid for services rendered from December 2002 to May 2003. A total of $4,481.37 was paid on 58 claims; but as it will be seen, it did not yet address all claims that would be submitted for this time period. It takes time to process claims and providers have up to a year after the date of service to submit claims. Three claims submitted by May 2003 had been denied. The following table shows the number of claims and the amount paid by month of service as of June 2003.

Medicaid Payments by Month of Service as of June 2003

Month of Service	Claims Paid	Amount Paid
December 2002	1	134.22
January 2003	0	0
February 2003	22	1,820.43
March 2003	28	2,012.56
April 2003	6	458.64
May 2003	1	55.52
TOTALS	**58**	**$ 4,481.37**

Number of claims submitted = 61 (3 denied)

From June 2003 forward, data was requested from Medicaid on a monthly basis for continuing information on the progress of Medicaid reimbursement of telemedicine claims from Alaska. In November 2004, a final update of information about Medicaid claims and payments was requested. Up through September 2004, 322 claims had been paid and 143 claims had been denied. While in the six-month period from December 2002 to May 2003, all payments were made in a single month, payments continued in every month after that except November 2003 and January 2004. The following table shows how much was actually paid out each month.

Medicaid Payments by Month of Payment as of October 2004

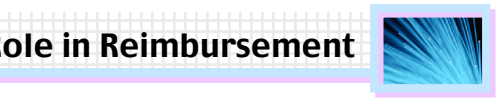
Month of Payment	Claims		Amount Paid
	Paid	Denied	
May 2003	58	3	4,408.69
June 2003	14	2	1,051.33
July 2003	19	4	1,510.44
August 2003	15	5	962.10
September 2003	3	1	164.22
October 2003	2	1	127.62
November 2003	0	0	0
December 2003	1	4	10.63
January 2004	0	1	0
February 2004	13	20	1,043.80
March 2004	73	3	5,284.90
April 2004	9	13	623.39
May 2004	16	7	989.15
June 2004	61	28	4,006.65
July 2004	9	11	690.29
August 2004	6	17	704.99
September 2004	23	22	2,504.81
TOTALS	**322**	**143**	**$ 24,083.01**

With only 5% of claims denied up through May 2003, on the surface, it seems like a big jump to just under 31% denied by October 2004. Over half the denied claims (52%) were because the recipient was not eligible for Medicaid on the date service was rendered. Other error code descriptions included "bill third party resource" (15%); "high variance error – fixed variance" (14%); "procedure rendered more than one time on same date" (14%); "claim exceeds

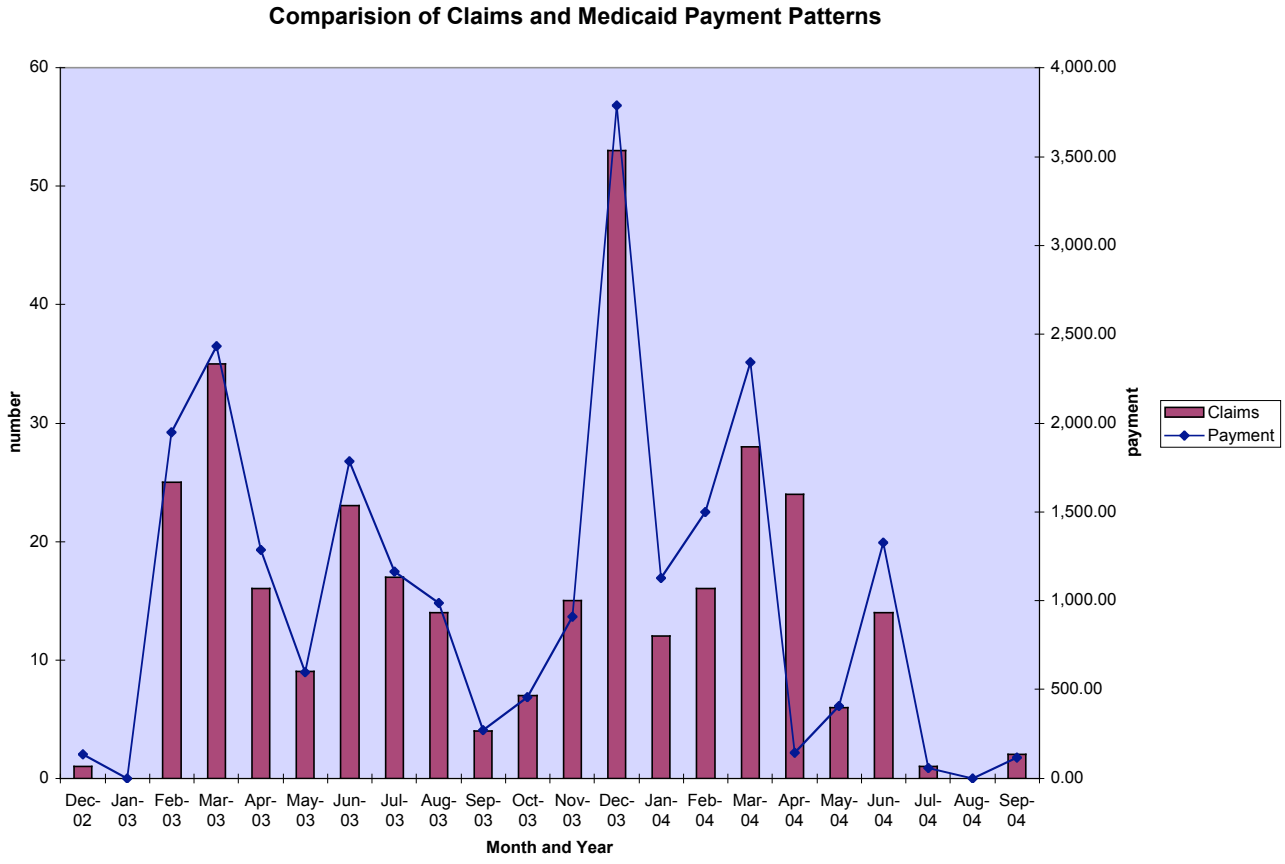
12 month filing time limit" (4%); "per your request, this claim is being denied" (3%); "total doc charges not equal sum of charges – replaced by" (3%); and 12 other miscellaneous errors at less than 3% each. A two-month sample (1/1/2004 to 2/29/2004) of all Medicaid claims for physician services rendered a denial rate of just over 30% indicating that the rate of Medicaid claim denial for telemedicine is probably typical as compared to other health care claims. None of the reasons for denial had anything to do with characteristics that would be unique to telemedicine. The following table updates information about Medicaid claims and payments by month of service with data that was available in November 2004.

Medicaid Payments by Month of Service Through September 2004

Month of Service	Claims		Amount Paid
	Paid	Denied	
November 2002	0	1	0
December 2002	1	0	134.22
January 2003	0	1	0
February 2003	25	6	1,949.22
March 2003	35	2	2,434.36
April 2003	16	10	1,286.14
May 2003	9	10	599.16
June 2003	23	13	1,783.78
July 2003	17	21	1,164.05
August 2003	14	5	988.03
September 2003	4	2	271.82
October 2003	7	1	454.96
November 2003	15	8	908.68
December 2003	53	14	3,788.14
January 2004	12	4	1,125.23
February 2004	16	12	1,500.63
March 2004	28	12	2,340.99
April 2004	24	13	1,449.80
May 2004	6	3	405.66
June 2004	14	5	1,324.83
July 2004	1	0	57.77
August 2004	0	0	0
September 2004	2	0	115.54
TOTALS	**322**	**143**	**$ 24,083.01**



The following graph compares the number of claims submitted (dots connected by a line) and the amount of money paid by Medicaid (bars) for telemedicine claims according to the months when services were rendered. These two sets of data are plotted on different scales (numbers versus dollars); but the patterns of claims submitted and money paid on claims mirror each other, another indication that Medicaid was consistently paying on telemedicine claims.



Conclusions & Discussion

Medicaid data presented here supports the conclusion that Medicaid will reliably and consistently reimburse for telehealth services, at least those of the store-and-forward type. It is worth noting that not all recipients of telemedicine services were eligible for Medicaid. It is estimated that about one-quarter of AFHCAN telehealth services were rendered to patients who

might have been eligible for Medicaid. Using this estimate, it can be surmised that of the 11,268 AFHCAN real cases archived by November 2003, 2,817 might have been eligible for Medicaid reimbursement if the regulations had been in place from the beginning of the project. While Medicaid reimbursement is a highly significant event and an important resource in and of itself for the future, it is even more significant when considering that other payers for health care services will very likely follow Medicaid's lead. Indeed, a major payer for health care services in Alaska, Premera Blue Cross Blue Shield of Alaska, approved reimbursement for telehealth services around the same time that Medicaid adopted regulations to pay for telehealth services, though very few claims had been submitted to them at the time of this writing.

These events were fairly recent for telehealth applications, but that alone may not explain the apparent under-utilization of these resources. Informal reports from providers suggested that the way telehealth has been reimbursed may have been a disincentive to its use. More specifically, there may be too little financial incentive for the provider to go through extra steps, both medical and administrative, to choose telemedicine as an option for reimbursable health care, in spite of its advantages and overall cost savings to the industry. Providers have expressed they have not received enough revenue in the process to maintain the necessary equipment and infrastructure to conduct telemedicine encounters. This may result in choosing options for health care that are much more expensive overall (i.e., involving travel), but cost less for the provider in the end. The data collected in this evaluation did not address this potential disincentive. It is certainly worth examining this issue in a future study as reimbursement by third party payers is one of the critically important, fundamental needs for sustainability of telehealth services.

CHAPTER V

Health Organization Surveys

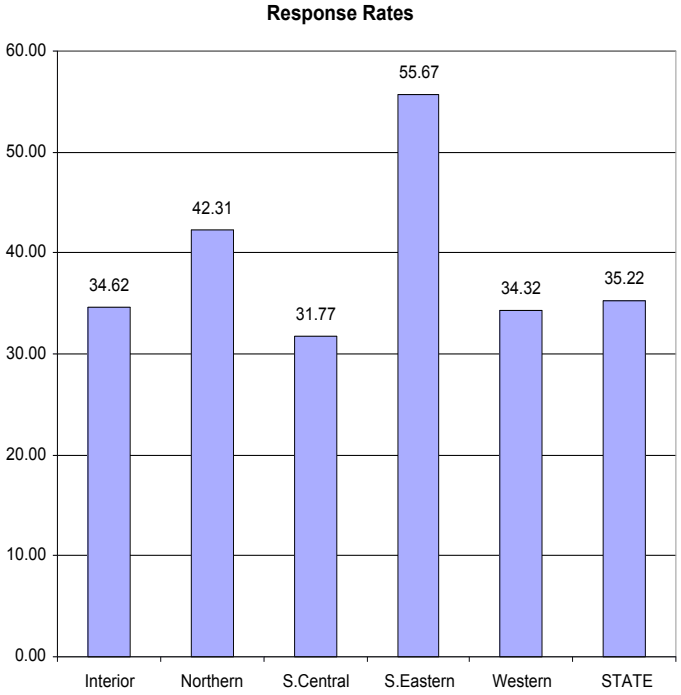
To assess the impact of the Alaska Federal Health Care Access Network (AFHCAN) project on health service delivery in rural/remote Alaska, three separate surveys were conducted (survey instruments are in Appendices D, E, & F). The purposes of these surveys were to: (1) assess if the project had improved access to healthcare and health information in rural/remote areas, (2) assess if the project had improved the quality of care at the local village clinic and/or regional medical center, (3) assess the project's impact on provider skills, and (4) identify sustainability issues. Three groups of personnel within the AFHCAN membership health organizations were surveyed: health providers, business personnel, and technology personnel.

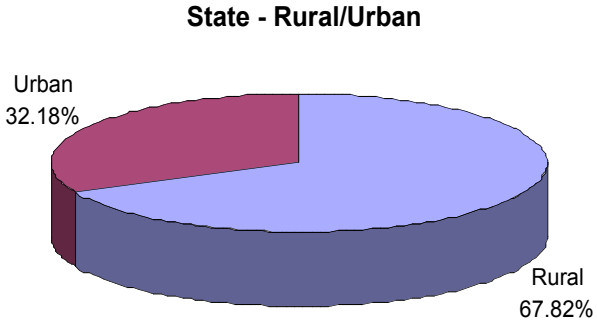
Health Provider Survey

During June and July 2003, AFHCAN member organizations received 1,235 health provider surveys. To begin the recruitment process for the study, each participant organization was contacted via mail with a telephone follow-up to obtain cooperation and arrange a survey distribution method. Distribution methods varied to some degree based on the organization's administrative structure. Some of the participating healthcare corporations distributed the survey from their administrative offices with a letter of introduction on their own letterhead. Other organizations distributed the surveys with a letter of introduction signed by AFHCAN administrators. The intent of this distribution flexibility was to obtain a better response rate.

Survey recipients were asked to complete and return the survey in an enclosed self-addressed stamped envelope within four weeks of receipt. After one month, a targeted survey distribution was administered in an effort to increase return rate and optimize representative quality. After both rounds of administration, 435 health provider surveys were returned for

analysis, yielding an overall statewide response rate of 35%. Across the five regions (Interior, Northern, Southcentral, Southeastern, and Western) the response rate varied from 32% to 56%.





Rural Health Provider Survey

Initial analysis of the demographic data (related to occupational makeup, the healthcare setting where employed, and the length of time in practice) indicated a definite discrepancy between those residing in rural settings and urban settings. This difference is due in no small part to availability of medical resources and to the AFHCAN project's primary goal of providing the more remote areas of Alaska with needed medical resources. Because of this discrepancy, the responses from rural area health providers were considered separately from those in urban areas. Of the 435 health provider respondents, those in the rural areas accounted for 68% (295) and those in urban areas (Anchorage, Fairbanks, and Juneau) for the remaining 32% (140). For the purposes of this report, only the findings from rural areas are included.

Occupations of Rural Provider Respondents

	Rural *N* = 295 %	Interior *n* = 11 %	Northern *n* = 11 %	S.Central *n* = 47 %	S.Eastern *n* = 41 %	Western *n* = 185 %
Community health aide	54.92	9.09	72.73	21.28	14.63	74.05
Midlevel practitioner	28.81	72.73	18.18	61.70	43.90	15.14
Physician	8.81	18.18	0.00	8.51	21.95	5.95
Other (e.g., physical therapist, audiologist, behavioral health practitioner)	7.12	0.00	9.09	6.38	19.51	4.86
Missing data				2.13		
Total	100	100	100	100	100	100

- Nearly 55% of rural health provider respondents were community health aides
- Nearly 75% in the Northern and Western Regions were community health aides
- 73% in the Interior and 62% in the Southcentral Regions were midlevel practitioners

Work Settings of Rural Provider Respondents

	Rural *N* = 291 %	Interior *n* = 11 %	Northern *n* =11 %	S.Central *n* = 46 %	S.Eastern *n* = 41 %	Western *n* = 182 %
Health center/ village clinic with community health aide/practitioner	47.46	9.09	63.64	8.51	7.32	67.57
Health center/ village clinic with nurse Practitioner/physician's assistant	15.59	45.45	27.27	29.79	17.07	9.19
Public health center/ village clinic with public health nurse	14.24	27.27	0.00	31.91	29.27	6.49
Health center/ village clinic with physician	6.78	0.00	9.09	6.38	17.07	4.86
Hospital with physician	9.49	18.18	0.00	14.89	17.07	6.49
Other	5.08	0.00	0.00	6.38	12.2	3.78

- 85% of respondents were working in health centers or village clinics without a physician on site

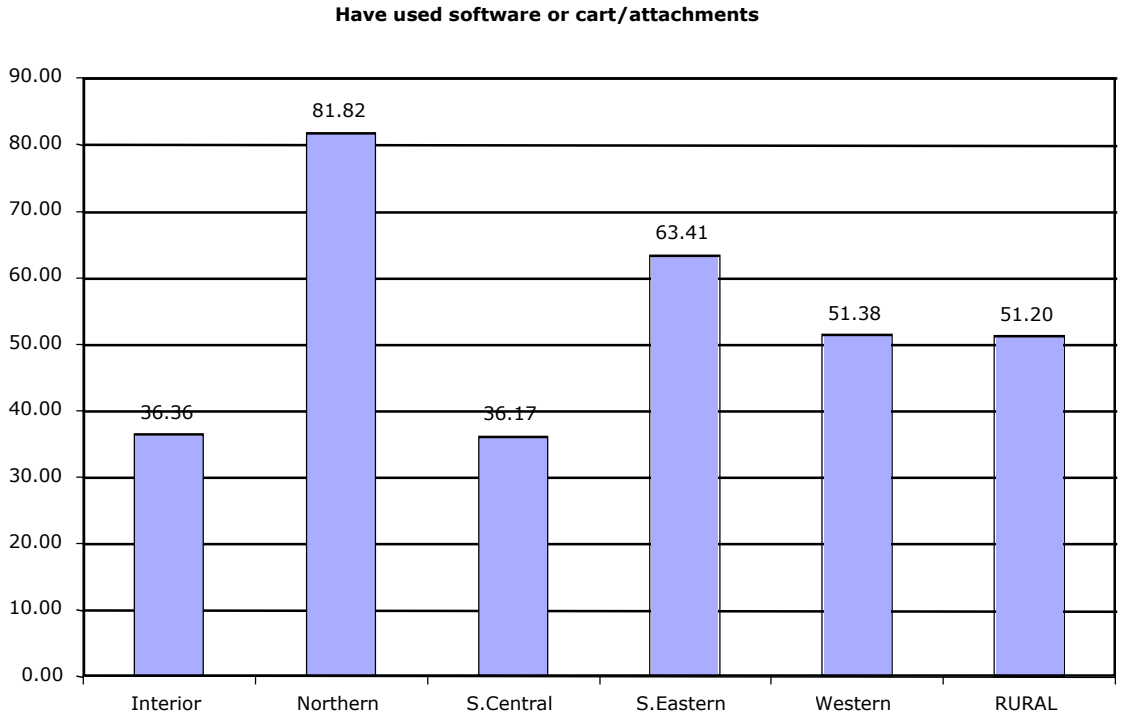
Length of Time Practicing in this Office

	Rural	Interior	Northern	S.Central	S.Eastern	Western
Respondents	262	10	10	46	41	155
Range	1 month – 34 years	6 months – 21 years	6 months – 28.42 years	2 months – 24 years	2 months – 30 years	1 month – 34 years
Total years	1683.61	79.00	66.67	271.60	270.00	996.50
Average years	6.43	7.90	6.67	5.90	6.59	6.43
Median years	9.04	10.00	2.25	5.25	7.08	7.83

- Respondents represented a fairly stable workforce

Use of AFHCAN Workstation

Respondents were asked to verify that they have, in fact, used the AFHCAN software or the cart/attachments.



- 51% of respondents reported they had used the software or cart/attachments
- The Northern Region had the highest rate of reported use (82%), followed by the Southeastern Region (63%)

Nonusers

Respondents who reported they had not used the AHFCAN telemedicine software or cart/attachments, were asked to explain why. From those who stated they had not used either the software or cart/attachments (49 percent across the rural regions), a total of 255 reasons were given by 144 respondents, most of which could be grouped into nine categories listed in the following table.

