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## Availability and Deployment of Telemedicine/Telehealth Technologies in Rural Alaska

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### Abstract

Telemedicine technologies are important lifelines for patients in rural areas. This study found 5 different telemedicine technologies used by patients throughout the Anchorage Service Unit and sheds light on the diverse internal and external teams involved in these services.

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Telehealth, the delivery of health-related services and information via telecommunication technologies, has been used since the 1950s to improve health care access and decrease health inequalities in rural populations. Advances in telecommunication have led to the recent expansion of applications to educate, enhance, and expedite health care services to underserved populations in remote regions.<sup>1–6</sup> Telemedicine is the use of electronic information and communication technologies to provide and support health care. It expedites diagnosis, improves referral coordination, minimizes treatment delays, provides increased access and sustainability of services, improves access to specialty medical services, and reduces travel costs to improve patient outcomes.<sup>6–8</sup>

Southcentral Foundation (SCF) in Anchorage, Alaska, is the tribal health care organization that oversees primary care of Alaska Native and American Indian patients in the Anchorage Service Unit, an area that comprises more than 100 communities of which 50 have remote Alaska Native health clinics. As part of the Alaska Native Medical Center (ANMC) in Anchorage, Alaska, SCF serves Anchorage Service Unit clinics up to 1,200 miles from its central clinic. Due to consistent issues with travel to rural communities (eg, geographic location, weather), SCF has invested resources in a variety of telemedicine technologies to provide and improve clinical services to patients throughout the Anchorage Service Unit.

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#### *Author disclosures*

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However, the integration and implementation of SCF telemedicine services have not been evaluated.

The purpose of this organizational assessment was to evaluate telemedicine technologies used to provide primary care services within a health care system that serves Alaska Native people in rural villages and to discuss the potential for telemedicine technology and capacity to improve health care to rural Alaska and other medically underserved areas.

## METHODS

The following sources of information were assessed: informant interviews with 10 key SCF and Alaska Native Tribal Health Consortium telehealth personnel (ie, directors, coordinators, technicians, etc); literature review of published papers; existing organizational program descriptions (ie, brochures, funded grants, websites, etc); and conference presentations covering all forms of telemedicine technology available to provide primary care to the Anchorage Service Unit served by SCF. These sources were gathered over a 3-month period in 2010 for telemedicine material published to date. Permission for all research activities was approved by the Alaska Area Institutional Review Board as well as the tribal boards that oversee the ANMC.

## RESULTS

There were 5 different telemedicine technologies used to provide primary care services to patients throughout the Anchorage Service Unit:

### **Alaska Federal Health Care Access Network (AFHCAN) Telemedicine Cart**

The AFHCAN cart is a mobile telemedicine workstation equipped with a variety of measurement and monitoring devices to collect clinical data for both general and specialty care providers servicing rural health clinics. Each AFHCAN cart is tailored to the health needs and training of the rural clinic site. Thus, AFHCAN carts at different sites have different peripheral devices such as an audiometer, tympanometry, and video otoscope for teletolaryngology services. An assessment found some peripheral devices were being used more often than others. Frequent use of these peripheral devices was related to a number of factors, including availability of the device on the cart, the familiarity of the village health aide with the devices, and the frequency of the case presentations at each village. Satellite connectivity for all AFHCAN carts is provided by the secure Wide Area Network and links to an AFHCAN server at ANMC. Software built for the cart allows users to create a case for a patient, choose which health care provider takes the case, and send the electronically encrypted case to the provider using a store-and-forward method of transmission.

### **Video Teleconferencing (VTC) Cart**

The VTC cart system (Ergotron<sup>®</sup> LX) is a mobile videoconferencing unit. The cart consists of a flat panel liquid crystal display, sound system, and videoconferencing web-cam all mounted on a wheeled cart. Cable connectivity to the videoconferencing partner runs on Internet connections provided by the secured AFHCAN network. Behavioral Health Services uses the VTC cart for 2 types of services: therapy sessions by qualified behavioral

health counselors and medication counseling by psychiatrists and nurse practitioners. Also, the SCF pharmacy can provide medication counseling to rural health clinics via the VTC cart, allowing the pharmacist to be in direct contact with the patient or village health aide.

### Medication Dispensing Unit

The Pharmaceutical Storage and Remote Dispensing System (RDS; Pick-Point™) is an automated medication dispensing machine with similar function to a common vending machine. The contents of the machine are accessible by lock and key or by secure, remote Internet access from the SCF hub pharmacy in Anchorage. The RDS is primarily used to provide telepharmacy services to end users in rural Alaskan communities by incorporating the oversight of a licensed pharmacist into the procedure of medication prescription. If a prescription is ordered for a diagnosis made at a rural clinic, a written copy of the encounter with the medication order is faxed to the Anchorage SCF pharmacy where it is reviewed, amended if necessary, and the medication is authorized for release from the RDS at the clinic. The use of telepharmacy has allowed access to prescription medications to patients in their remote location and provides assurance to providers that patients are able to access their medications in a timely manner.

