Rural Telemedicine and Telehealth: The Alaskan Experience

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Alaska: Context

- Largest state: 1,481,346 sq. km.
- Population: >710,000
- Lowest population density:
  - < .5 persons per sq. km.
- Half population in Anchorage
- Alaska natives: 14.8% of population
- 6 major linguistic/cultural groups, 226 tribes
- 2/3 live in more than 200 villages
- Very limited road system
- Many villages accessible only by boat or bush plane
Alaska Native Claims Settlement Act (ANCSA)

- No treaties or reservations
- ANCSA became law in 1971
- Settled land claims before construction of oil pipeline
- Received 44 million acres and $962.5 million
- 13 Native Corporations
  - Nonprofit affiliates administer health services
- Also more than 200 village corporations
Alaska: Challenges in Rural Education and Health Care Delivery

- Shortage of professionals
  - teachers, physicians
- Distance from specialized expertise
  - medical specialists
  - teachers of specialized and advanced subjects
- Problems exacerbated by poverty and isolation
- Lowest population density in U.S.
  - Only 4 communities over 10,000
  - Isolated villages and small towns
    - More than 200 villages
    - Many villages accessible only by boat or bush plane
    - Most of village population is native American
ALASKA’s PHYSICIANS

- Shortage of physicians

- Distance from specialized expertise
  - medical specialists

- Problems exacerbated by poverty and isolation

- 49% of all physicians in Alaska are primary care physicians
  - U.S. average is 28%

- Alaska is 48th of states in “doctors to residents” ratio
  - 65% are located in Anchorage
  - Shortages in many specialties

- 59% of the state’s residents are in medically underserved areas.

Historically, Alaskan health care has incorporated a public health mission and primary care focus, and is less reliant on specialty acute care than other parts of the country.
Early Telemedicine...

“We went from house to house taking care of the sick... Our tools consisted of a thermometer, a stethoscope, and a blood pressure cuff.... We had no phones... but used the school’s [HF] radio to report [on] our patients. There was no nonsense about confidentiality.”

-- Health aide Paula Ayunerak
Early Experiments: NASA ATS-1 Satellite Single Channel Voice Network

1971-1976: led to satellite communications for all rural clinics and reliable communications for all villages
ALASKA LOCATIONS WITH ATS-1 GROUND STATIONS

PHSU = Public Health Service Unit
## Days of Communication for Village Clinics

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<tr>
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<tbody>
<tr>
<td><strong>Satellite Villages</strong></td>
<td>51.7 (14%)*</td>
<td>270.2 (74%)</td>
<td>310 (85.0%)</td>
</tr>
<tr>
<td><strong>HF Radio Villages</strong></td>
<td>44.0 (12%)</td>
<td>24.3 (7%)</td>
<td>N/A</td>
</tr>
</tbody>
</table>

* Of possible contact days

## Number of Episodes Treated with Doctor’s Advice

<table>
<thead>
<tr>
<th></th>
<th>Before Satellite 1970-71</th>
<th>After Satellite 1971-72</th>
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</thead>
<tbody>
<tr>
<td><strong>Satellite Villages</strong></td>
<td>47.1</td>
<td>184.6</td>
</tr>
<tr>
<td><strong>HF Radio Villages</strong></td>
<td>24.7</td>
<td>15.0</td>
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</tbody>
</table>
From “Bush Telegraph” to Broadband

• Early days: communication by HF radio
• Since 1980s, all permanent communities of at least 25 people have telephone service
• >95% of households have telephones
• Broadband in Anchorage and large towns
• Rural/remote service typically 768 kbps
• Remote service by satellite:
  – Generally reliable, but latency, high cost
Alaska Fiber Optic System

- Prudhoe Bay
- Fairbanks
- Anchorage
- Valdez
- Whittier
- Juneau
Community Access in Rural Alaska:
At the post office, at the store, or under a tree...
Internet Access in Rural Alaska Schools