Reasons for Nonuse	*n*	%
Am not trained on the equipment	77	30.20
Equipment is set up but not connected to the network	53	20.78
Equipment has not been set up	38	14.90
Have not used before and am uncomfortable using it	29	11.37
Have not had a clinical encounter in which it would be useful	27	10.59
Supervisor does not encourage me to use it	7	2.75
Could not make the equipment work	4	1.57
Do not like using telemedicine	3	1.18
Lost our connection	1	0.39
Other barriers	16	6.27
(Items not mutually inclusive)	255	100

- 49% reported they had not used the software or cart
- 43% of reasons for nonuse were related to training
- 36% of reasons for nonuse were related to either the equipment was not set up or it was set up but not connected to the network

Level of Use Reported by Users

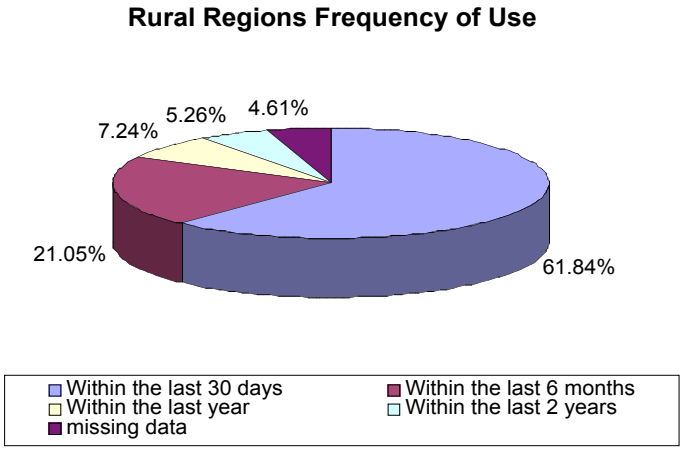
Of those respondents who reported that they had used the AFHCAN software or cart/attachments, three levels of use were indicated.

Level of Use Reported by Users	*n*	%
I have used the AFHCAN software but not the cart/attachments (otoscope, camera, etc.) to document and send a Telemedicine case for review	100	67.11
I have used the cart/attachments (otoscope, camera, etc.) to document a case but not to send for review.	9	6.04
I have used both the AFHCAN software and cart/attachments (otoscope, camera, etc.) to document and send a Telemedicine case for review.	40	26.85
Total	149	100

- 67% used only the store function
- 27% used all store-and-forward capabilities
- 6% used the AFHCAN software only (This may be due to 8.81% of rural respondents being physicians. They would not need to transmit images of things they could examine themselves.)

Frequency of Use

In order to get an idea of how frequently the AFHCAN software or cart/attachments were used in their practice, respondents were asked to respond to a four-item response question.



- 62% of users reported they had used the software/equipment within the last 30 days
- 21% reported using it in the last 6 months

Specific Areas of Use

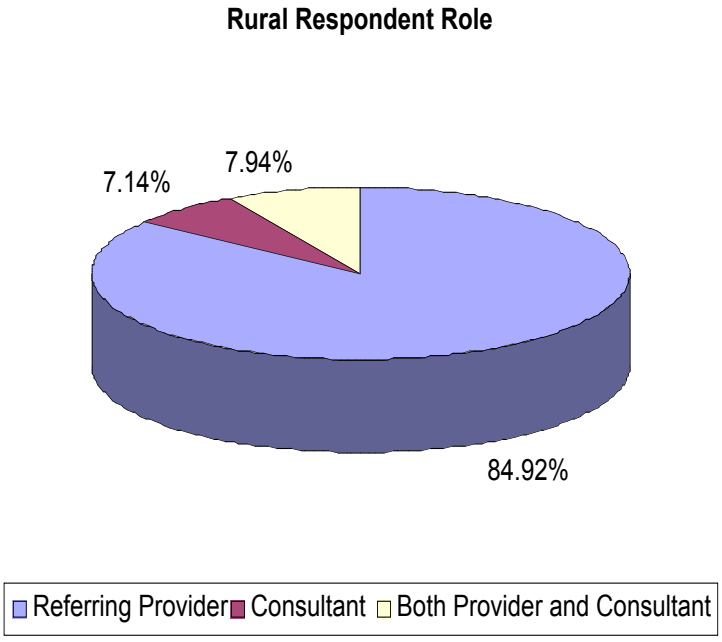
From a list of nine areas, respondents who had used the AFHCAN software or the cart/attachments were asked how they had used it. A total of 343 responses were given by 142 respondents.

Areas of Use	*n*	%
Sending an image or data	111	32.36
Creating test cases for training	80	23.32
Documenting a patient encounter	77	22.45
Patient education	50	14.58
Continuing medical education	8	2.33
Looking up medical information	7	2.04
Other	5	1.46
Video-conferencing	4	1.17
Telecounseling or telepsychiatry	1	0.29
(Items not mutually exclusive)	343	100

- 42% of equipment use was for training or educational purposes

Areas of Cart Attachment Use

When one thinks of telemedicine, one typically thinks of the actual hardware. Otoscope, digital camera, EKG, and other peripherals make up the AFHCAN cart as attachments. Utility of peripherals, frequency of use, and applications no longer used, as well as role of the provider, offer information on what is used, why, by whom, and its effectiveness. Across rural regions of the state, 126 individuals responded to this section of the survey. As requested, they identified their primary role in utilizing AFHCAN telemedicine resources. Most were referring providers.



Respondents were asked to identify which AFHCAN cart attachments they used. A total of 307 responses were provided by referring providers; 26 by consultants; and 30 by those who described their role as both provider and consultant. Responses are summarized by specific attachments in the following table.

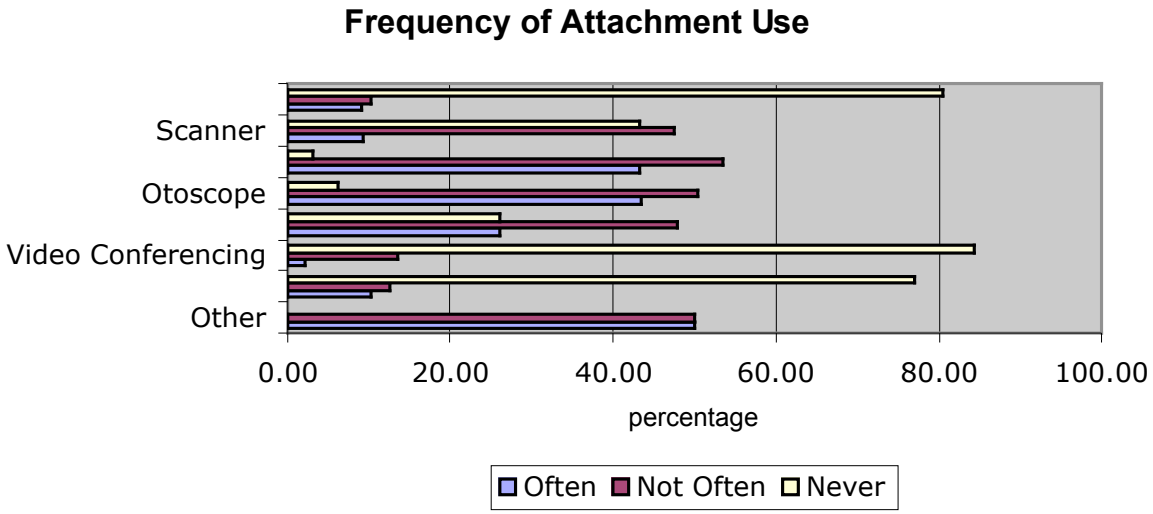
Areas of Cart Attachment Use

Use	User	*n*	%
Teleradiology	Referring Provider	10	3.26
	Consultant	1	3.85
	Both	5	16.67
	Total	16	4.41
Video Conferencing	Referring Provider	2	7
	Consultant	0	0
	Both	2	7
	Total	4	1.1
EKG	Referring Provider	60	19.54
	Consultant	6	23
	Both	5	17
	Total	71	19.56
Otoscope	Referring Provider	95	30.94
	Consultant	9	34.6
	Both	8	26.66
	Total	112	30.85
Digital Camera	Referring Provider	99	32.24
	Consultant	8	30.76
	Both	8	26.66
	Total	115	31.68
Scanner	Referring Provider	29	9.4
	Consultant	2	7.69
	Both	2	6.66
	Total	33	9.09
Dental Camera	Referring Provider	9	2.93
	Consultant	0	0
	Both	0	0
	Total	9	2.48
Other	Referring Provider	3	0.97
	Consultant	0	0
	Both	0	0
	Total	3	0.83

- Digital camera, otoscope and EKG were used most by all respondents
- Teleradiology was used proportionately more by respondents who identified their role as both referring provider and consultant

Frequency of Attachment Use

Provided with the choices of *Often*, *Not Often,* and *Never*, those who had used the AFHCAN resources were asked to judge the frequency with which they had used each attachment (peripheral) they identified.



- 43% reported using both the otoscope and digital camera *Often*
- 74% reported they used the EKG *Not Often* to *Never*
- 77% reported they *Never* used teleradiology
- 47% reported using the scanner *Not Often* and 43% *Never*
- 84% reported *Never* having used videoconferencing

Reasons for Nonuse of Attachments

Identifying provider role and frequency of use of AFHCAN attachments was necessary to assess the applicability and need of such resources. It does not address reasons why these resources may no longer be applicable for the respondent or if they were ever useful. In an effort to identify the reasons attachments were not being used, those who had used AFHCAN resources were asked to select one of eight reasons for non-use for each peripheral attachment (one response was an open-ended "Other").

Reason for Nonuse of an Attachment	Tele-radiology %	Video-conf. %	EKG %	Otoscope %	Digital Camera %	Scanner %	Dental Camera %
I have not been trained in that application	29.91	38.60	16.92	5.13	3.45	20.99	38.38
No patients have needed that service	23.36	29.82	23.08	7.69	20.69	50.62	28.28
Another practitioner in the clinic can provide the service	4.67	1.75	9.23	10.26	3.45	2.47	5.05
Using the equipment took more time than not using it	3.74	1.75	13.85	33.33	13.79	3.70	0
I have been trained but am still uncomfortable using it	3.74	4.39	9.23	20.51	27.59	8.64	2.02
The equipment does not work correctly	.93	1.75	6.15	7.69	13.79	3.70	1.01
I used the equipment but received no response	.93	0	0	10.26	6.90	0	0
Other	32.71	21.93	21.54	5.13	10.34	9.88	25.25
Total percent	100						

- Lack of training and clinical need were generally the reasons for non-use of peripherals

Other Reasons Stated. Specific reasons in the *Other* category were given for some attachments:

- Teleradiology: *Not available here*, *Not area of expertise*, and *What's that?*
- Videoconferencing: *Not available* and *Unsure of liability and HIPAA issues*
- EKG attachment: *Not available*, *Not area of expertise*, and *We already had an EKG*
- Digital camera: *No one to receive images* and *No connectivity to network*
- Scanner: *No one to receive images*, *No connectivity to network*, and *Not set up for collaborative care*
- Dental Camera: *Not available here*, *Not area of expertise*, and *What's that?*

Additional Attachments Needed

Identification of the provider role as well as the frequency of use of AFHCAN attachments was necessary to assess applicability and needs for specific resources. In addition, reasons for discontinuation of use addressed the unique nature of local rural practice. In an effort

to identify additional local needs, twelve potential attachments were presented to respondents, plus an open-ended option. Respondents were asked to select any which would be of benefit to their patients and their practice. The 12 additional peripherals listed included the following:

Colposcope	Dental Scope	Fetal Monitoring
Hearing Test/Audiometer	Holter Monitor	Ophthalmoscope
Retinal Exam	Spirometer	Stethoscope
Tympanometer	Vision Screening Test	Vital Signs Monitoring

Statewide, 111 respondents took the opportunity to identify items they would like to see added to the AFHCAN cart. On average, slightly over four items were identified per individual.

Proposed Attachments	%
Fetal Monitoring	12.50
Hearing Test/Audiometer	12.50
Vital Signs Monitoring	10.94
Vision Screening Test	10.49
Ophthalmoscope	8.48
Tympanometer	8.04
Retinal Exam	7.81
Stethoscope	7.37
Dental Scope	5.80
Spirometer	5.80
Holter Monitor	4.91
Colposcope	4.02
Other	1.34
Total	100

- Fetal Monitoring, Hearing Test/Audiometer, Vital Signs Monitoring, and Vision Screening Test were the most frequently identified peripherals
- The response "Other" included *Health education*, *Nasal scope*, *User-friendly software*, *Vaginal probe*, *Vaginal scope*, and *Video camera*

Reasons to Use Telemedicine

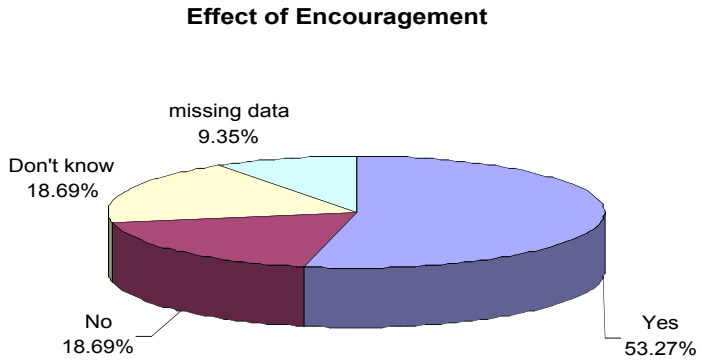
Health providers who used the AFHCAN resources were asked to identify the reason(s) "why" they used these telemedicine resources in their practice. Overall 137 individuals identified at least one out of eight provided responses outlined in the following table.

Reasons to Use Telemedicine	*n*	%
I like the way the equipment works for obtaining patient information	87	20.76
I can provide better healthcare using telemedicine	85	20.29
My organization/ hospital wants me to use it	64	15.27
My supervisor encourages me to use it	46	10.98
Need access to specialty consultation	43	10.26
The physician I work with wants me to use it	38	9.07
I obtain faster response from my provider	35	8.35
My patient wants me to use it	14	3.34
Other	7	1.67
(Items not mutually exclusive)	419	100

- 41% of respondents used the equipment to increase quality of healthcare or to obtain patient information
- 35% of respondents used the equipment at the request of others

The Effect of Encouragement

The question of whether or not people were encouraged to use AFHCAN resources and how encouragement might impact their use deserved consideration. This was especially important considering that, as previously noted, 35 percent of respondents who used the AFHCAN resources did so at the direction of someone else. In total, 152 individuals responded to the question regarding increased usage vis-à-vis increased encouragement. Thirty percent of respondents indicated they already received such encouragement. Of those who indicated they did not receive encouragement, 53% reported they would use software/cart/attachments more often if they received supervisor encouragement.



Comfort Level Using AFHCAN Equipment

Individuals who indicated they used AFHCAN software and/or cart/attachments were asked to rate their level of comfort using these resources as part of their healthcare practice. This rating was done on a Likert-scale with a 1 to 5 metric from *1 Very Comfortable* to *5 Very Uncomfortable*, with the midpoint *3* indicating *Comfortable*. Many respondents indicated comfort level ratings between two numbered responses on the scale, for example *1.25* or *3.5*. Grouping responses into three categories smoothed out extraneous "noise" and made data both easier to interpret and more meaningful. The three categories were *More than Comfortable* (*1 – 2.75*), *Comfortable* (*3*), and *Less than Comfortable* (*3.25 – 5*).

Comfort of Use	*n*	%
More than comfortable	55	37.93
Comfortable	55	37.93
Less than comfortable	35	24.14
Total	145	100

- Three out of every four respondents who used the AFHCAN resources were *Comfortable* (38%) or *More than Comfortable (*38%) using them

Training

In total, 285 separate individuals in the rural regions of the state responded to questions regarding types of training they had received on use of AFHCAN software or cart/attachments. Out of 285 rural respondents, 96 (34%) recorded they had not received training in use of either AFHCAN software or cart/attachments. Of the 189 individuals (66%) indicating they received training, 253 "types" of training were identified. Follow-up training, conducted in the respondent's clinic or at a location away from the clinic, was received by 13% of respondents.

Types of Training Received by 189 Respondents	*n*	%
Group training (5 or more) at a location away from clinic	51	20.16
Group training (5 or more) in my clinic	36	14.23
Individual or small group training (less than 5) at a location away from my clinic	36	14.23
Individual or small group training (less than 5) in my clinic	94	37.15
Follow-up training in a location away from my clinic	15	5.93
Follow-up training in my clinic	19	7.51
Other	2	.79
(Items not mutually exclusive)	253	100

- Individual or small group training in the respondents' clinics was the training that occurred most frequently (37%)
- 47% of those who received training reported participating in more than one training session

Individuals who indicated they had received training, were asked to rate their level of satisfaction with the training. This rating was done on a Likert-scale with a 1 to 5 metric - *1 Very Satisfied* to *5 Not Satisfied*, with the midpoint *3* indicating *Satisfied*. As explained with the previous item, many respondents indicated satisfaction ratings on the scale between two numbered responses. Thus data were grouped into three categories: *More than Satisfied* (*1 – 2.75*), *Satisfied* (*3*), and *Less than Satisfied* (*3.25 – 5*).

Satisfaction with Training	*n*	%
More than satisfied	71	37.97
Satisfied	67	35.83
Less than satisfied	49	26.20
Total	187	100

- Close to three out of every four respondents were *Satisfied* (36%) or *More than Satisfied (*38%) with training they received

These data clearly indicated that, across the board, individuals who received training were satisfied with it. However, regardless of the level of satisfaction with training they received in the past, 60% of respondents who received training indicated they needed additional training in the use of the AFHCAN software or the cart/attachments.

Training Needs	*N*	%
Need additional training:	177	60
All aspects	96	54.11
Specific application	49	27.4
Review	19	10.96
Nonspecific	13	7.53
(Items not mutually exclusive)	177	100

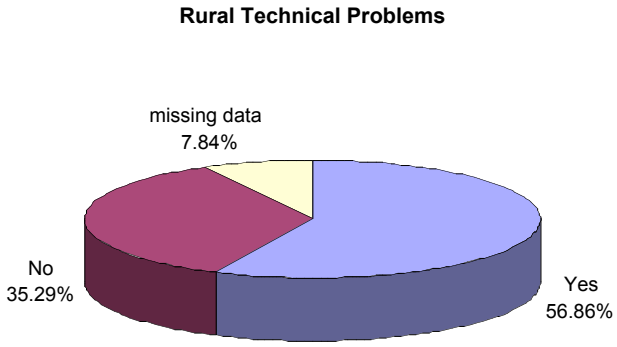
Technology & Technical Assistance

Respondents who had used the AFHCAN ressources were asked to rate how well the AFHCAN software and/or the cart/attachments "generally worked." This rating was also done on a Likert-scale with a 1 to 5 metric - *1 Very Well* to *5 Not Well*, with the midpoint *3* indicating *Adequate*. As in the previous Likert-scale items, a number of respondents indicated ratings between two numbered responses on the scale. Thus responses were grouped into three categories: *More than Adequate* (*1 – 2.75*), *Adequate* (*3*), and *Less than Adequate* (*3.25 – 5*).

User Rating of Equipment Performance	*n*	%
More than adequate	70	50.36
Adequate	49	35
Less than adequate	20	14.39
Total	139	100

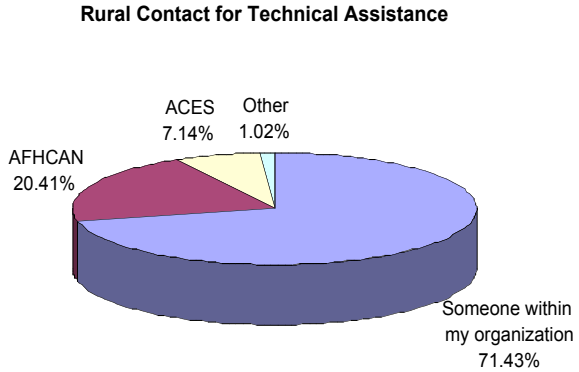
- 85% of those responding to this item reported AFHCAN resources worked *More than adequately* (50%) or *Adequately* (35%)

Issues of use, comfort, and even training, are somewhat in the control of the end user—the person actually using the AFHCAN software and cart/attachments in a clinical setting. Issues concerning the technology of the hardware and software are generally out of the prevue of this end-user, who would have to call on others for assistance. When those who had used the AFHCAN resources were asked if they had experienced technical problems with the AFHCAN software or with the cart/attachments, 153 individuals responded.