### Home Health-Monitoring Unit

The Turtle Home Telehealth Monitoring Unit (ViTelCare™) is a vital-sign monitoring device designed for home use. Equipped with a monitor screen, peripheral vital-sign monitoring devices, and keypad for manual data entry from other independent monitoring devices, the Turtle enables patients to measure and monitor their vital signs, while transmitting the information to a designated primary care provider (PCP) via standard telephone lines or Internet connectivity on the AFHCAN network.

When a patient is assigned a Turtle, the overseeing PCP recommends the parameters and frequency for the measurements to be taken. If the patient's measurements fall outside the parameters set by the PCP, a 24-hour call center follows up with the patient on the accuracy of the measurement before contacting the patient's PCP to inform the PCP of the measurement of concern. SCF Home Based Services acts as the next point of contact from the 24-hour call center for Turtle users residing on the road system connected to Anchorage. In 2009, 67 Turtles were deployed for SCF patients in or near Anchorage to patients located on the Western Aleutian Islands of Alaska up to 1,200 miles from Anchorage.

### Teleradiology Image Capturing System

The Alaska Federal Health Care Partnership Teleradiology Program uses a clinic-based imaging system composed of image-capturing technology and a computer to process and transmit images of patients from remote sites to the ANMC campus for professional consultation. Two image-capturing technologies are used in clinics overseen by SCF: computerized radiography to capture x-ray images and ultrasound. The computer digitizes the images into a universal format and transmits the images via the secure AFHCAN network. A weeklong training session is offered for remote site personnel to capture and send images using these technologies. Orders can be automatically or manually added to the work list for the ANMC radiologist in routine or emergent situations. Teleradiology is used

throughout the rural clinics served by SCF PCPs as well as by the clinicians in nearby urban Alaskan communities.

## DISCUSSION

SCF is the primary care branch of the ANMC. In 1999, SCF completed its transition from Indian Health Service ownership to Alaska Native ownership.<sup>9</sup> With the transition, SCF transformed its model of care to a customer-owned and driven health care system, with an emphasis on team-oriented care.<sup>9</sup> Telemedicine technologies allow primary care teams to approach health care at a distance in a similar collaborative fashion. An interdepartmental organizational assessment characterized available technologies, services, and established system capacity for providing distance-based primary health care. It also illuminated the diverse internal and external teams that are involved in providing telemedicine health care in rural Alaska.

This assessment confirmed that SCF has the institutional capacity for providing distance-based services within 1 health care system with remote satellite clinics. Education on telemedicine technologies may serve as a valuable resource for urban-based providers to expand their options of health care for rural patients. Furthermore, VTC carts can be used to connect urban-based providers not only with their patients, but also with the remote clinic providers and personnel as well. In this way the VTC carts can be used to bridge the urban-rural divide by enhancing provider-to-provider communication and reinforce the team-oriented model of health care.

Transfer of relevant technical knowledge and skills using programs, such as the Native Telehealth Outreach and Technical Assistance Program, will enable participants in a telemedicine program to develop institution-wide projects to enhance community-wide dissemination of health care information.<sup>2</sup> The 4 years of experience of the Rural Anchorage Service Unit pharmacy indicates that one of the future challenges will be to integrate telemedicine with the existing infrastructure of rural clinics and urban-based clinics so that telemedicine care can more easily become part of daily clinical practice.<sup>3</sup>

Another consideration when developing a telemedicine program is the coordination among the vested parties in the use of telemedicine technologies. As seen in the organizational assessment, multiple departments or individual PCPs may have different needs for each technology, with some technologies used by more than 1 urban-based user. Coordination can be encouraged with strong buy-in and communication from the PCP receiving medical information from the technology, the rural end user of the technology producing the information, and the technical support for the technology. Through development of a coordinated telemedicine program, cost and support for technologies used by more than 1 department/provider could be shared, reducing the financial and technological hurdles that may deter providers from adopting telemedicine technology into their practice. As was noted with the Turtle's patient-specific parameters ordered by a PCP, customization of services provided through telemedicine technologies may increase buy-in for end users, as well as PCPs. As several technologies, including some of the Turtles, VTCs, and RDSs, were acquired with grant awards, coordination of grant application efforts for telemedicine

technologies that could be shared among PCPs and departments would most likely benefit with establishment of a centralized telemedicine program.

## CONCLUSION

Further efficacy studies of telemedicine in rural areas are necessary to determine whether specific populations may benefit from the use of telemedicine technologies. Results of studies, such as the Informatics for Diabetic Education and Telemedicine Project, provide evidence for the benefit of incorporating telemedicine technologies into clinical practice and generate reason for PCPs to undertake the technological and financial burdens of providing care through telemedicine technology.<sup>10</sup> Pilot studies designed with each rural site fully engaged in the process and with a focus on addressing specific needs would hold promise for telemedicine to fill the gap in health care access and quality in rural communities.

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### *Study Source*

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