Village schools must offer K-12 if at least 10 students

Lack of specialized teachers

Use of Internet for homework, course content, online classes

Schools with E-rate as anchor tenants
Telemedicine in Alaska Today: The AFHCAN Network

AFHCAN Telehealth System:
253 sites; 70 member organizations
- Village clinics: Native health aides
- Public Health clinics
- Regional hospitals
- Military installations, Coast Guard, Veterans Administration

Covers more than 212,000 beneficiaries
- About 40% of Alaska population
- Majority are in Alaska native villages
- Supported by USF Rural Health Care Program

Alaska receives the largest amount of any State: $29m in 2009

See www.afhcan.org
Design Evolution

• Base Cart include:
  – Metal Frame
  – Isolated Power System
  – CPU and LCD Touchscreen
  – Expansion Ports for USB, RS232, Video In/Out, External Display

• Currently Supported Peripherals include:
  – Video Otoscope
  – Digital Camera
  – Scanner
  – Video Conferencing
  – ECG
  – Spirometer
  – Tympanometer
  – Audiometer
  – Dental Camera
  – Vital Signs Monitor
  – Stethoscope
THE ALASKA NATIVE HEALTH CARE SYSTEM

Typical Referral Patterns

REFERRALS FROM:
- HOSPITALS
- MD HEALTH CENTERS
- PAINP HEALTH CENTERS
- CHA CLINICS
Point Hope to Kotzebue $280
Savoonga to Nome $304
Chevak to Bethel $250
Nuiqsut to Barrow $390
Old Harbor to Kodiak $156
Kotzebue, Alaska: Inupiat community on the Bering Sea...

• Has regional hospital
• Serves Inupiat villages in NW Alaska
Telemedicine facilities for consultation between Alaskan regional hospital in Kotzebue and village clinics...
Telehealth: Emergency Delivery

- A woman in Alaska's Northwest Arctic Borough goes into labor, hundreds of miles away from the nearest doctor.
- Doctors 200 miles away, in the town of Kotzebue, guided the village's health practitioner through the delivery using live, two-way video and voice technologies.
- Now more than half of doctors’ contact with patients is through telemedicine and thousands of "tele-consultations" occur in the region each year.
Case originated...

Case received...Alaska Native Medical Center, Anchorage
Telemedicine in Wales:
Inupiat Village on the Bering Sea

• Closest mainland settlement to Siberia
• Part of Norton Sound Health District (Bering Straits Native Corporation)
• Regional Hospital in Nome
Wales: Clinic and Telemedicine Facilities
Village Health Aides using Telemedicine Facilities
What are your key organizational goals for telehealth applications?

**GOALS FOR TELEMEDICINE**

- **Quality of Care**: Higher Priority
- **Access to Care**: Higher Priority
- **Patient Satisfaction**: Average Priority
- **Continuity of Care**: Average Priority
- **Information Transfer**: Lesser Priority
- **Cost of Care/Saving**: Lesser Priority

*Lesser Priority, Average Priority, Higher Priority*
Store & Forward vs Real-Time Telehealth

**Store & Forward**
- Asynchronous Interaction
- Documents & Images
- Electronic Medical Records
- Patient Education

**Real-Time**
- Face-to-Face Interaction
- Immediate Feedback

**Remote consultation**

Clinical specialties for telemedicine
- Radiology
- Dermatology
- Pathology
- Oncology
- Ophthalmology
- Dental

- Cardiology
- ENT
- GI
- Pulmonary
- Rheumatology

- Psychology/ Psychiatry
- Neurology
- Speech therapy
- Physical therapy
AFHCAN Telehealth

• 10 year Operational History
  – 22,000 cases in 2010

• Whole Telehealth Solution
  – Design → Manufacturing → Deployment →
    Installation → Training → Support →
    Marketing