- 57% of respondents indicated they experienced technical problems with either the software or with the cart/attachments

Those respondents who reported they had experienced technical problems with the AFHCAN software or cart/attachments, were asked to identify who they contacted to address the problem. Close to three-quarters (71%) of respondents reported they contacted someone within their own organizations. AFHCAN was contacted 20% of the time and ACES 7% of the time. Although one percent identified "Other" as the source of technical assistance, exactly who they contacted was not recorded (i.e., missing data).



Those individuals who identified either AFHCAN or ACES as the agency they contacted for technical assistance were asked to provide a rating of the support they received on a Likert-scale with a 1 to 5 metric - *1 Good* to *5 Poor*, with the midpoint *3* indicating *Adequate*. A number of respondents indicated incremental differences, so responses were grouped into three categories: *More than adequate* (*1 – 2.75*), *Adequate* (*3*), and *Less than adequate* (*3.25 – 5*). It should be noted that more than twice as many respondents contacted AFHCAN as those who contacted ACES.

	AFHCAN		ACES	
Support Rating	*n*	%	*n*	%
More than adequate	20	54.05	11	61.11
Adequate	9	24.32	5	27.78
Less than adequate	8	21.62	2	11.11
Total	37	100	18	100

- 78% of respondents who contacted AFHCAN for technical assistance rated the support they received as *More than adequate* or *Adequate*
- 89% of respondents who contacted ACES for technical assistance rated the support they received as *More than adequate* or *Adequate*

Change in Healthcare Practice

Since telemedicine is an innovation in medical service delivery, it made sense to gauge the impact AFHCAN resources had on healthcare practices within the state of Alaska. Across the rural regions of the state, 139 individuals identified various ways the AFHCAN software and cart/attachments influenced the way they conducted their healthcare practice. Those respondents who indicated AFHCAN changed the way they provided healthcare identified the area of impact from eight closed-end responses and one open-ended response. In total, 110 individuals provided 327 responses (average of 2.97 responses per respondent). None of the respondents provided an open-ended "Other" response. Almost 80% of respondents indicated that AFHCAN resources positively changed the way they practiced healthcare.

How AFHCAN Changed Healthcare Practice	*n*	%
It allows me to provide higher quality healthcare.	89	27.22
Patients do not have to travel as much for healthcare.	54	16.51
Patients receive more attention from other providers or specialists.	48	14.68
It allows a higher degree of patient education.	48	14.68
Patients do not have to wait as long for healthcare.	43	13.15
I learn more from my supervising physician.	25	7.65
I receive more support from others in managing difficult cases.	20	6.12
(Items not mutually exclusive)	327	100

Computer Use

Since the store-and-forward approach is computer-based technology, it might be helpful if users were somewhat familiar with computers. Those who had used AFHCAN resources were asked how often they used a computer prior to use of AFHCAN resources. They provided this information on a Likert-scale with a 1 to 5 metric – *1 Frequently* to *5 Never*, with the midpoint *3* indicating *Infrequently*. A number of respondents indicated incremental differences, thus responses were grouped into three categories: *Somewhat Frequently to Frequently* (*1 – 2.75*), *Infrequently* (*3*), and *Less than Infrequently to Never* (*3.25 – 5*).

Computer Use Prior to Using AFHCAN Resources	*n*	%
Somewhat frequently - Frequently	105	72.92
Infrequently	25	17.36
Less than infrequently - Never	14	9.72
Total	144	100

- 73% of respondents who had used AFHCAN resources indicated they had previously used a computer *Somewhat Frequently to Frequently*
- The remaining 27% specified *Infrequently* (17%) and *Less than Infrequently to Never* (10%).

Health providers who had used AFHCAN resources were also asked about the kind of computer applications they generally used prior to the AFHCAN project. In total, 135 individuals provided 376 responses.

Kind of Computer Uses	*n*	%
Email	117	31.12
Internet	105	27.93
Word processing	102	27.13
Spreadsheet	46	12.23
Other	6	1.60
(Items not mutually exclusive)	376	100

- Email and Internet accounted for over half of reported computer use.

Finally, users of AFHCAN resources were asked if using the AFHCAN software or cart/attachments changed their level of computer use. This information was presented on a Likert-scale with a 1 to 5 metric – *1 More* to *5 Less*, with the midpoint *3* indicating *About the Same*. A number of respondents indicated incremental differences, thus responses were grouped into three categories: *Somewhat More to More* (*1 – 2.75*), *About the Same* (*3*), and *Somewhat Less to Less* (*3.25 – 5*).

Use of Computers Since AFHCAN	*n*	%
Somewhat more - More	35	25
About the same	99	70.71
Somewhat less - Less	6	4.29
Total	140	100

- 25 % reported that since using AFHCAN software and cart/attachments, their use of the computer increased

Health Care Integration

The question of whether AFHCAN software and the cart/attachments had become an integral part of the provider's practice was assessed through another Likert-scale item which asked, "If the AFHCAN telemedicine software or the cart/attachments were to be removed tomorrow, at what level would it affect your clinical practice?" Feedback from health providers

who had used the AFHCAN resources was provided on a Likert-scale with a 1 to 5 metric –*1 A lot* to *5 Not At All*, with the midpoint *3* indicating *Somewhat*. As in previous Likert-scale questions, a number of respondents indicated incremental differences, thus responses were grouped into three categories: *More than Somewhat to A lot* (*1 – 2.75*), *Somewhat* (*3*), and Less than *Somewhat to Not at All* (*3.25 – 5*).

Impact of AFHCAN Resource Removal	*n*	%
More than Somewhat - A lot	45	34.09
Somewhat	48	36.3.6
Less than somewhat - Not at all	39	29.55
Total	132	100

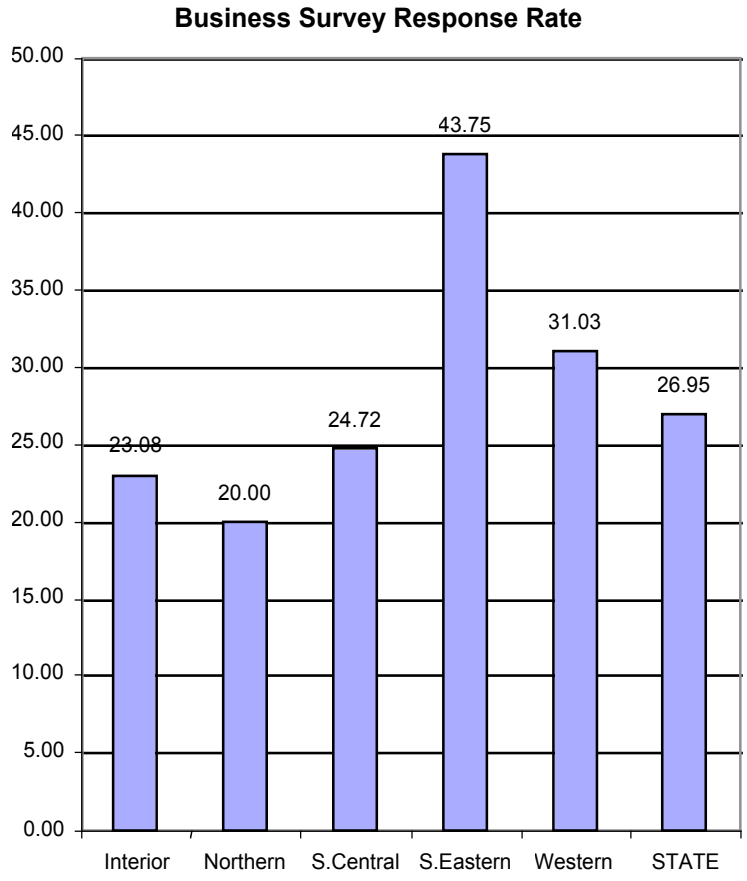
- 70% of respondents indicated their clinical practice would be impacted if AFHCAN resources were no longer available

Users of the AFHCAN resources who indicated that removal of AFHCAN software and cart/attachments would affect their clinical practice at some level, were asked to explain their response in an open-ended item. Although 81 of those who indicated a removal effect provided a written response, only 51 (65%) offered responses that really answered the question. These responses fell into two categories:

- 48% indicated specific area of practice would be affected. For example:
  - *Ability to provide consults for Bush physicians*
  - *I send a lot of images to ENT while in field clinics*
  - *No EKG's, no ear exams*
- 17% indicated that patient care would be affected. For example:
  - *It would take a lot out of our clinic, making it difficult to work with the doctors and specialists*
  - *We would probably need to see more patients in our clinics*
  - *Since we are remote, it could mean patients would have to come to town more often*

Business Personnel Survey

During June and July 2003, 167 separate individuals representing the business side of 145 health organizations across the state received the AFHCAN Telemedicine Business Survey. Recipients were asked to complete and return the survey in an enclosed self-addressed stamped envelope within four weeks of receipt. After one month, a targeted round of survey distribution was administered in an effort to increase return rate and optimize its representative quality. After both rounds of administration, a total of 45 business surveys were returned for analysis yielding a 27% overall statewide response rate. Across the five regions, the response rates varied from 20% to 44%. The Southeastern Region returned 7 of the 16 surveys distributed (44%) followed by the Western Region which had 9 of the 29 distributed surveys returned (31%). In the Southcentral Region 22 out of 89 potential respondents returned their survey (25%); in the Interior Region 3 out of 13 were returned (23%), and the Northern Region had 4 out of 20 returned (20%).



Due to the small number of business respondents in the sample, data presented here were aggregated for more meaningful analysis.

Types of Facilities Where Business Respondents Were Employed

Business - Type of Facility Employed	*N*	%
Administrative center	10	22.22
Health centers with physicians	9	20.00
Health centers with public health nurse	9	20.00
Hospital with physicians	7	15.56
Health centers with nurse practitioners/ physician's assist.	5	11.11
Health centers with community health aides/ practitioners	3	6.67
Other	2	4.44
Total	45	100

- Across the regions there was a fair amount of variation in type of facility where respondents were employed.

Occupations of Business Respondents

Occupation	*N*	%
Other	21	47.73
Program manager	10	22.73
Financial/business officer/manager	7	15.91
CEO	4	9.09
Information services manager	2	4.55
Total	44	100

- Close to one half of business respondents chose *Other* and reported:
  - Administrative clerk – 3 respondents
  - Administrator – 3 respondents
  - Administrative supervisor – 2 respondents
  - Physician, department manager – 2 respondents
  - Analyst – 1 respondent
  - Assistant operations manager– 1 respondent
  - Clerical worker – 1 respondent
  - COO– 1 respondent (CEO?)
  - Director– 1 respondent
  - Executive assistant to director– 1 respondent
  - Nurse coordinator– 1 respondent
  - Public health nurse– 1 respondent
  - Procurement officer– 1 respondent
  - Self-governance director– 1 respondent
  - VP health director– 1 respondent

Length of Time at this Job

	Interior	Northern	S.Central	S.Eastern	Western	STATE
Respondents	3	4	22	6	9	44
Range	5–18 yrs	3 mo–20 yrs	1 yr 6 mo-24 yrs	2 yrs 1 mo- 17 yrs	6 mo–18 yrs 10 mo	3 mos–24 yrs
Total years	30.00	27.25	185.83	42.43	74.74	360.25
Average years	10.00	6.81	8.45	7.07	8.30	8.19
Median years	7.00	3.50	8.50	5.42	7.08	7.63

- Respondents represented a fairly stable workforce

Education Level of Business Respondents

Educational Level	*N*	%
High school/GED	3	6.67
Some college credit	10	22.22
Associate's degree	6	13.33
Bachelor's degree	9	20.00
Graduate degree	12	26.67
Medical degree	4	8.89
Other	1	2.22
Total	45	100

- 56% of the business respondents reported possessing at least a bachelor-level degree

AFHCAN Resource Deployment

Involvement in Decision to Deploy AFHCAN Resources. Respondents were asked to characterize their involvement in the decision to deploy AFHCAN telemedicine resources in their organization.

Involvement in Decision-Making	*N*	%
I was not involved in the decision-making process.	19	42.22
I was involved in decision-making process.	13	28.89
I was consulted in decision-making process.	11	24.44
I was involved only in the financial aspects of the process.	2	4.44
Total	45	100

- 58% of the respondents were involved at some level in the decision to deploy AFHCAN resources at their place of employment

Decision-Making Authority to Deploy AFHCAN Resources. Although respondents may have been involved in the decision to deploy AFHCAN resources in their organizations, they may not have been the persons who actually made the final decisions. Decision-making authority is potentially related to an organization's commitment to allocate resources. It would be expected that higher levels of authority would relate to higher commitment of resources for sustainability. Business respondents were asked who in their organization was involved in the final decision.

Occupation	*N*	%
CEO	17	19.77
Board of directors	14	16.28
Clinicians	14	16.28
Don't know	13	15.12
Telehealth committee	10	11.63
CIO	8	9.30
Other	6	6.98
CFO	4	4.65
(Items not mutually exclusive)	86	100

- Across the state there was little uniformity in who had final decision-making authority with regard to deployment of AFHCAN resources.
- In one-third of organizations the final decision to deploy AFHCAN resources was made at the executive and board levels.

Organizational Goals for Telemedicine

Respondents were presented with six potential organizational goals for telemedicine and an open-ended "Other" option. They were asked to rank order these goals from one to six, with one being equivalent to "most important." Not all organizational goals presented to the business respondents were ranked and it was not uncommon for a respondent to rank order what they considered the "top three" and stop there. In addition, at least someone considered each of the six presented organizational goals to be important enough the assign a ranking of "1" or "2" to each.

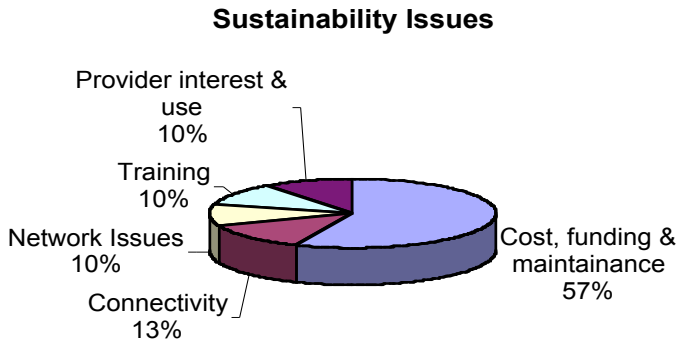
The top five goals:

Organizational Goal	Rating	Largest %
Access to care	1	48.65
Quality of care	2	37.14
Patient satisfaction	3	30.00
Continuity of care	4	25.71
Cost/economics	5	25.00

- Cost was not a high-ranking goal
- The top two rated goals, *Access to care* and *Quality of care*, are consistent with the outcome areas identified by the Office for the Advancement of Telehealth

Sustainability

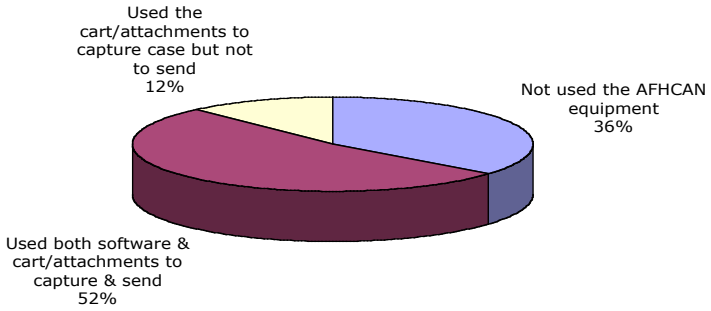
Respondents were asked if they had any major concerns about the sustainability of telehealth. Twenty-seven respondents (60%) took this opportunity to address the issue of sustainability. Review of this narrative data yielded five response categories.



- *Costs, Funding & Maintenance:* The vast majority of concerns were related to having adequate resources to pay for connectivity, equipment maintenance, replacement, and technical support.
- *Connectivity:* These concerns were related to problems with inconsistent connectivity and lack of Internet access in some villages.
- *Provider Interest and Use:* These concerns were related to the need for providers to "buy" into the technology and use it.
- *Training:* These concerns were related to the need for ongoing training to sustain telemedicine.
- *Network Issues:* These concerns were related to the need to integrate AFHCAN technology with other databases.

Use of AFHCAN Resources

Business respondents were asked if staff at their organizations used the AFHCAN software or cart/attachments. Forty-five respondents answered this question. Overall, 64% reported that staff at their organizatons had used one or more of the AFHCAN resources.



Of the 64% of business respondents who reported that AFHCAN telemedicine capabilities had been used, the following specific uses were identified.

Areas of Telemedicine Use	*n*	%
Sending an image or data	22	27.85
Patient education	18	22.78
Documenting a patient encounter	15	18.99
Creating test cases for training	12	15.19
Looking up medical information	6	7.59
Video-conferencing	3	3.80
Telecounseling or telepsychiatry	2	2.53
Continuing medical education	1	1.27
(Items not mutually exclusive)	79	100

- 70% used these resources to send data, educate a patient, or document a patient encounter

Nonusers

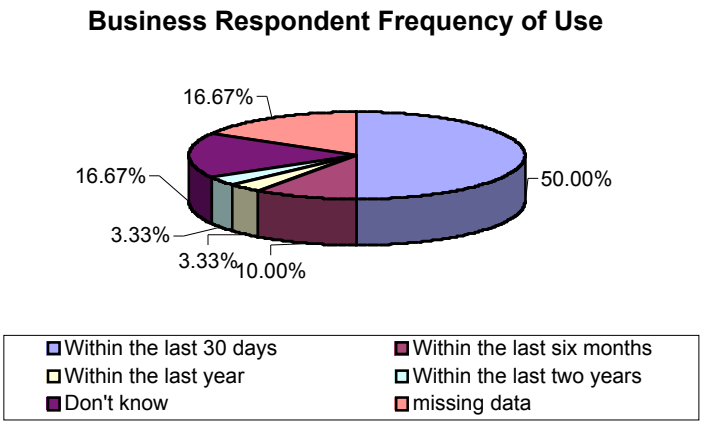
There were 15 business respondents (33%) who reported staff in their organizations had not used the AFHCAN software or cart/attachments to capture a case. They were asked to describe the reasons for nonuse. Presented with ten reasons and one open-ended option, respondents were asked to select all that applied to their organization.

Reasons for Not Using Telemedicine Resources	*n*	%
The equipment has not been set up	9	47.37
Staff have not had a clinical encounter in which it would be useful	3	15.79
Although set up, we are not connected to the network	2	10.53
Staff have not been trained on the equipment	1	5.26
Staff do not like using telemedicine	1	5.26
Other	3	15.79
Total	19	100

- Over half of the reasons for nonuse (58%) were related to equipment not being set up or connected to the network
- Responses to the "Other" category included: *Don't know if we have it, No connectivity between our patient record and AFHCAN*, and *No interface with corporate database*

Frequency of Use

To obtain information about frequency of use, the 30 business respondents who reported their organizations used the AFHCAN resources were asked when was the last time they were used. Exactly one-half of respondents indicated use within the last 30 days.



Involvement with Telemedicine Use

The role business personnel had in influencing use of AFHCAN resources varied according to the part they play in policy and decision-making at their organizations. Most of the respondents in organizations that had implemented AFHCAN resources were involved with telemedicine at some level in their organizations.

Involvement with Telemedicine Use	*n*	%
Occasional policy issues	8	26.67
Day-to-day decision making	5	16.67
Overall policy direction	5	16.67
Financial matters only	5	16.67
Not involved in any telemedicine issues	2	6.67
Missing data	5	16.67
Total	30	100

- 43% of respondents were involved with policy issues
- 33% were involved in either day-to-day affairs or financial matters

Organizational Attitude Toward Telemedicine

Since these business respondents were involved with the business side of telemedicine and healthcare, their perceptions regarding the organizational "attitude" toward telemedicine was quite insightful. They were asked to rate the perceived value of telemedicine to their respective organizations. It should be noted that none of the respondents identified the response category "I believe that telemedicine has no value to our organization."

Organizational Attitude Toward Telemedicine	*n*	%
Very valuable to our organization	11	36.67
Limited value to our organization	5	16.67
Too early to know how valuable	4	13.33
Valuable to our organization	3	10.00
Don't know or not certain	3	10.00
Missing data	4	13.33
Total	30	100

- 47% reported that telemedicine had value to their organization (37% *Very valuable* and 10% *Valuable*)

Telemedicine's Influence on Healthcare

Since telemedicine was an innovation in medical service delivery, it made sense to gauge the impact that AFHCAN resources had on healthcare practice within the State of Alaska from the perspective of individuals involved on the business side of the equation. Twenty-five respondents reported that AFHCAN telemedicine had resulted in changes to healthcare practices. These respondents marked a total of 61 items from among the eight closed-ended choices identifying ways in which AFHCAN resources had changed the way healthcare was provided by their organization (average of 2.44 responses per respondent).

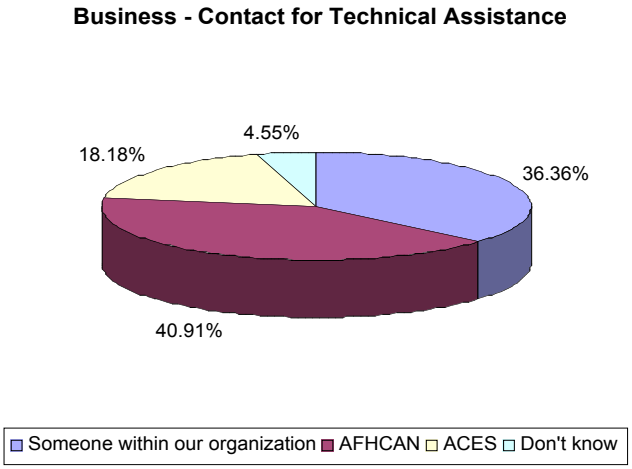
Telemedicine's Influence on Healthcare	*n*	%
Allows us to provide higher quality healthcare.	15	24.59
Patients receive more attention from providers.	13	21.31
Staff receive more support in managing difficult cases.	12	19.67
Patients do not have to travel as much.	11	18.03
Staff learn more from the supervising physician.	7	11.48
Other	3	4.92
(Items not mutually exclusive)	61	100

- 46% reported that AFHCAN telemedicine had resulted in increased patient care:
  - 25% — higher quality healthcare
  - 21% — more attention from providers
  - 10% — reduced patient travel

Technology and Technical Assistance

Business respondents in organizations utilizing AFHCAN resources were asked about technical problems encountered with the AFHCAN software or the cart/attachments. Across the State, 40% of respondents reported they had experienced technical problems and 27% reported they had not had any technical problems. One-fifth of respondents reported that they did not know whether there had been any technical problems with the software or the cart/attachments.

Those respondents who reported they experienced technical problems were asked to identify who they contacted to address the problem(s) from a list of options: *Someone in their own organization*, *AFHCAN*, *Alaska Clinical Engineering Services (ACES)*, or *Don't know*.



- The largest proportion of the business respondents reported they contacted AFHCAN (41%) followed by contacting someone within their own organization (37%)
- 19% reported contacting ACES
- 5% reported they did not know who was contacted in such situations

Those individuals who identified either AFHCAN or ACES as the agency they contacted for technical assistance, were asked to provide a rating of the support they received on a Likert-scale with a 1 to 5 metric - *1 Good* to *5 Poor*, with the midpoint *3* indicating *Adequate*. A number of respondents indicated incremental differences and responses were grouped into three categories: *More than Adequate* (*1 – 2.75*), *Adequate* (*3*), and *Less than Adequate* (*3.25 – 5*).

	AFHCAN		ACES	
Technical Assistance Rating	*n*	%	*n*	%
More than adequate	7	77.78	4	100
Adequate	2	22.22	0	0
Less than adequate	0	0	0	0
Total	9	100	4	100

- All respondents had a positive perception of the technical assistance they received from AFHCAN or ACES

Internal Evaluation

Business respondents in organizations utilizing AFHCAN resources were asked about organizational evaluation activities of AFHCAN telemedicine. Across the State, 40% of the respondents indicated their organization was currently evaluating the use of AFHCAN resources. An equal proportion indicated they were not currently conducting an evaluation, and 20% failed to record an answer. Respondents who indicated they were not currently conducting an evaluation of the AFHCAN telemedicine system were asked if they had plans to do so in the future. All 40% indicated yes. Respondents who reported evaluation activities were occurring were asked to identify what aspects of telemedicine services were being assessed.

Business Aspects of Evaluation	*n*	%
AFHCAN cart & peripherals	6	13.64
AFHCAN software	6	13.64
Provider clinician satisfaction	6	13.64
Cost-benefit analysis	6	13.64
Patient satisfaction	5	11.36
Patient outcomes	5	11.36
Referring clinician satisfaction	4	9.09
Don't know	3	6.82
Other	3	6.82
Total	44	100

Of those who reported they were currently evaluating AFHCAN telemedicine:

- 55% combined reported that the assessment was focused on:
  - AFHCAN cart and peripherals
  - AFHCAN software
  - Provider clinician satisfaction
  - Cost-benefit analysis
- 23% combined reported that the assessment was focused on:
  - Patient satisfaction
  - Patient outcomes
- 14% combined reported
  - Don't know
  - Other: *Clearer policies and procedures (i.e., HIPPA, etc.), Increased communication*, and *Provider education*.
- 9% reported referring clinician satisfaction was the focus of assessment

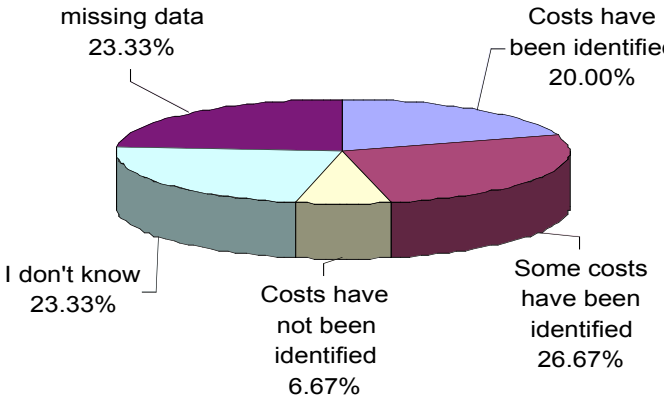
AFHCAN Telemedicine Success

Whether or not the organization was currently conducting an evaluation of telemedicine resources, or planning to in the future, business respondents were asked an open-ended question to describe how they would know if AFHCAN telemedicine had been a success. Fifteen (33%) provided answers. Review of this narrative data yielded five response categories:

1. Increased Usage/Input (17.39%). Examples: *Increase use by staff, Incorporation more into practice, Increase referral to physicians and providers*
2. Connectivity – Hardware and/or Software Related (13.04%). Example: *If we could be connected to somewhere we can send an image*
3. Provider/Patient Satisfaction (26.09%). Examples: *Med staff approval, CHA/P approval, Documented changes in patient care, direction, outcome*
4. Quality of Care (26.09%). Example: *If it allows us to provide care equal in quality to a face-to-face visit while reducing costs associated with same – possibly increased access would be a benefit*
5. Miscellaneous (17.39%). For example, *This is between the clinic, Executive Director, and the Council*

AFHCAN Telemedicine Costs

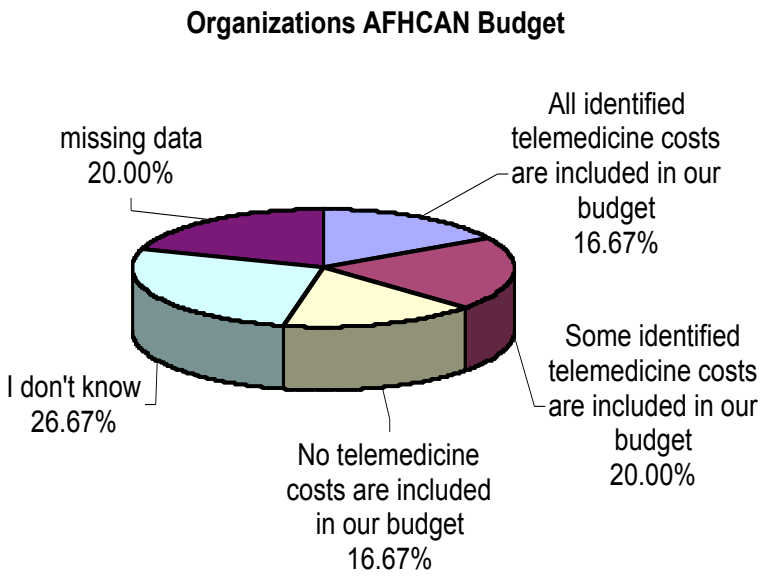
All technological innovations come with a cost, some anticipated, some not. Business respondents were asked if they thought costs related to telehealth had been identified. Provided with four closed-ended options, individuals selected just one response as their answer.



- 20% reported that all the costs had been identified
- 47% reported that some, if not all, of the costs had been identified

Organizational Telemedicine Budget

Once costs were identified they could be anticipated and included in the organizational budget. Business respondents were asked to characterize their organization's current budget with regard to AFHCAN telemedicine. Provided with four closed-ended choices, individuals were requested to select just one response as their answer. Across the State, roughly a similar proportion of respondents who indicated that all telemedicine costs were identified, also reported that telemedicine costs were included in their budgets.



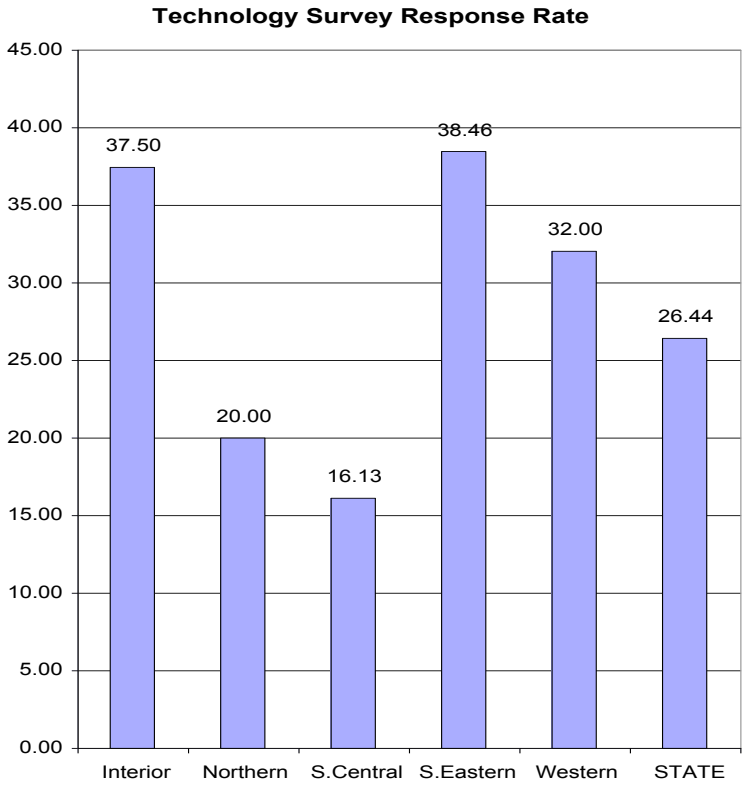
- 37% reported organizational budget contained telemedicine costs

Future Use

In closing, business respondents whose organizations utilized AFHCAN resources were asked a simple Yes/No question: "If the AFHCAN office were to disappear and no more technical support or training were available for telemedicine, would your organization continue using the AFHCAN telemedicine system?" Nine respondents did not answer this question. Twelve indicated they were unsure if their organization would continue using telemedicine without AFHCAN support or training. Nine indicated their organization would continue even without support or training from the AFHCAN Office.

Technology Personnel Survey

During July and August 2003, 87 individuals representing the technology personnel of telehealth organizations across the state received the AFHCAN Telemedicine Technology Survey. Recipients were asked to complete and return the survey in an enclosed self-addressed stamped envelope within four weeks of receipt. After one month, a targeted round of survey distribution was administered in an effort to increase return rate and optimize its representative quality. After both rounds of administration, a total of 23 technology surveys were returned for analysis yielding a 26% overall statewide response rate. Across five regions, response rates varied from 16% to 38%. The Southeastern Region returned 5 of 13 surveys distributed (38%) followed closely by the Interior Region, which had 3 of 8 surveys returned (38%). Within the Western Region, 8 of 25 surveys were returned (32%); within the Northern Region, 2 of 10 were returned (20%); and in Southcentral Region, 5 of 31 were returned (16%).



Due to the small number of technology respondents data presented here were aggregated for more meaningful analysis.

Type of Facility

Technology - Type of Facility Employed	*N*	%
Health center with physicians	8	34.78
Health center w/ community health aides/practitioners	6	26.09
Health center with nurse practitioners/physician assist.	3	13.04
Other	3	13.04
Hospital with physicians	2	8.70
Health center with public health nurse	1	4.35
Total	23	100

- Technology respondents worked in diverse settings

Occupations of Technology Respondents

Occupation	*N*	%
Information services	7	30.43
Network administrator	6	26.09
CIO	3	13.04
Other	7	30.43
Total	23	100

- Close to one-third of technology respondents indicated *Other*:
  - Health director – 3 respondents
  - Clinic administrator – 1 respondent
  - IT manager – 1 respondent
  - Telehealth coordinator/informatics – 1 respondent
  - Tribal health director – 1 respondent

Time Practicing in this Office

☐	Interior	Northern	S.Central	S.Eastern	Western	STATE
Respondents	3	2	5	5	8	23
Range	9 mo-13 yrs 1 mo	4 mo-2 yrs 10 mo	9 mo-10 yrs	3 yrs 2 mo-15 yrs 1mo	2 yrs 10 mo-12 yrs	4 mo-15 yrs 1 mo
Total years	15.08	3.16	26.75	25.25	52.67	122.91
Average years	5.03	1.58	5.35	5.05	6.58	5.34
Median years	1.25	1.58	3.00	3.50	6.30	4.42

- Stability for the technology personnel was varied

Education Level & Certification of Technology Respondents

Educational Level	*N*	%
High school/GED	4	17.39
Some college credit	7	30.43
Associate's degree	2	8.70
Bachelor's degree	6	26.09
Graduate degree	3	13.04
Other	1	4.35
Total	23	100

- 39% of technology respondents possessed at least a bachelor-level degree

Individuals involved in computer hardware or software operation often acquire various levels of certification as part of their professional development. This professional certification helps ensure a certain level of competency and demonstrates this proficiency to employers. Respondents reported possessing the following certifications:

Prof. Cert.	*N*	%
MCP	4	22.22
CCNA	3	16.67
A+	2	11.11
N+	2	11.11
MCSE	1	5.56
CCNP	1	5.56
Other	5	27.78
Total	18	100

- The response category *Other* was identified by 28%. They included:
  - AT&T Fiber-Optic certification
  - CHE
  - MSANP
  - PAC
  - USCG Health Service technician

Receipt & Use of AFHCAN Equipment

Technology respondents were asked if the organization they worked for had received the AFHCAN resources. Those who responded *Yes* were asked if the equipment was used.

Received?	*N*	%	Used?	*n*	%
Yes	21	87.50	Yes	18	85.71
No	2	8.33	No	2	9.52
Don't know	1	4.17	Don't know	1	4.76
Total	23	100	Total	21	100

- 88% reported their organization received the telemedicine equipment
  - Of those, 86% reported their organization was using the equipment

Nonusers

Approximately 10% of technology respondents whose organizations received the equipment reported their organizations did not use it. These respondents were asked to select from 11 items, plus one open-ended "Other," to explain the reason(s) for non-use.

Reasons for Nonuse	*n*	%
Equipment has not been set up.	1	20.00
We lost our connection.	1	20.00
Staff have not been trained.	1	20.00
Supervisor(s) don't encourage staff to use it.	1	20.00
Staff do not like using telemedicine.	1	20.00
Total	5	100

Teleconferencing Equipment

An AFHCAN telemedicine peripheral with multiple uses is the teleconferencing equipment. Technology respondents were asked whether or not their organization had the teleconferencing equipment.

- 45% indicated *Yes*
- 40% indicated *No*
- 15% indicated *Don't know* (5%) and missing data (10%)

Respondents who indicated their organization had teleconferencing equipment were asked to describe how it was used. Primary uses were for administrative, education, and training furnctions.

Teleconferencing Equipment Use	%
Administrative functions	28.57
Education and training	21.43
Clinical care	7.14
Other (i.e., Fetal Alcohol Syndrome Clinics)	7.14
Not used	21.43
Missing data	14.29
Total	100

Training

Respondents were asked if technical staff had received training on the AFHCAN software's "Administrative" pages.

- 50% indicated *Yes*
- 25% indicated *No*
- 15% indicated *Don't know*
- 10% did not respond

Value of Telemedicine

The value of telemedicine in general and AFHCAN resources in particular was an area targeted in the survey of technology respondents.

Technology Organizational Value of Telemedicine	%
I believe it is very valuable to our organization.	30.00
I believe it is valuable to our organization.	30.00
I believe it has limited value to our organization.	20.00
I believe it is too early to know.	15.00
Missing data	5.00
Total	100

- 60% reported that telemedicine was either *Valuable* or *Very valuable*
- 20% reported they believed telemedicine had *Limited organizational value*

Internal Evaluation of AFHCAN Telemedicine

Aside from soliciting the respondents' opinions, the survey also asked about formal evaluation endeavors on the part of participating organizations. Technology respondents were asked about organizational evaluation activities of AFHCAN telemedicine.

- 30% reported their organization was currently evaluating telemedicine
- 40% reported their organization was not currently evaluating
- 30% reported they *Did not know* (25%) or did not respond (5% missing data)

Of those who reported they were currently evaluating AFHCAN telemedicine, the following focus areas for evaluation were identified:

Evaluation Focus Areas	%
AFHCAN cart & peripherals	27.78
AFHCAN software	16.67
Patient satisfaction	16.67
Provider clinician satisfaction	11.11
Referring clinician satisfaction	11.11
Patient outcomes	11.11
Cost-benefit analysis	5.56
Total	100

- Almost 45% of the reported evaluation activities identified by technology respondents focused on AFHCAN equipment

Respondents who indicated their organizations were not currently evaluating AFHCAN telemedicine, were asked whether they plan to do so in the future.

- 33% indicated *Yes*
- 6% indicated *No*
- 27% indicated *Don't know*
- 33% did not respond (missing data).

AFHCAN Telemedicine Success

Fifty-two percent of technology respondents provided answers to an open-ended item asking them to describe how they would know if AFHCAN telemedicine had been a success. Success variables fell into five response categories:

1. Increased or full utilization (42%)
2. Cost issues are solved (25%)
3. Provider and patient satisfaction, including reduced patient travel (25%)
4. Expanded network connections and access to specialty care (17%)
5. Miscellaneous (e.g., progress reports) (17%)

WAN Impact

Technology respondents were asked to indicate what impact, if any, the AFHCAN wide area network (WAN) communications infrastructure had on their organization's relationships with the private sector telecommunications industry. This impact rating was done on a Likert-scale with a 1 to 5 metric - *1 Significant Negative Impact* to *5 Significant Positive Impact*, with the midpoint *3* indicating *No Impact*. Many respondents indicated impact ratings between two numbered responses, thus responses were grouped into three categories: *Negative Impact* (*1 – 2.75*), *No Impact* (*3*), and *Positive Impact* (*3.25 – 5*).

Impact of WAN on Private Sector Relationships	*N*	%
Positive Impact	10	50
No Impact	7	35
Negative impact	1	5
Missing data	2	10
Total	20	100

- 50% of technology respondents indicated that AFHCAN had *Positive Impact* on their organization's relationships with the private sector telecommunications industry

Respondents were next asked to indicate to what extent the AFHCAN changed their organization's WAN infrastructure. This rating was done on a Likert-scale with a 1 to 5 metric - *1 No Noticeable Change* to *5 Significant Change*, with the midpoint *3* indicating *Some Change*.

Many respondents indicated ratings between two numbered responses on the scale, thus responses were grouped into four categories: *No Change* (*1*), *Slight Change (1.25 – 2.75), Some Change* (*3*), and *Significant Change* (*3.25 – 5*).

Extent of Change in WAN Infrastructure	*N*	%
Significant change	8	40
Some Change	5	25
Slight change	2	10
No change	3	15
Missing data	2	10
Total	20	100

- 65% indicated that the AFHCAN resulted in *Significant change* or *Some change* in their organization's WAN

Respondents who indicated AFHCAN telemedicine had resulted in a noticeable change in their organization's WAN infrastructure identified the following areas of impact.

Technology Area of Change in WAN Infrastructure	%
Broadened scope of services	22.50
Improved performance of networked systems	15.00
Introduced voice-over IP technology	12.50
Introduced store-and-forward telehealth technology	12.50
Introduced digital imaging	12.50
Introduced H.323 IP videoconferencing	10.00
Complicated WAN operations and management	7.50
Altered use of digital imaging	5.00
Simplified WAN operations and management	2.50
Total	100

AFHCAN Network Traffic

In an effort to capture AFHCAN network traffic patterns, respondents were asked to provide information regarding area(s) of use.

AFHCAN Network Traffic	*N*	%
Store-and-forward technology	12	29.27
Access to other health info systems	10	24.39
Internet	8	19.51
Voice-over IP	4	9.76
Videoconferencing	3	7.32
Teleradiology	3	7.32
Other	1	2.44
(Items not mutually exclusive)	41	100

Close to 73% of technology respondents identified three primary areas of network use:

- 29% store-and-forward
- 24% access to other health information systems
- 20% the Internet

AFHCAN Services & Cost Savings

Technology respondents were asked to indicate the AFHCAN services their organization utilized. Respondents from two regions (Interior and Northern) did not provide responses to this item. Of those who responded, assistance with the Universal Service Fund (USF) was identified by the largest proportion of respondents.

- Assisting with USF (31%)
- Assisting with data network design (25%)
- Assisting with network security design (19%)
- Assisting with voice network design (13%)
- Resolving network performance issues (13%).

Respondents were asked to identify which traffic areas traveled over the AFHCAN connection and which AFHCAN services saved their organization money. Seventy-one percent reported their organizations realized cost savings in the following areas:

Technology Service Areas – Cost Savings	*N*	%
Store-and-forward telemedicine	6	17.14
Internet	6	17.14
Videoconferencing	4	11.43
Teleradiology	4	11.43
Access to other health info. systems	3	8.57
USF application assistance	3	8.57
Resolving network performance issues	3	8.57
Voice-over IP	2	5.71
Data network design assistance	2	5.71
Voice network design assistance	1	2.86
Network security design assistance	1	2.86
(Items not mutually exclusive)	35	91.42

Aside from cost savings as a result of AFHCAN generated network and traffic activities, there are other related costs. Staff time devoted to AFHCAN technology maintenance was a cost that had to be absorbed by participating organizations. Respondents were asked to report the amount of staff time in full-time equivalent (FTE) was devoted to telemedicine maintenance. Sixty-eight percent of respondents answered this question.

Staff time on AFHCAN Maintenance	*N*	%
.05 FTE	2	10.53
.10 FTE	3	15.79
.25 FTE	3	15.79
1.00 FTE	2	10.53
2.00 FTE	2	10.53
5.00 FTE	1	5.26
Missing Data	6	31.58
Total	19	100

There was wide variation around the state regarding the amount of staff time devoted to telemedicine maintenance. However, almost one half of the technology respondents indicated that .25 FTE or less was devoted to telemedicine maintenance.

Technical Assistance and Support

Related to the issue of maintenance, was maintaining contact with either ACES or AFHCAN for support. Toward this end, respondents were provided with six response items regarding how often they contacted either of these organizations (2 respondents did not answer).

- 40% reported they contacted ACES or AFHCAN less than one time per month
- 25% reported contact one time per month
- 15% reported contact several times per month
- 5% reported they had never contacted either ACES or AFHCAN for support

Those who has contacted AFHCAN for support were asked to rate the support they received. This rating was done on a Likert-scale with a 1 to 5 metric - *1 Very Helpful* to *5 Poor* with the midpoint *3* indicating *Adequate*. Responses were grouped into three categories: *More than Adequate* (*1 – 2.75*), *Adequate* (*3*), and *Less than Adequate* (*3.25 – 5*).

Rating of AFHCAN Support	*n*	%
More than adequate	8	40
Adequate	5	25
Less than adequate	6	30
Missing data	1	5
Total	20	100

- 65% rated the support they received from AFHCAN as *Adequate or better*

Transfer of Ownership

Technology respondents were also asked to rate their level of satisfaction with the mechanism used to transfer ownership of AFHCAN equipment to their particular organization. This rating was done on a Likert-scale with a 1 to 5 metric - *1 Very Satisfied* to *5 Not Satisfied* with the midpoint *3* indicating *Somewhat Satisfied*. Responses were grouped into three categories: *Satisfied* (*1 – 2.75*), *Somewhat Satisfied* (*3*), and *Somewhat Dissatisfied* (*3.25 – 5*). Respondents were also given the option of replying *I don't know*.

Satisfaction with Transfer of Ownership	*N*	%
Satisfied	6	30
Somewhat satisfied	9	45
Somewhat dissatisfied	2	10
I don't know	2	10
Missing data	1	5
Total	20	100

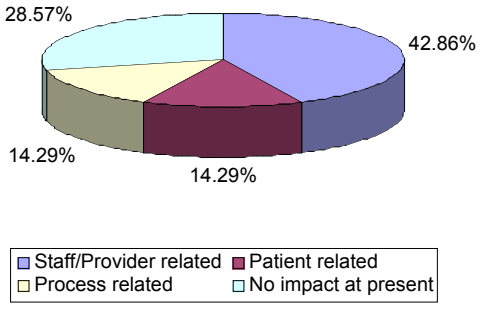
- 75% of technology respondents indicated satisfaction with the transfer of ownership of AFHCAN equipment to their organization.

Impact on Organizational Resources

Respondents were asked to describe, in an open-ended format, how AFHCAN deployment of store and forward technology impacted the technology management and support resources at their organizations. Thirty percent of technology respondents offered answers to this question. Following are examples from four categories of responses.

1. Staff/Provider related: *We have increased our technical support to better serve the providers*
2. Patient related: *We have better patient compliance when they can see what is going on*
3. Process related: *Store photos for the doctor (referring) send to him at urban hospital, diagnoses complete, directs the PA to send patient on medivac or commercial plane*
4. No impact at present: *None at this time*

Impact of AFHCAN Store & Formard Technology



- 43% of respondents reported the main impact of the AFHCAN store and forward technology had been in the area of staff and provider services
- 29% of respondents indicated that so far, deployment had not impacted their organization's management and support resources.

Sustainability

The issue of sustainability and all it implies (e.g., maintenance, training, fiscal resources, upgrading, etc.) speaks to the future of both AFHCAN and telemedicine in the state of Alaska. Technology respondents were asked to rate their level of confidence regarding their organization's ability to sustain telemedicine without the assistance of the AFHCAN Office. This rating was done on a Likert-scale with a 1 to 5 metric - *1 Very Confident* to *5 Not at all Confident* with the midpoint *3* indicating *Somewhat Confident*. Responses were grouped into three categories: *Confident* (*1 – 2.75*), *Somewhat Confident* (*3*), and *Somewhat Not Confident* (*3.25 – 5*).

Confidence Sustaining Telemedicine without AFHCAN	*N*	%
Confident	2	10
Somewhat confident	8	40
Somewhat not confident	8	40
Missing data	2	10
Total	20	100

- 80% of respondents indicated some uncertainty as to their organization's ability to sustain telemedicine without AFHCAN

Staff Training

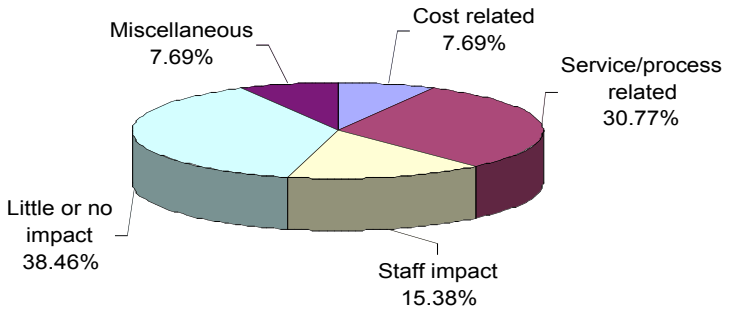
Staff training is also part of the sustainability equation. Organizations must be prepared to both orient new staff and offer continued training on the AFHCAN store-and-forward telemedicine system. Respondents were asked to assess how well equipped their organizations were to provide on-going orientation and training with new staff. Rating was done on a Likert-scale with a 1 to 5 metric - *1 Very Well Equipped* to *5 Not Equipped* with the midpoint *3* indicating *Somewhat Equipped*. Responses were grouped into three categories: *Equipped* (*1 – 2.75*), *Somewhat Equipped* (*3*), and *Less than Somewhat Equipped* (*3.25 – 5*).

Equipped to Train New Staff	*N*	%
Equipped	5	25
Somewhat equipped	8	40
Less than somewhat equipped	5	25
Missing data	2	10
Total	20	100

- Only 25% of technology respondents reported their organizations were *Equipped* to provide ongoing training and orientation on the AFHCAN system

Future Impact

Respondents were asked in an open-ended question to describe the impact disappearance of the AFHCAN program would have on their organization's Information Services and Information Technology (IS/IT) operations and resources – 57% of the respondents offered answers. Responses fell into five categories.



Examples of these responses included:

- Cost related: [Without AFHCAN] *the cost of services would increase*
- Service/process related: *Sending a patient on a medivac or commercial* [air carrier] *to the hospital,* [to find out later that the patient didn't need to be medicated or be in the hospital]
- Staff impact: *AFHCAN offices have the expert-level knowledge we need when first-line support on my end can't figure it out - Also, new developments are needed*
- Little or no impact: *Minimal at this time because it is a new piece of equipment - However, I anticipate we will use this equipment more in the future and become more dependent on it*
- Miscellaneous: *We would be madder than wet squirrels at somebody for at least a generation*

Conclusions & Discussion

Telemedicine is becoming an integral part of healthcare delivery in rural Alaska. Consistent with the AFHCAN project use and satisfaction results reported in Chapter III, the data from Health Organization Surveys also provided evidence that AFHCAN resources had played a role in improving access to higher quality healthcare for those in rural/remote areas. The majority of respondents, regardless of occupational area, perceived AFHCAN telemedicine hardware, software, training, and support to be valuable and as having a positive impact on healthcare delivery in rural Alaska. Although the response rates were smaller than hoped, the findings between respondent groups were fairly consistent and provided support for the conclusions.

AFHCAN resources were not fully utilized. Only 51% of health providers reported they used the software or cart/attachments. Technology personnel reported higher levels of equipment use than health providers or business personnel. This difference may be attributed to the small number of technology survey respondents and may not be a representative sample. Two major issues were most often identified for non-use: lack of training and the equipment was not set up or not connected to the network.

Improved Rural/Remote Access to Health Care & Information

One of the goals of the AFHCAN project was to improve access to healthcare and health information. Survey results indicated that for respondents using the software and/or equipment, the project did indeed increase access. The equipment was used primarily by referring providers working in health centers or village clinics without a physician on site, with the otoscope and digital camera as the most frequently used peripherals. These providers were predominantly Community Health Aides/Practitioners (CHA/Ps) or midlevel practitioners. Three of the four most frequently cited reasons for using the equipment were related to improving access: sending images or data (32%), documenting patient encounters (22%), and patient education (15%). Two of the four most frequently cited influences of the project on healthcare by business respondents

were also related to access: increased support to staff managing difficult cases (20%) and reduced patient travel (18%).

Improved Quality Of Care in Rural Alaska

AFHCAN resources were perceived by all respondent groups as improving the quality of healthcare at local village clinics and/or regional medical centers in rural Alaska. In fact, not only did the vast majority of health providers (79%) who used the equipment indicate that telemedicine positively changed the way they provided healthcare, they also noted that if these resources were not available it would have a negative effect on patient care. *"It would compromise care for patients in remote villages."*

Impact on Provider Skills

Among the most frequently cited uses of AFHCAN resources were training and educational functions. Although 75% of health providers who used the equipment reported they were comfortable using it, 60% indicated they wanted more training. However, technology personnel reported they lacked confidence in their specific organization's ability to provide this training. Further, nearly half of the reasons cited for not using the equipment were related to training. These findings suggested that ongoing training was needed to ensure continued, as well as increased use of telemedicine in rural Alaska. The respondents in these surveys appeared to be a fairly stable workforce; thus increasing training resources would be worth the investment. Interestingly, 25% of the health providers who used the AFHCAN resources reported they used computers more since the introduction of the AFHCAN equipment, an unanticipated generalization of skills learned in the course of the project.

Sustainability Issues

The vast majority of health providers and business personnel reported that AFHCAN telemedicine was either valued or highly valued as a resource. However, in addition to insufficient training, the other major barriers to the use of telemedicine were that the equipment

was not set up or if set up, not connected to the network. Generally, technology respondents lacked complete confidence that their organizations would be able to maintain telemedicine without support. Nearly all the technology respondents indicated they maintained at least some contact with AFHCAN or ACES for support. Further, sustainability will depend on a system or process to upgrade equipment and software as the technology changes.

Overall, most respondents indicated satisfaction with the technical support or repair they received from AFHCAN or ACES. Moreover, the AFHCAN project appeared to have a positive effect on technology in health corporations in Alaska, specifically in the areas of relationships with the private sector telecommunications industry and improving WAN infrastructure.

Business respondents were generally concerned with funding, costs, and maintenance issues. However, they indicated somewhat of a commitment to telemedicine with or without AFHCAN, with more than 40% of the respondents affirming that their organizations would continue if the AFHCAN office was no longer a resource. Technology respondents indicated that AFHCAN resources saved their organizations money and a relatively small amount of staff resources were devoted to maintenance. The financial commitment to the AFHCAN appeared to be related to the level of decision-making authority within the organization to deploy AFHCAN resources. The decision to deploy AFHCAN resources was made at the executive and board levels in one third of the organizations. Correspondingly, about one third of the organizations included telemedicine costs in their budgets. However, respondents indicated that only 20% of the organizations have identified all the costs associated with telemedicine.

Although indicators from this evaluation were positive, it was still too early to draw many definitive conclusions regarding a complete picture of the efficacy and sustainability of the AFHCAN system or telemedicine in general. Further, the response rates obtained on the surveys were relatively small. However, that being said, it is important to point out that it takes time to create sustainable systems change. Full deployment of the AFHCAN carts was not completed until September 2002; and as of December 2003, only 65% of the carts were installed and

connected to the server and network. Thus, the integration of AFHCAN resources in the field began less than two years prior to this report. Based on the results of surveys, the promise for AFHCAN to increase access to and quality of healthcare, particularly in rural and remote areas of Alaska, continued to be valid. The need for more training and technical assistance to set-up and connect the equipment was a major issue, and these needs will probably continue to some degree indefinitely. Moreover, as telemedicine becomes more incorporated into healthcare delivery, one can expect there will be increased demand for additional applications, as well as upgraded equipment and software. Although funding is a current concern regarding sustainability, organizations will likely find the necessary resources if health providers view telemedicine as an important component of healthcare delivery.

The Alaska Federal Health Care Access Network (AFHCAN) summative evaluation activities reported in this document provide snapshots in time of the AFHCAN project. This addendum reports AFHCAN changes and trends following this data collection and analysis. The Addendum was written by Stewart Ferguson, Director of AFHCAN at the time of this report.

ADDENDUM

A. Stewart Ferguson, Ph.D.

The Alaska Federal Health Care Access Network (AFHCAN) completed its sixth fiscal year of operations on September 30, 2004. The six years were composed of an initial four-year "project" term focused on meeting the goals of the original project proposal, followed by a two year "transition" period. Fiscal Year 2004 marked the last year of that transition phase, and was a year of critical changes as AFHCAN migrated away from a project-mentality towards a mature telemedicine business.

During the early months of the transition phase, AFHCAN shared evaluation data with the Center for Human Development at the University of Alaska Anchorage (UAA), and provided feedback during the development of the questionnaires used by UAA to gather data. The data sharing agreement that formed the basis of the relationship between UAA and AFHCAN was developed more than 18 months ago, as were the questionnaires, and much of the UAA data in this report were gathered 9 to 12 months ago.

While the data accurately reflects the time period in which it was gathered, much has happened since then. Usage has risen dramatically: the UAA data in the proceeding report cited 11,268 archived real cases whereas the current total is now 20,739 archived real cases. This increase of 84% in real telehealth cases occurred with only a 33% increase in the number of test cases during the same time period with very few sites added to the system. This is suggestive of a greater systemic adoption of telehealth, and is consistent with many of the changes noted by AFHCAN in the last 12-18 months.

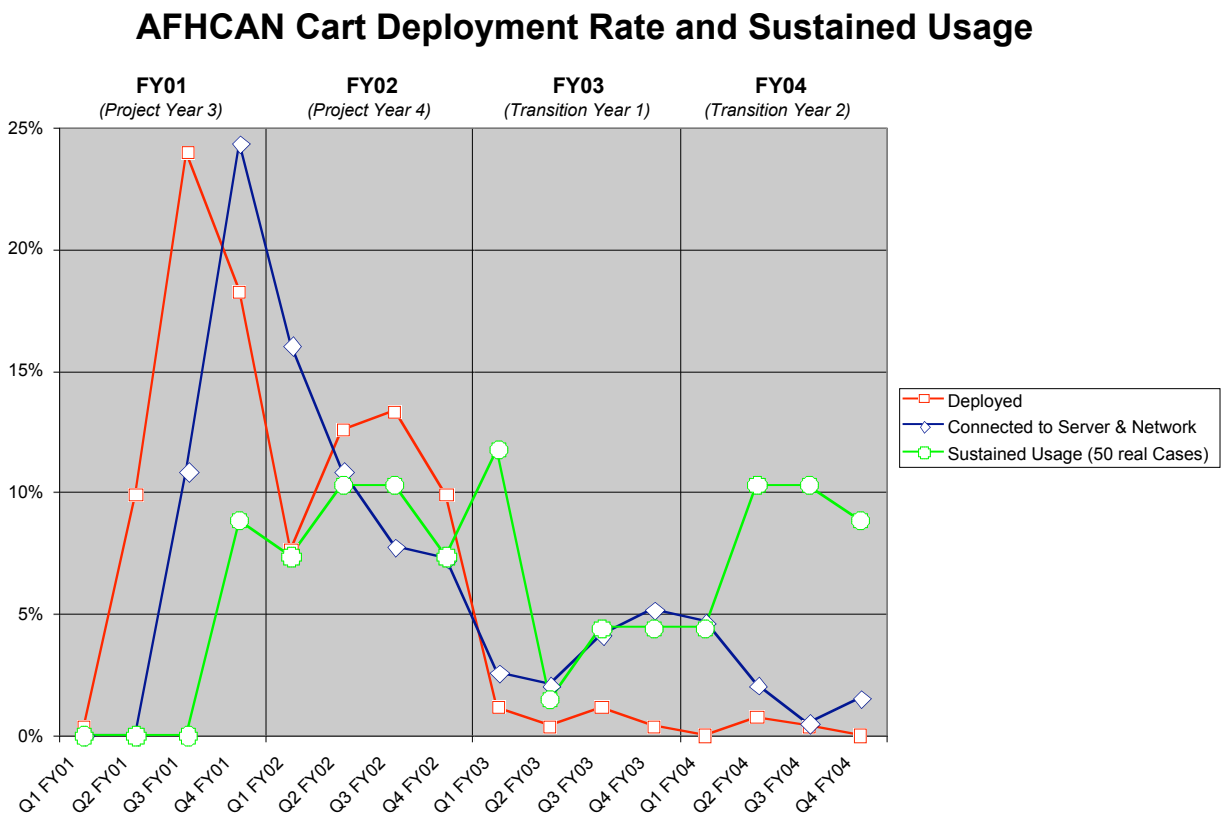
The intent of this addendum is to report new data, and changes/trends that have emerged in the time between the time UAA gathered data and the current time. This is particularly relevant since AFHCAN has evolved in response to external drivers. The effects of these changes are noticeable and will have a significant impact on the future growth of telehealth in Alaska.

Responding to Customer Needs

The AFHCAN Project Office has had three major activities over the last six years. The first two years of the Project Cycle (FY99, FY00) were focused on developing a deployable platform, with a shift towards deployment of this system during the next two years FY01- FY02 (or the last two years of the four-year project). During FY03-FY04 (transition years) deployment tapered off and efforts were more focused on increasing utilization of the systems in place.

Evidence for this is shown in the following chart, which indicates the percentage of total carts deployed during each quarter of the fiscal year. A total of 138 and 114 carts were deployed in FY01 and FY02 respectively, compared with 8 and 3 carts deployed in FY03 and FY04. Of the 263 carts deployed to clinical settings in the past 4 years, 96% were deployed during the four-year project cycle and 4% were deployed in the transition years.

The chart also indicates the percentage of carts that were connected to servers and the number of carts that reached the milestone of "sustained usage." The latter was defined as being used to create 50 clinical cases and does not include test cases. The chart clearly demonstrates the time lag between the deployment of a cart, the connectivity of the cart to the network, and reaching the usage milestone of 50 cases. It would appear that it takes at least 3 months (one fiscal quarter) for a cart to be connected to the network following deployment. This delay is typically due to issues beyond the control of the AFHCAN Office. It is often caused by delays in establishing network connectivity which is not within the AFHCAN's scope of responsibility.



Percentage of carts deployed, connected, and used within the AFHCAN system for each fiscal quarter. Percentages are based on the number of carts achieving each status by Q4 FY04. For deployed carts it is a percentage of the 263 carts that were deployed. For connected carts it is a percentage of the 193 carts that were connected to a server. For sustained usage, it is a percentage of the 68 carts that were used to create at least 50 clinical cases.

Perhaps the most critical observation from the chart is the delay in creating 50 real cases with the carts after the carts were connected to the server/network. A delay of 6 months to a year occurred after peak deployment in FY01. This was followed by a large reduction for the next year in the number of carts reaching this milestone, followed by a sustained increase in the last three Quarters of FY04.

Carts reach this milestone only when the telehealth *system* is fully functioning. Providers have to be trained to create cases, providers need to accept cases for consultation and be trained on the system, providers have to perceive a clinical need, and support processes need to be in place to support both clinical and technical needs.

The AFHCAN office recognized the need to provide higher levels of training and support in FY02, but was unable to respond immediately to this need due to budget limitations and concern that the AFHCAN would not be funded beyond FY02. In addition, the early support services offered through Alaska Clinical Engineering Services (ACES) were focused on technical and deployment support whereas the support needs of users were now driven by clinical and user-interface issues over the long-term. By mid-FY03 the AFHCAN system was being used by more than 700 providers throughout Alaska, and the AFHCAN system was deployed on more than 42 interconnected servers.

Continued funding in FY03 allowed the AFHCAN Office to commit to creating a limited Support department and a professional Training department. Budget delays and subsequent hiring delays postponed creation of disciplined support and training teams and concomitant processes. These began to be developed in late FY03 and early FY04.

It is believed these systems largely account for the increase in the numbers of carts reaching the milestone of 50 clinical cases observed in FY04. AFHCAN now provides professional support services on a 24-7 basis and continues to expand clinical training both within Anchorage and at customer sites. Significant time and effort has gone into developing coordinated mechanisms for customer-centric operations, especially focused on coordination among a customer support desk, production support, dispatch, and telehealth coordinators.

The AFHCAN Support team now actively contacts most if not all sites every three months to offer support. The three-person call center handles approximately 600-700 calls every quarter with a "first call resolution" (meaning the problem is resolved in the first call) approximately 50% of the time. The AFHCAN Training team provides training to approximately 50-75 users every quarter, and is actively working to create certification courses for all users, trainers, installers, and system administrators. Training courses are offered regularly in Anchorage at the AFHCAN Office and on-site at customer premises.

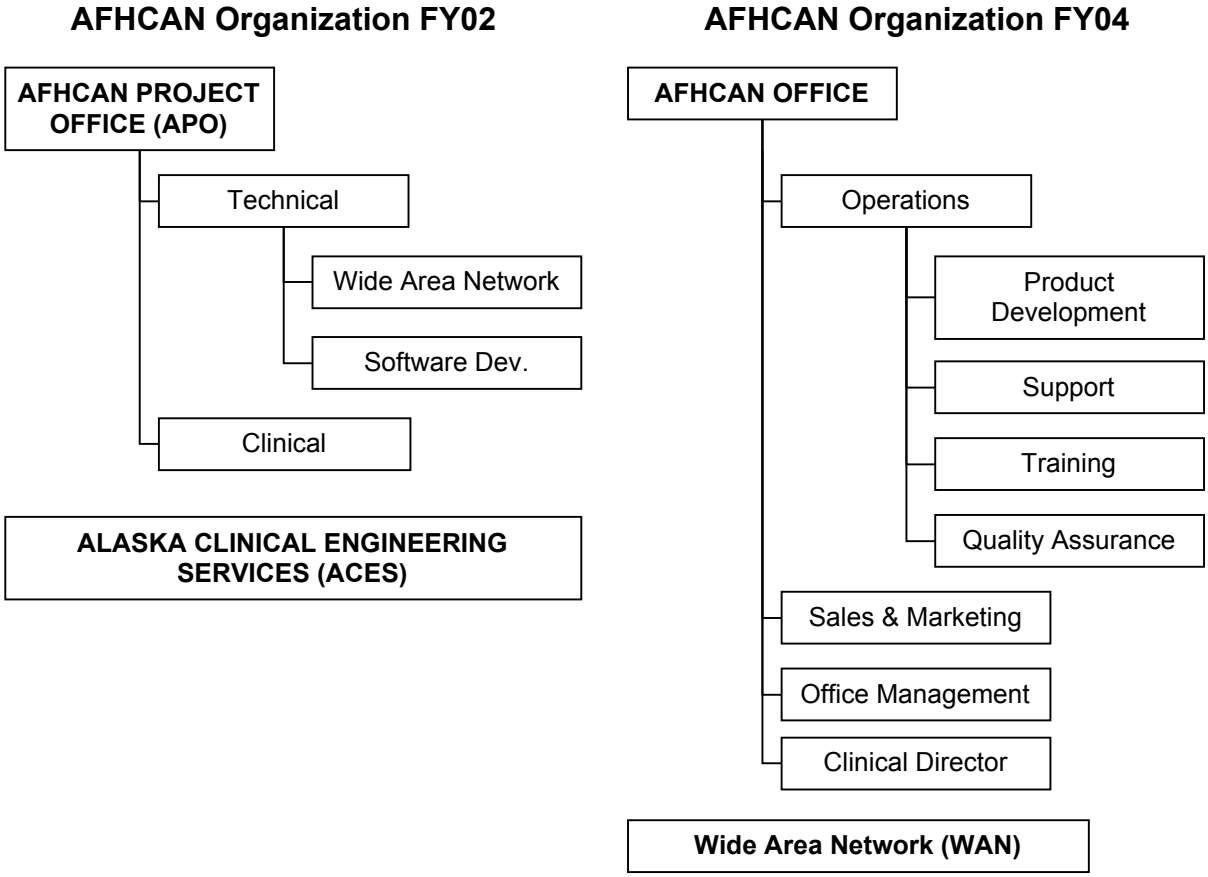
Reorganization

The UAA surveys, conducted in late FY03 and early FY04, determined that the two major reasons for lack of cart utilization were a) lack of connectivity and b) training needs. This is consistent with the above analysis, and the AFHCAN Office was already in the process of adapting to these needs in early FY03 through a major internal reorganization.

Reorganizing the AFHCAN Office required a major shift from a focus on "technology development" towards a Whole Product Solution (WPS) approach. The WPS is a recognition that AFHCAN is not in the business of deploying technology, but rather in the business of deploying solutions that include products and services. Customer needs are addressed at all stages of product development. As a result, internal processes improved, for example, to clearly and unambiguously:

- Integrate feedback from support and training into product development cycles
- Integrate quality assurance, document management, process, and policy throughout all stages of product development
- Develop tools and mechanism to create training and support before a product is released to a customer to encompass the entire life-cycle of that product (i.e. from installation through steady-state operations to future releases of products)

In FY02, AFHCAN was poorly designed to respond to the increasing demands from users for support and training services. The following graph indicates the structure of AFHCAN in FY02 and, after reorganization, in FY04. In FY02, the organization was well structured for deployment, but less well structured for an integrated development and delivery environment. Limited accessibility to the deployment teams (often in the field) and physical separation of the APO and ACES offices created communication difficulties. There was no single support plan for customers. Depending on personal relationships, users would freely call ACES, the clinical team, or the development team. No mechanisms were in place to document support needs, or to follow through with user needs.



During FY03 the AFHCAN Office created an Operations team to better integrate development and delivery of products and services. Using rigorous Project Management procedures, this group can deliver a WPS such that new software is fully tested, integrated, and documented for user application by the Support and Training groups before deployment to customers. All customer requests including procurement, deployment, and repairs are now coordinated through the Support team, which along with Training and Quality Assurance, are represented on all Project Development Teams. Other key shifts in AFHCAN structure included:

- Moving the wide area network (WAN) outside the AFHCAN Office, in recognition of the larger role of the WAN beyond AFHCAN telehealth
- Creation of a Sales and Marketing group within AFHCAN to provide better communication with AFHCAN customers, and to look for new funding and revenue options
- Improved internal office management to continuously improve internal processes and mechanisms

The wide area network (WAN) developed as part of the AFHCAN project is now managed under the Alaska Native Tribal Health Consortium's (ANTHC) Division of Information Technology (DIT). The network continues to support AFHCAN Telemedicine and other store-and-forward technologies for teleradiology and telepharmacy. Additionally, the WAN is supporting an increasing amount of videoconferencing for tele-behavioral health, Community Health Aide training, and administrative meetings. Currently, the WAN reaches more than 160 of the 248 AFHCAN sites, and ANTHC is working to interconnect a number of non-federal sites which have existing business and clinical relationships with federal partners. The WAN has received grant funding to play a significant role in expanding videoconferencing infrastructure for real-time telehealth applications in FY05. The AFHCAN Office and the WAN Group have been reorganized within the corporate structure of the ANTHC. Both the AFHCAN Office and WAN are located with DIT, which also supports the ACES and Resource Patient Management System (RPMS). Working collaboratively allows a more integrated, unified, and efficient approach to statewide systems.

Strategic Planning

The AFHCAN Office participated in a seven-month process, termed the Framework for the Advancement and Sustainability of Telehealth (FAST), with the Alaska Federal Health Care Partnership (AFHCP). The goal was to devise a framework for developing a plan for sustaining AFHCAN systems. This process involved a detailed analysis of AFHCAN activities, costs, service delivery, product analysis, etc. The conclusion, reached in January 2004, was to develop four comprehensive plans:

- A Closure Plan for AFHCAN to end the original four-year project
- A Sustainment Plan to support sites with AFHCAN equipment if no future funding is available

- An ANTHC Telehealth Business Plan to form the AFHCAN Office into a business operation with capability to take contracts outside the AFHCP with a new name, managed totally by ANTHC (the WAN in this scheme would be separately funded but completely managed within ANTHC / DIT)
- An AFHCP telemedicine plan for the future to be developed by AFHCP

The first plan was a Closure Plan designed to provide a scope of work, timelines and a budget to complete specific activities required in the original AFHCAN proposal. Essentially, this closed out the original AFHCAN project. This plan was approved in July 2004 by the Executive Committee of the Partnership, and is the basis for much of the FY05 AFHCAN activity. It was developed as part of a cost-effective solution to deploy significant upgrades and provide expanded products and services throughout the state of Alaska in FY05. The plan addresses the need to deploy all remaining equipment and site funding from the AFHCAN project, complete a USDA funded grant, provide support for the WAN in FY05, and provide partial funding to update AFHCAN servers and specific components on the AFHCAN carts for participating customers.

System Utilization

Usage of the AFHCAN software continued to grow steadily in FY04 despite limited deployment of new sites. The number of real archived cases grew from 3,193 in 9/1/02 to 9,494 by 9/1/03 and 18,651 by 9/19/04. Similar to previous years, the majority of the cases were related to Primary Care, Audiology, ENT, Dermatology, and Cardiology. However, this year saw significant growth in the number of other clinical services delivered through telehealth.

The growth in telehealth cases by 50% in FY04 compared to FY03 cannot be explained by new carts being deployed (only 1% of carts were deployed in FY04) or the number of carts being connected to servers (only 9% of carts were added to server connectivity in FY04). The 50% increase in usage was the result of increased utilization at existing sites and is likely related to improved support/training services offered by AFHCAN. The increased utilization occurred

on a systemic basis and was not the result of a single organization increasing usage. This is consistent with the observation that the 21 AFHCAN carts that reached "sustained utilization" (50 clinical cases) in the past eight months were spread throughout twelve health corporations. In the eight months prior to this, only six carts reached this milestone, which is consistent with the limited training and support services offered at that time.

An often unreported benefit of the AFHCAN system is the number of times the cart is used to visualize data during an encounter without saving the data. AFHCAN deliberately trains users to use the equipment as often as possible even if a case will not be saved or sent. This practice increases the skills of the operator and can provide direct health benefits to patients. One example is the imaging of a patient's tympanic membrane to provide patient education, elicit their cooperation in the treatment plan, increase compliance with a treatment plan, or to reduce the use of antibiotics. Data obtained in FY04 indicates that the AFHCAN carts are being used extensively for this purpose and this usage is not reflected in the above usage statistics. The number of unsaved cases—literally undocumented usage of the system—can actually exceed documented usage. The following table indicates the number of unsaved case versus the number of saved cases for three organizations, demonstrating a range of 47% to 143% of undocumented but productive usage of the system.

	Saved Cases	Unsaved Cases
Organization A	3500	1647
Organization B	1236	1763
Organization C	1683	1517

Product Development

FY04 is the first year that AFHCAN has not deployed software upgrades to the existing web-based application, choosing instead to focus all programming efforts on a significant redesign of the core telehealth software. The new software, slated for release to beta-test sites on January 10 2005, will provide additional levels of security and maximize performance, especially

over satellite connectivity. This release will also allow providers to create cases when connectivity with the server fails. This new platform—a true client-server enterprise solution—is designed to enable AFHCAN staff to add features and capabilities faster and with greater stability. AFHCAN has doubled the size of the programming staff, hired a full time tester, and added a hardware engineer to the team.

AFHCAN is also redesigning the cart to utilize newer technology and support more peripherals. The current cart configuration supports four peripherals, and AFHCAN is developing five more peripherals in FY05 to be integrated into the software and added to carts. These include tympanometers, spirometers, vital signs monitors, stethoscopes, and home health peripherals.

AFHCAN / ANTHC is listed with the U.S. Food and Drug Administration as a Medical Device manufacturer, and has listed the carts, software, and servers as medical devices. Few telehealth projects in the US have taken this approach. AFHCAN is working in compliance with the FDA Quality Systems approach for all current and future development efforts on hardware and software.

AFHCAN is also pursuing UL and CE certifications for the AFHCAN cart, a necessary step to move towards commercial sales in the United States and Europe. AFHCAN is pursuing a longer-range goal of achieving ISO 9001/9002 certification.

Moving Beyond the Alaska Federal Sites

AFHCAN has been asked to look beyond the original project proposal and to share solutions with non-AFHCAN sites, particularly with other Alaskan providers. This has not occurred yet for many good reasons. Upon reflection, the goals of the AFHCAN Project were not fully achieved during the four-year project cycle, and the necessary products and services had not been developed to expand beyond the 248 sites. The AFHCAN Project has really taken 6-7 years to complete, leaving the Office with few resources to accommodate requests from outside

organizations. The last two "transition years" have allowed the AFHCAN Office to redesign their core products (software and carts) and to develop services to scale beyond the 248 sites.

The transition from a project on the federal side to working with private health care providers has also raised many business, legal, and regulatory issues for the Alaska Native Tribal Health Consortium. One simple example is the need for liability insurance for AFHCAN staff when operating outside of the federal sector. A more complex example would be the legal and routing protocols for delivery of health care when a mix of federal and non-federal beneficiaries are present in the patient population.

Another outcome of this analysis was the need to develop a commercially viable product line for telehealth consistent with FDA, CE and UL regulations. This entailed a major 18-month development effort on the software, which also addressed improvements in performance, security, functionality, and scalability. This product line is only now becoming available.

Clinical Care

Many projects, started in previous years, continued in FY04. Some of these projects were pilot studies or validation studies that are now beginning to demonstrate a return on investment.

The "traveling audiologist program", for example, grew from five clinics in FY03 to a total of 21 remote clinics and has now served 518 patients. This program, jointly supported by the ENT Department at ANMC and AFHCAN, provides for a contract audiologist to travel to remote sites in Alaska to provide audiological services. The audiologist is trained to create ENT telemedicine cases consisting of clinical histories, images and audiological data. To date, this program has cost approximately $40,000 and saved more than $80,000 in patient travel. Most critically, approximately 75% of patients received much faster access to care, and the 25% who did not need care were saved the expense of traveling to a regional specialty clinic. Based on the demonstrated success and clear business case, ANMC is currently considering offering this as an additional clinical service.

Leslie Neely RN, case manager for the ENT Clinic in Kotzebue, described the benefits of this program for providers and patients:

> Having Beverly LeMaster [audiologist] go out to the villages is a huge financial benefit. Beverly saw 20 patients a day in Selawik which saved us $2400.00 in airfare alone, since those patients would have to be flown to Kotzebue for the same service. Since most of the patients she saw were minors, you can add on another $2400.00 for a parent to accompany the child. On top of that, the child misses a day of school, the parent misses a day of work, and there are usually other children in the family whose care must be arranged.

In FY03, the AFHCAN staff completed the second phase of a validation study to determine if post-surgical follow-up of ear patients via telemedicine was as effective as an in-person exam. The conclusion of this study was that store-and-forward telemedicine, with images taken by Community Health Aides, is as good as an in-person exam for the follow-up exam of patients receiving PE tubes. This study is now being implemented with clinical protocols at regional and village locations. Maniilaq Association estimates it is saving them $30,000 annually on travel costs.

AFHCAN continues to collect responses from providers to evaluation questions contained within the software. Providers agree or strongly agree that the quality of care provided to patients is improved in 85% of telehealth cases. Providers also estimate that travel is being saved in 40% of cases. Extrapolated over 9,000 cases in FY04, this reflects possible savings in the range of $1m to $3m depending on the cost of round trip airfare and the need for guardians to accompany younger patients.

Reimbursement

The Medicaid data contained in this report clearly indicated that Medicaid reimbursement for telehealth has been occurring in Alaska, albeit at a low volume. The AFHCAN Office also conducted an internal review/study of Medicaid billing to track the cost savings on travel for the initial claims submitted to Medicaid.

Medicaid regulations in Alaska permitted reimbursement for store-and-forward telemedicine beginning on December 15th, 2002. The AFHCAN staff rapidly generated a Billing Form in the software to facilitate billing for telemedicine cases. Ten months later, a limited number of claims were processed for Otolaryngology consultation. The 91 claims studied represented total payments from Medicaid of $6,970. Knowing the location of the patients, and the travel avoided for patients and escorts, AFHCAN estimates that $55,437 was saved in travel costs by Medicaid—a savings of $7.95 for each $1 spent on claims.

What's Next?

Customers currently using AFHCAN products and services will see significant improvements in 2005. The next generation of AFHCAN software will be released in the first quarter of 2005 and deployed to sites as rapidly as possible. Providers will experience better performance and most importantly, more rapid development of requested features. New clinical peripherals, currently being developed and integrated into the AFHCAN software and carts, will be deployed in 2005 at the request of participating customers. This includes tympanometers, spirometers, colposcopes, vital signs monitors, dental cameras, and home health peripherals. The almost 300 carts throughout the state will also be upgraded to include newer technology. Funding from the U.S. Department of Agriculture and support from the Alaska Federal Health Care Partnership is making this possible.

AFHCAN will continue to actively promote telehealth in Alaska during FY05, with programs focused on expanding clinical services, utilization, research, training, and support. AFHCAN is committed to maintaining a position as a market leader in innovative store-and-forward telehealth solutions. New business opportunities will enhance sustainability of this system, and deliver better products and services to all AFHCAN customers to improve access to and quality of health care delivery.

APPENDIX A
Data Resources, Sources, and Documents

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APPENDIX B
Images Taken With Equipment

Note: This report shows the number of images taken with each hardware component for both real and test cases. These data have only been gathered since November 2001 and depend on weekly email reports arriving at APO to report the data. As a result, the total number of cases reported here is lower than the cumulative case numbers reported elsewhere. Data are through November 2003.

Organization	*Site*	*Cases*	*Digital Camera Images*	*ECG Traces*	*Scanned Images*	*Video Otoscope Images*
AFHCAN	*AFHCAN Office*	*33*	81	9	11	20
ANMC	*ANMC Campus*	*1539*	1557	133	1456	3147
APIA	*Anchorage Office*	*25*	16	8	8	15
APIA	*St. George Clinic*	*5*	10	0	0	7
ASNA	*Samuel Simmons Hospital*	*72*	67	13	31	106
BACH	*Bassett Army Hospital*	*24*	37	6	6	10
BBAHC	*Kanakanak Hospital*	*1030*	1213	434	201	1098
CATG	*Yukon Flats Health Clinic*	*36*	21	41	13	39
Chistochina	*Chistochina Health Clinic*	*2*	0	5	0	1
Chugachmiut	*Chugachmiut*	*23*	41	8	13	9
CRNA	*Copper Center Health Clinic*	*4*	0	0	0	14
EAFB	*Elmendorf Hospital*	*35*	70	2	16	16
EAT	*Adak Clinic*	*2*	2	4	4	4
EAT	*Akutan Health Clinic*	*10*	14	0	1	10
EAT	*Cold Bay Clinic*	*17*	3	9	0	36
EAT	*False Pass Clinic*	*13*	18	5	3	16
EAT	*King Cove Clinic*	*95*	119	36	14	63
EAT	*Nelson Lagoon Health Clinic*	*74*	4	19	0	12
EAT	*Sand Point Clinic*	*8*	11	0	0	17
EAT	*Whittier Clinic*	*0*	0	0	0	0
Eyak	*Eyak*	*44*	38	31	4	21
Hoonah	*Hoonah Health Clinic*	*29*	32	26	4	11

KANA	*Alutiiq Health Clinic*	*187*	171	42	14	179
KIC	*Kenaitze*	*43*	93	0	2	33
Maniilaq	*Maniilaq Medical Center*	*3020*	5870	712	108	2979
Mentasta Lake	*Mentasta Lake*	*25*	7	13	22	3
Ninilchik	*Ninilchik*	*5*	7	3	1	6
NSHC	*Norton Sound Hospital*	*1577*	2119	118	1501	3075
SEARHC	*Mt. Edgecumb Hospital (MEH)*	*265*	459	28	34	257
Seldovia	*Seldovia*	*15*	9	25	4	6
TCC	*Chief Andrew Isaacs Health Clinic*	*141*	185	136	17	102
Tyonek	*Tyonek*	*2*	0	3	1	2
UASF	*Eielson AFB Hospital*	*2*	4	0	1	0
USCG	*USCG Cordova*	*11*	26	4	6	13
USCG	*USCG Juneau*	*9*	7	1	1	3
USCG	*USCG Ketchikan*	*25*	54	8	16	12
USCG	*USCG Kodiak*	*29*	37	10	7	46
USCG	*USCG Port Clarence*	*16*	34	8	8	18
USCG	*USCG Sitka*	*25*	11	16	0	4
USCG	*USCG St. Paul*	*12*	3	3	3	26
Yakutat	*Yakutat Health Clinic*	*10*	22	3	0	11
YKHC	*Yukon Kuskokwim Delta Region Hospital (YKDR)*	*865*	559	150	613	2184
Total		**9404**	**13031**	**2072**	**4144**	**13631**

APPENDIX C
AFHCAN Telemedicine User Satisfaction Questions

Question asked of Consulting Providers:

1) Did viewing this telemedicine case/image affect PATIENT TRAVEL for diagnosis or treatment of this case (compared to a phone consult)?

   - ❑ It prevented patient travel
   - ❑ It caused patient travel
   - ❑ It had no effect on patient travel

Questions asked of Referring Providers:

2) For this case, rate the following statement: I am COMFORTABLE creating a telemedicine case.

3) For this case, rate the following statement: Telemedicine helps me COMMUNICATE with a doctor.

4) For this case, rate the following statement: The telemedicine system played a role in EDUCATING THIS PATIENT.

5) For this case, rate the following statement: Telemedicine makes my JOB MORE FUN.

6) For this case, rate the following statement: Telemedicine improved PATIENT SATISFACTION.

7) For this case, rate the following statement: Telemedicine will improve the QUALITY OF CARE for this patient.

8) For this case, rate the following statement: I am SATISFIED with how the EQUIPMENT worked.

9) For this case, rate the following statement: The SOFTWARE is EASY TO USE.

10) For this case, rate the following statement: Telemedicine is a WASTE OF TIME for me and this patient.

11) In creating this case, what did you have the most DIFFICULTY with?

Response choices, items two through 11:
1 - Strongly Disagree; 2 – Disagree; 3 – Neutral; 4 – Agree; 5 - Strongly Agree

APPENDIX D
Health Provider Survey

AFHCAN Telemedicine Provider Survey

Instructions: Please fill in the circle or check the box beside the appropriate answer for each question. If you have completed this survey before, thank you. Your answers will be saved and you do not need to fill out the survey again. After completing the survey, please use the enclosed envelope to mail it to the Center for Human Development, 2210 Arca Drive Anchorage, AK 99508. Please respond by July 28, 2003.

What is your organization's zip code?_____

1. Please identify your occupation. (Please select only ONE response)

⓪ Physician
① Physician Assistant
② State Public Health Nurse
③ Advanced Nurse Practitioner
④ Community Health Aide/Practitioner
⑤ Behavioral Health Practitioner
⑥ Audiologist
⑦ Physical Therapist
⑧ Other (Please Specify)

2. How long have you been in practice?

⓪ Less than 1 Year
① 1-3 Years
② 3-5 Years
③ 5-10 Years
④ More than 10 years

3. Please report your highest degree received and the year you received it.

Degree	Year Received
⓪ High School/GED	
① Community Health Practitioner Certificate	
② Some college credit	
③ Associate's Degree	
④ Bachelor's Degree	
⑤ Graduate Degree	
⑥ Medical Degree	
⑦ Other (Please specify)	

4. In which type of office do you primarily work? (Please check only ONE box)

⓪ Hospital with Physicians
① Health Center/Village Clinic with Physicians
② Health Center/Village Clinic with Nurse Practitioner's/Physician's Assistants
③ Public Health Center/Village Clinic with Public Health Nurse
④ Health Center/Village Clinic with Community Health Aides/Practitioners
⑤ Other (Please Specify)

5. How long have you been practicing in this office?

_____ Years _____ Months

6. Please identify the type of training that you received on the use of the AFHCAN telemedicine software or the AFHCAN cart/attachments (Please check ALL that apply)

- ☐ No training **(Please skip to question # 8)**
- ☐ Group training (5 or more) at a location away from my clinic
- ☐ Group training (5 or more) in my clinic
- ☐ Individual or small group training (less than 5) at a location away from my clinic
- ☐ Individual or small group training (less than 5) in my clinic
- ☐ Follow-up training in a location away from my clinic
- ☐ Follow-up training in my clinic
- ☐ Other (Please Specify) _____

7. Rate your satisfaction with the training you have received to use the AFHCAN telemedicine software or the AFHCAN cart/attachments.

Very Satisfied — Satisfied — Not Satisfied

1 2 3 4 5

8. Do you feel you need additional training in the use of the AFHCAN telemedicine software or the AFHCAN cart/attachments?

- ⓪ Yes (Please answer Question 9)
- ① No (Please go to Question 10)

9. If Yes, in what areas or with which devices?

_____

_____

_____

10. Have you ever used AFHCAN telemedicine software on your computer, or used the AFHCAN cart or attachments?

⓪ I **have not** used the AFHCAN software or the cart/attachments (otoscope, camera, etc.)	**Please answer items #11 – 12 only.**
① I **have** used the AFHCAN software but, **not** the cart/attachments (otoscope, camera, etc.) to document and send a Telemedicine case for review	**Please answer items #13 - 30**
② I **have** used the cart/attachments (otoscope, camera, etc.) to document a case but, **not** to send a case for review	**Please answer items #13 - 34**
③ I **have** used **both** the AFHCAN software and cart/attachments (otoscope, camera, etc.) to document and send a Telemedicine case for review	**Please answer items #13 - 34**

Please answer Questions 11-12 ONLY if you HAVE NOT used the AFHCAN telemedicine software or the AFHCAN cart/attachments in your practice.

11. If you have not used the AFHCAN telemedicine software or the AFHCAN cart/attachments in your practice, which of the following statements best describes the reason(s) that you have not used them?
(Please check ALL that apply.)

- ☐ The equipment has not been set up
- ☐ The equipment is set up, but we are not connected to the network
- ☐ We lost our connection to the network
- ☐ I have not been trained on the equipment
- ☐ My supervisor doesn't encourage me to use it
- ☐ My patients do not want me to use it
- ☐ I have not used it before and am uncomfortable using it
- ☐ I have not had a clinical encounter in which it would be useful to use it
- ☐ I could not make the equipment work
- ☐ I do not like using telemedicine
- ☐ Other barriers (please specify)

12. If you are not using the AFHCAN telemedicine software or the AFHCAN cart/attachments because they are not available to you, would you use them if they were?

- ⓪ Yes
- ① No

If you have not used the AFHCAN telemedicine software or the cart as part of your practice, this is the end of the survey**.**

Please do not complete the following items.

Please Return The Completed Survey
In The Enclosed Postage Paid Envelope To:

Jennifer Carter, MS

Research Coordinator

Center for Human Development

2210 Arca Drive

Anchorage, AK 99508

Toll Free in Alaska 1-800-243-2199 Or In Anchorage: (907) 272-8270

13. When did your site receive the AFHCAN telemedicine software or the AFHCAN cart/attachments?

_____ (Date Received)

☐ Don't Know

14. How long have you been using the AFHCAN telemedicine software or the AFHCAN cart/attachments as part of your practice?

_____ Years _____ Months

15. When was the last time you used the AFHCAN telemedicine software or the AFHCAN cart/attachments in your practice?

⓪ Within the last 30 Days
① Within the last Six Months
② Within the last Year
③ Within the last Two Years

16. In which of the following ways have you used the AFHCAN telemedicine software or the AFHCAN cart/attachments? (Check ALL that apply)

☐ Patient education
☐ Sending an image or data
☐ Documenting a patient encounter
☐ Creating test cases for training
☐ Tele-counseling or Tele-psychiatry
☐ Video-conferencing
☐ Continuing medical education
☐ Looking up medical information
☐ Other (please specify) _____

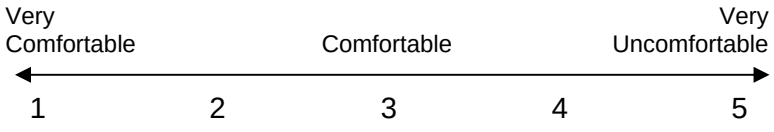
17. Why do you use the AFHCAN telemedicine software or the AFHCAN cart/attachments in your practice? (Check ALL that apply)

☐ My patients want me to use it
☐ I can provide better health care using telemedicine
☐ I obtain faster response from my provider
☐ My organization/hospital wants me to use it
☐ My supervisor encourages me to use it
☐ The physician I work with wants me to use it
☐ Need access to specialty/consultation
☐ I like the way the equipment works for obtaining patient information (like ECG or ear images)
☐ Other (please specify) _____

18. If you received more encouragement from your supervisor would you use the AFHCAN telemedicine software or the AFHCAN cart/attachments more often?

⓪ Yes
① No
② Don't know
③ Not Applicable, My supervisor already encourages me to use it.

19. How would you rate your level of comfort using the AFHCAN telemedicine software or the AFHCAN cart/attachments as part of your practice?



20. Please rate how well the AFHCAN telemedicine software or the AFHCAN cart/attachments generally work.

Very Well — Adequate — Not Well

1 2 3 4 5

21. Have you had any technical problems with the AFHCAN telemedicine software or the AFHCAN cart/attachments for which you needed help?

⓪ Yes (Please go to question 22)
① No (Please go to Question 25)

22. Who did you contact for assistance with the AFHCAN software or cart/attachments? (Please check ALL that apply)

☐ Someone within my organization
☐ AFHCAN
☐ ACES (Alaska Clinical Engineering Services)
☐ Other (Please Specify) _____

23. If you contacted AFHCAN for assistance with the AFHCAN software or cart/attachments, how would you rate the support available to you?

Good — Adequate — Poor

1 2 3 4 5

24. If you contacted ACES for assistance with the AFHCAN software or cart/attachments, how would you rate the support available to you?

Good — Adequate — Poor

1 2 3 4 5

25. How has use of the AFHCAN telemedicine software or the AFHCAN cart/attachments changed the way you provide health care? (Please check ALL that apply.)

☐ I don't believe that it has changed the way that I provide health care
☐ I believe that I receive more support from others in managing difficult cases
☐ I believe that I learn more from my supervising physician
☐ I believe that patients do not have to travel as much for health care
☐ I believe that patients receive more attention from other providers or specialists
☐ I believe that patients do not have to wait as long for health care
☐ I believe that it allows a higher degree of patient education
☐ I believe that it allows me to provide higher quality health care
☐ Other (Please Specify)

26. Before using the AFHCAN telemedicine software or the AFHCAN cart/attachments, how often did you use a computer?

Frequently — Infrequently — Never

1 2 3 4 5

27. If applicable, what applications did you generally use the computer for? (Please check ALL that apply)

- ☐ Email
- ☐ Internet
- ☐ Word Processing
- ☐ Spreadsheet
- ☐ Other (Please Specify) _____

28. Since using the AFHCAN telemedicine software or the AFHCAN cart/attachments, how would you rate your use of computers for reasons other than telemedicine?

More — About the Same — Less

1 2 3 4 5

29. If the AFHCAN telemedicine software or the AFHCAN cart/attachments were to be removed tomorrow, at what level would it affect your clinical practice?

A lot — Somewhat — Not At All

1 2 3 4 5

30. Please explain:

_____

The following questions ask only about the AFHCAN telemedicine cart and attachments. Please answer these questions ONLY if you HAVE used the AFHCAN cart or attachments.

31. In what ways have you used the AFHCAN telemedicine cart/attachments? (Check ALL that apply)

	As a Referring Provider	As a Consultant/Giving a Second Opinion
Teleradiology	☐	☐
Video Conferencing	☐	☐
EKG	☐	☐
Otoscope	☐	☐
Digital Camera	☐	☐
Scanner	☐	☐
Dental Camera	☐	☐
Other (Please Specify)	☐	☐

32. How often do you use the following AFHCAN telemedicine cart/attachments applications? (Please check the appropriate box for each application and indicate how often you use each application).

	Often	Not Often	Never	Frequency of Use
Teleradiology	☐	☐	☐	
Video Conferencing	☐	☐	☐	
EKG	☐	☐	☐	
Otoscope	☐	☐	☐	
Digital Camera	☐	☐	☐	
Scanner	☐	☐	☐	
Dental Camera	☐	☐	☐	
Other (Please Specify)	☐	☐	☐	

33. If there are applications you have not used, or that you no longer use, which of the following statements best describes your reason for not using it? (Fill in only ONE circle for each application that you do not use. Skip applications that you use.)

Teleradiology

⓪ No patients have needed that service
① The equipment does not work correctly
② Using the equipment took more time than not using it
③ I used the equipment but received no response
④ I have not been trained in that application
⑤ I have been trained but am still not comfortable in using telemedicine for that procedure
⑥ Another practitioner in the clinic can provide the service
⑦ Other (please specify)

Video Conferencing

⓪ No patients have needed that service
① The equipment does not work correctly
② Using the equipment took more time than not using it
③ I used the equipment but received no response
④ I have not been trained in that application
⑤ I have been trained but am still not comfortable in using telemedicine for that procedure
⑥ Another practitioner in the clinic can provide the service
⑦ Other (please specify)

EKG

⓪ No patients have needed that service
① The equipment does not work correctly
② Using the equipment took more time than not using it
③ I used the equipment but received no response
④ I have not been trained in that application
⑤ I have been trained but am still not comfortable in using telemedicine for that procedure
⑥ Another practitioner in the clinic can provide the service
⑦ Other (please specify)

Otoscope

⓪ No patients have needed that service
① The equipment does not work correctly
② Using the equipment took more time than not using it
③ I used the equipment but received no response
④ I have not been trained in that application
⑤ I have been trained but am still not comfortable in using telemedicine for that procedure
⑥ Another practitioner in the clinic can provide the service
⑦ Other (please specify)

Digital Camera

⓪ No patients have needed that service
① The equipment does not work correctly
② Using the equipment took more time than not using it
③ I used the equipment but received no response
④ I have not been trained in that application
⑤ I have been trained but am still not comfortable in using telemedicine for that procedure
⑥ Another practitioner in the clinic can provide the service
⑦ Other (please specify)

Scanner

⓪ No patients have needed that service
① The equipment does not work correctly
② Using the equipment took more time than not using it
③ I used the equipment but received no response
④ I have not been trained in that application
⑤ I have been trained but am still not comfortable in using telemedicine for that procedure
⑥ Another practitioner in the clinic can provide the service
⑦ Other (please specify)

Dental Camera

⓪ No patients have needed that service
① The equipment does not work correctly
② Using the equipment took more time than not using it
③ I used the equipment but received no response
④ I have not been trained in that application
⑤ I have been trained but am still not comfortable in using telemedicine for that procedure
⑥ Another practitioner in the clinic can provide the service
⑦ Other (please specify)

Other (Please Specify) _____

⓪ No patients have needed that service
① The equipment does not work correctly
② Using the equipment took more time than not using it
③ I used the equipment but received no response
④ I have not been trained in that application
⑤ I have been trained but am still not comfortable in using telemedicine for that procedure
⑥ Another practitioner in the clinic can provide the service
⑦ Other (please specify)

34. Are there any other applications or attachments you would like to be added to the AFHCAN Telemedicine cart? (Please check ALL that apply)

- ☐ Colposcope
- ☐ Dental Scope
- ☐ Fetal Monitoring
- ☐ Hearing Test/Audiometer
- ☐ Holter Monitor
- ☐ Ophthalmoscope
- ☐ Other (Please Specify) _____
- ☐ Retinal Exam (for diabetic screen)
- ☐ Spirometer
- ☐ Stethoscope
- ☐ Tympanometer
- ☐ Vision ScreeningTest
- ☐ Vital Signs Monitoring (BP, PulseOx, Pulse)

Thank You For Your Time

Please Return The Completed Survey
In The Enclosed Postage Paid Envelope To:

Jennifer Carter, MS

Research Coordinator

Center for Human Development

2210 Arca Drive

Anchorage, AK 99508

Toll Free in Alaska 1-800-243-2199 Or In Anchorage:(907) 272-8270

APPENDIX E
Business Personnel Survey

AFHCAN Telemedicine Business Survey

Instructions: Please fill in the circle beside the appropriate answer for each question. If you have completed this survey before, thank you. Your answers will be saved and you don't need to fill out the survey again. After completing the survey, please use the enclosed envelope to mail the survey to the Center for Human Development(CHD), 2210 Arca Dr. Anchorage, AK 99508. Please respond by July 28, 2003.

What is your zip code: _____

1. Please check the type of facility in which you primarily work. (Please check only ONE.)

⓪ Hospital with Physicians
① Health Center with Physicians
② Health Center with Nurse Practitioner's/Physician's Assistants
③ Health Center with Community Health Aides/Practitioner's
④ Health Center with Public Health Nurse
⑤ Administrative Center
⑥ Other (Please Specify)

2. What is your current position within the organization? (Please check only ONE.)

⓪ Chief Executive Officer
① Information Services manager (please specify)
② Program manager (please specify)
③ Financial/Business Officer/Manager
④ Other (please specify)

3. How long have you have been working at this organization?

_____ Years _____ Months

4. Please report your highest degree received and the year you received it.

Degree	Year Received
⓪ High School/GED	
① Community Health Aid Certificate	
② Some college credit	
③ Associate's Degree	
④ Bachelor's Degree	
⑤ Graduate Degree	
⑥ Medical Degree	
⑦ Other (Please specify)	

5. When did your organization receive the AFHCAN equipment and/or the AFHCAN software?

_____ Date Received _____ Don't Know

6. How would you characterize your involvement in the decision to deploy AFHCAN telemedicine in your organization? (Please check only ONE.)

- ☐ I was involved in the decision making process
- ☐ I was consulted in the decision making process
- ☐ I was not involved in the decision making process
- ☐ I was involved only in the financial aspects of the decision making process

7. In your organization, who made the decision to deploy the AFHCAN telemedicine equipment ? (Please check ALL that apply.)

- ☐ Board of Directors
- ☐ CEO
- ☐ CIO
- ☐ CFO
- ☐ Clinicians
- ☐ Telehealth Committee
- ☐ Other _____
- ☐ Don't Know

8. What are your key organizational goals for telehealth applications? Please rank in order of importance to your organization by placing a number beside each application. (1=most important).

- _____ Access to Care
- _____ Patient Satisfaction
- _____ Quality of Care
- _____ Information Transfer
- _____ Costs/Economics
- _____ Continuity of Care
- _____ Other _____

9. What are your major concerns about the sustainability of telehealth?

_____
_____
_____
_____
_____
_____

10. Have staff at your organization ever used AFHCAN telemedicine software on their computers, or used the AFHCAN cart or attachments?

⓪ Staff **have not** used the AFHCAN software or the cart/attachments (otoscope, camera, etc.) to capture a case	**Please answer items #11 – 12 only.**
① Staff **have** used the AFHCAN software but, **not** the cart/attachments (otoscope, camera, etc.) to capture and send a Telemedicine case for review	**Please answer items #13 – 29**
② Staff **have** used the cart/attachments (otoscope, camera, etc.) to capture a case but, **not** to send a case for review	**Please answer items #13 – 29**
③ Staff **have** used **both** the AFHCAN software and cart/attachments (otoscope, camera, etc.) to capture and send a Telemedicine case for review	**Please answer items #13 – 29**

11. If staff at your organization <u>have not</u> used the AFHCAN telemedicine software or the AFHCAN cart/attachments, which of the following statements best describes the reason(s) that they have not used them? (Please check <u>ALL</u> that apply.)

- ☐ The equipment has not been set up
- ☐ The equipment is set up, but our organization is not connected to the network
- ☐ We lost our connection to the network
- ☐ Staff have not been trained on the equipment
- ☐ Supervisor(s) don't encourage staff to use it
- ☐ Our patients do not want us to use it
- ☐ Staff are uncomfortable using it
- ☐ Staff have not had a clinical encounter in which it would be useful
- ☐ Staff couldn't make the equipment work
- ☐ Staff do not like using telemedicine
- ☐ Other barriers (please specify)

12. If staff at your organization <u>are not</u> using the AFHCAN telemedicine software or the AFHCAN cart/attachments because they are not available, would they use them if they were?

- ⓪ Yes
- ① No

If your organization <u>has not</u> used the AFHCAN telemedicine software or the cart, this is the end of the survey.

Please <u>do not</u> complete the following items.

Please return the survey in the enclosed envelope to:

Jennifer Carter

Center for Human Development

2210 Arca Dr.

Anchorage, AK 99508

13. How long has staff at your organization been using the AFHCAN telemedicine software or the AFHCAN cart/attachments as part of their practice?

_____ Years _____ Months

14. When was the last time the AFHCAN telemedicine software or the AFHCAN cart/attachments were used?

⓪ Within the last 30 Days
① Within the last Six Months
② Within the last Year
③ Within the last Two Years
④ Don't Know

15. In which of the following ways has staff used the AFHCAN telemedicine software or the AFHCAN cart/attachments? (Check ALL that apply)

☐ Patient education
☐ Sending an image or data
☐ Documenting a patient encounter
☐ Creating test cases for training
☐ Tele-counseling or Tele-psychiatry
☐ Video-conferencing
☐ Continuing medical education
☐ Looking up medical information
☐ I don't know how the software or cart/attachments are being used

16. How would you characterize your current involvement with AFHCAN telemedicine use within your organization? (Please check only ONE.)

☐ I am involved in day to day decision making
☐ I am involved in occasional policy issues
☐ I am involved in overall policy direction
☐ I am involved in financial decisions/matters only
☐ I am not involved in any telemedicine issues

17. How would you characterize your current attitude toward the use of AFHCAN telemedicine within your organization ? (Please check only ONE.)

☐ I believe it is too early to know how valuable telemedicine will be to our organization.
☐ I believe that telemedicine has no value to our organization
☐ I believe telemedicine has limited value to our organization.
☐ I believe telemedicine is valuable to our organization.
☐ I believe telemedicine is very valuable to our organization
☐ I don't know or am not certain

18. Have you had any technical problems with the AFHCAN telemedicine software or the AFHCAN cart/attachments for which you needed help?

⓪ Yes (Please go to question 19)
① No (Please go to question 22)
② Don't Know (Please go to question 22)

19. Who was contacted for assistance with the AFHCAN software or cart/attachments? (Please check ALL that apply)

- ☐ Someone within our organization
- ☐ AFHCAN
- ☐ ACES (Alaska Clinical Engineering Services)
- ☐ Other (Please Specify) _____
- ☐ Don't Know

20. If your organization contacted AFHCAN for assistance with the AFHCAN software or cart/attachments, how would you rate the support available to you?

Good Adequate Poor

1 2 3 4 5

21. If your organization contacted ACES for assistance with the AFHCAN software or cart/attachments, how would you rate the support available to you?

Good Adequate Poor

1 2 3 4 5

22. How has use of the AFHCAN telemedicine software or the AFHCAN cart/attachments changed the way your organization provides health care? (Please check ALL that apply.)

- ☐ I don't believe that it has changed the way that we provide health care
- ☐ I believe that staff receive more support from others in managing difficult cases
- ☐ I believe that staff learn more from the supervising physician
- ☐ I believe that patients do not have to travel as much for health care
- ☐ I believe that patients receive more attention from other providers or specialists
- ☐ I believe that it allows us to provide higher quality health care
- ☐ Other (Please Specify) _____

23. Is your organization currently evaluating the use of AFHCAN telemedicine ?

- ⓪ Yes (Please go to question 24)
- ① No (Please go to question 25)

24. What aspects of AFHCAN telemedicine are you currently evaluating? (Check ALL that apply)

⓪ AFHCAN cart & peripherals
① AFHCAN software
② Provider clinician satisfaction
③ Referring clinician satisfaction
④ Patient satisfaction
⑤ Cost-benefit analysis
⑥ Patient outcomes
⑦ I don't know
⑧ Other_____

25. If you are not currently evaluating AFHCAN telemedicine, do you plan to do so in the future?

⓪ Yes
① No

26. How will you know if the AFHCAN Telehealth project is successful for you?

_____
_____
_____
_____
_____
_____

27. How would you characterize the costs with regard to AFHCAN telehealth? (Please check only ONE.)

☐ Telemedicine costs have been identified
☐ Some telemedicine costs have been identified
☐ Telemedicine costs have not been identified
☐ I don't know

28. How would you characterize the current budget of your organization with regard to AFHCAN telemedicine? (Please check only ONE.)

☐ All identified telemedicine costs are included in our budget
☐ Some identified telemedicine costs are included in our budget
☐ No telemedicine costs are included in our budget
☐ I don't know

29. If the AFHCAN office were to disappear and no more technical support or training were available for telemedicine, would your organization continue using the AFHCAN telemedicine system? (Please check only ONE.)

- ☐ Yes
- ☐ No
- ☐ I don't know

Thank You For Your Time

Please Return The Completed Survey In The Enclosed Postage Paid Envelope To:

Jennifer Carter, MS

Research Coordinator

Center for Human Development

2210 Arca Drive

Anchorage, AK 99508

Toll Free in Alaska 1-800-243-2199

Or

In Anchorage:(907) 272-8270

APPENDIX F
Technology Personnel Survey

AFHCAN Telemedicine Technical Survey

Instructions: Please fill in the circle or check the box beside the appropriate answer for each question. If you have completed this survey before, thank you. Your answers will be saved and you don't need to fill out the survey again. After completing the survey, please use the enclosed envelope to mail the survey to the Center for Human Development(CHD), 2210 Arca Dr. Anchorage, AK 99508. Please send us your completed survey by August 20, 2003.

What is your organization's zip code: _____

1. Please check the type of facility in which you primarily work. (Please check only ONE.)

⓪ Hospital with Physicians
① Health Center with Physicians
② Health Center with Nurse Practitioners/Physician's Assistants
③ Health Center with Public Health Nurse
④ Health Center with Community Health Aides/Practitioners
⑤ Other (Please Specify)

2. What is your current position within the organization? (Please check only ONE.)

⓪ CIO
① Help desk manager
② Network Administrator
③ IS staff
④ Other (please specify)_____

3. How long have you have been working at this organization?

_____ Years _____ Months

4. Please report your highest degree received and the year you received it.

Degree	Year Received
⓪ High School/GED	
① Community Health Aid Certificate	
② Some college credit	
③ Associate's Degree	
④ Bachelor's Degree	
⑤ Graduate Degree	
⑥ Medical Degree	
⑦ Other (Please specify)	

5. What professional certification(s) do you have? (Please check ALL that apply.)

- ☐ A+
- ☐ N+
- ☐ MCP
- ☐ MCSE
- ☐ MCDBA
- ☐ MCSD
- ☐ CCNA
- ☐ CCNP
- ☐ CCIE
- ☐ CISSP
- ☐ Other (please specify)_____

6. Has your organization received AFHCAN Telehealth equipment or AFHCAN software?

_____ Yes _____ No _____ Don't Know

If your organization has NOT received AFHCAN equipment or software (or you do not know), this is the end of the survey. Please do not complete any more items.

Please return the survey in the enclosed envelope to:

Jennifer Carter

Center for Human Development

2210 Arca Dr.

Anchorage, AK 99508

7. When did your organization receive the AFHCAN equipment or the AFHCAN software?

_____ Date Received _____ Don't Know

8. Has your organization used the AFHCAN telemedicine equipment and/or software?

___ Yes (Please go to question # 10) ___ No (Please go to question # 9) ___ Don't Know (Please go to question # 9)

9. If staff at your organization <u>have not</u> used the AFHCAN telemedicine equipment and software, which of the following statements best describes the reason(s) for not using it? (Please check <u>ALL</u> that apply.)

- ☐ The equipment has not been set up
- ☐ The equipment is set up, but our organization is not connected to the network
- ☐ We lost our connection to the network
- ☐ The cart is not working and I do not know why
- ☐ Staff have not been trained on the equipment
- ☐ Supervisor(s) don't encourage staff to use it
- ☐ Our patients do not want us to use it
- ☐ Staff are uncomfortable using it
- ☐ Staff have not had a clinical encounter in which it would be useful
- ☐ Staff couldn't make the equipment work
- ☐ Staff do not like using telemedicine
- ☐ Other barriers (please specify)_____

If your organization <u>has NOT</u> used the AFHCAN software (or you do not know), this is the end of the survey. Please <u>do not</u> complete any more items.

Please return the survey in the enclosed envelope to:

Jennifer Carter

Center for Human Development

2210 Arca Dr.

Anchorage, AK 99508

10. How long has staff at your organization been using the AFHCAN telemedicine software or the AFHCAN cart as part of their practice?

_____ Years _____ Months

11. Does your organization have videoconferencing equipment?

___ Yes (Please go to question # 12) ___ No (Please go to question # 13) ___ Don't Know (Please go to question # 13)

12. If you have videoconferencing equipment, what is it being used for? (Please check <u>ALL</u> that apply.)

- ☐ Clinical care
- ☐ Administrative functions
- ☐ Education and training
- ☐ It is not being used
- ☐ Other uses (please specify)_____

13. Has any of your technical staff received training on the AFHCAN Software's "Administrative" pages?

_____ Yes _____ No _____ Don't Know

14. Do you believe that telemedicine has value to your organization? (Please check ONLY ONE).

☐ I believe it is too early to know how valuable telemedicine will be to our organization.
☐ I believe that telemedicine has no value to our organization
☐ I believe telemedicine has limited value to our organization.
☐ I believe telemedicine is valuable to our organization.
☐ I believe telemedicine is very valuable to our organization
☐ I don't know or am not certain

15. Is your organization currently evaluating the use of AFHCAN telemedicine cart or software ?

⓪ Yes (Please go to question 16)
① No (Please go to question 17)
② I don't know (Please go to question 18)

16. What aspects of AFHCAN telemedicine are you currently evaluating? (Check ALL that apply)

⓪ AFHCAN cart & peripherals
① AFHCAN software
② Provider clinician satisfaction
③ Referring clinician satisfaction
④ Patient satisfaction
⑤ Cost-benefit analysis
⑥ Patient outcomes
⑦ I don't know
⑧ Other_____

17. If you are not currently evaluating AFHCAN telemedicine, do you plan to do so in the future?

⓪ Yes
① No
③ I don't know

18. How will you know if the AFHCAN Telemedicine project is successful for you?

19. What impact, if any, has the AFHCAN wide area network communications infrastructure had on your relationships with the private sector telecommunications industry (such as AT&T and GCI) in Alaska?

Significant Negative impact — No impact — Significant Positive impact

1 2 3 4 5

20. To what extent has involvement in the AFHCAN Telemedicine program changed your organization's wide area networking infrastructure?

No noticeable change — Some change — Significant change

1 2 3 4 5

21. If there has been noticeable change in your organization's wide area networking infrastructure, please check all changes that apply.

- ☐ Broadened scope of services available across WAN
- ☐ Narrowed scope of services available across WAN
- ☐ Simplified WAN operations and management
- ☐ Made WAN operations and management more complex
- ☐ Introduced voice over IP technology on WAN
- ☐ Introduced H.323 IP video teleconferencing on WAN
- ☐ Introduced store and forward telehealth technology
- ☐ Introduced digital imaging in your org's delivery of care across WAN
- ☐ Altered use of digital imaging in your org's delivery of care across WAN
- ☐ Improved performance of networked systems across WAN
- ☐ Degraded performance of networked systems across WAN
- ☐ Not Applicable

22. Which of the following traffic is traveling over your connection to the AFHCAN network? (Check ALL that apply)

- ☐ Store & Forward Telemedicine
- ☐ Voice over IP (Voice over data toll bypass services)
- ☐ VideoConferencing (H.323 IP video teleconferencing services)
- ☐ Teleradiology
- ☐ Access to other healthcare information systems (e.g., RPMS)
- ☐ Internet
- ☐ Other, please specify_____

23. Does your organization take advantage of the other AFHCAN telehealth network services? (Check ALL that apply)

- ☐ Data network design assistance
- ☐ Voice network design assistance
- ☐ Network security design assistance
- ☐ USF application assistance
- ☐ Resolving network performance issues
- ☐ Other, please specify_____

24. In your opinion which, if any, of the following network traffic/services have saved money for your organization? (Check ALL that apply)

- ☐ None
- ☐ Store & Forward Telemedicine (i.e. travel costs)
- ☐ Voice over IP (i.e. long distance charges)
- ☐ VideoConferencing (i.e travel costs)
- ☐ Teleradiology
- ☐ Access to other healthcare information system
- ☐ Internet
- ☐ Data network design assistance
- ☐ Voice network design assistance
- ☐ Network security design assistance
- ☐ USF application assistance
- ☐ Resolving network performance issues
- ☐ Other, please specify_____

25. How much staff time in FTEs (Full Time Employee) is spent on AFHCAN Telemedicine technology maintenance?

_____FTE

26. How often does your organization contact ACES or AFHCAN for support? (Check only One.)

- ☐ Never
- ☐ Less than once a month
- ☐ Once a month
- ☐ Several times per month
- ☐ Once a week
- ☐ Daily

27. How would you rate the AFHCAN support?

Very helpful — Adequate — Poor

1 2 3 4 5

28. How satisfied are you with mechanisms used to transfer ownership of AFHCAN equipment to your organization?

Very satisfied — Somewhat satisfied — Not satisfied

1 2 3 4 5

☐ I don't know

29. If the AFHCAN store and forward technology deployment has had an impact on the technology management and support resources of your organization, please describe.

_____
_____
_____
_____
_____
_____

30. How confident are you that your organization can sustain AFHCAN telemedicine without the assistance of the AFHCAN office?

Very confident — Somewhat confident — Not at all confident

1 2 3 4 5

31. How well equipped are you to train new staff and orient them to the AFHCAN store and forward Telemedicine system?

Very well equipped — Somewhat equipped — Not equipped

1 2 3 4 5

☐ I don't know

32. Please describe the impact that the disappearance of the AFHCAN Telemedicine program would have on your organization's IS/IT operations and resources?

_____
_____
_____
_____
_____
_____