Data from AFHCAN,
Director Stewart Ferguson, Ph.D.
About 72% of the patients seen needed something done (meds, surgery, ongoing monitoring) and 26% needed to be screened out.
Annual Travel Savings (by Case Role)

- **Primary Care**
- **Specialty Care**

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<tr>
<th>Year</th>
<th>Primary Care</th>
<th>Specialty Care</th>
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<tbody>
<tr>
<td>2001</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>2002</td>
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<td>$1,000,000</td>
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<tr>
<td>2003</td>
<td>$1,000,000</td>
<td>$1,500,000</td>
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<tr>
<td>2004</td>
<td>$1,000,000</td>
<td>$2,000,000</td>
</tr>
<tr>
<td>2005</td>
<td>$1,500,000</td>
<td>$2,500,000</td>
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<td>2006</td>
<td>$2,000,000</td>
<td>$3,000,000</td>
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<tr>
<td>2007</td>
<td>$2,500,000</td>
<td>$3,500,000</td>
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<tr>
<td>2008</td>
<td>$3,000,000</td>
<td>$3,500,000</td>
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<tr>
<td>2009</td>
<td>$3,000,000</td>
<td>$3,500,000</td>
</tr>
<tr>
<td>2010</td>
<td>$3,000,000</td>
<td>$3,500,000</td>
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## Medicaid Study: 2003-2009

*Decreased Travel = Cost Savings*

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<thead>
<tr>
<th></th>
<th>Quantity</th>
<th>Cost</th>
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<tbody>
<tr>
<td>Claims Paid by Medicaid</td>
<td>4,482</td>
<td>($269,894)</td>
</tr>
<tr>
<td>Telemedicine Prevented Travel</td>
<td>3,662</td>
<td>$3,116,034</td>
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</tbody>
</table>

**Notes:**
- Travel is saved for 75% of all patients.
- Assume all patients under 18 need an escort.
- Travel costs based on 1 week advance fares.

**Net Savings Realized by Medicaid**

$2,846,140

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*Note: For every $1 spent by Medicaid on reimbursement, $10.54 is saved on travel costs.*
Telehealth Impact on Extended Waiting Times (> 4 months)

Percent Appointment Availability With 5 Month or Longer Wait Time

- Pre-Telemed 1991-2001 (n=1216)
- With Telemed 2002-2004 (n=276)
- With Telemed 2005-2007 (n=210)

Data courtesy of Phil Hofstetter
20% of all specialty consultations are turned around in 60 minutes.

50%-60% are turned around in the same day.

70%-80% are turned around within 24 hours.
Since 2003, telehealth prevented an estimated 4,777 lost days at work, and a total of 1,444 lost days at school for the patients in this study.
Diabetic Retinopathy

- Diabetic Retinopathy is the leading cause of new blindness among adults
- Blindness due to diabetes can be eliminated by timely diagnosis and treatment
- ~4% of AI/AN’s with DM need laser treatment to prevent vision loss
Joslin Vision Network (JVN) Portable JVN Pilot

Deployment of the IHS-JVN in Alaska using a portable platform reversed a seven year decline in exam rates
Cochlear Implants...

• Now implants can be done in Alaska with follow-up speech therapy using telehealth facilities in communities

• Previously, patient and family had to relocate to Seattle for a year for child to get necessary speech therapy
Lessons from AFHCAN

Design for Success:

• KNOW THE NEEDS of your users (those who will use the system) and customers (those who will pay for the system).

• Plan for turnover → “Keep it Simple”

• Expect dynamic requirements → “Make it Scalable”

-- Stewart Ferguson, Director, AFHCAN
Lessons from Alaska Telemedicine

• Reliable communication between health aides and physicians can improve timeliness and accuracy of patient diagnosis and treatment
• Telemedicine consults can reduce the need for transferring patients from their communities, although some serious conditions that might have been overlooked may require patient transfer
• Patients may be able to return to their communities sooner if they can be monitored by a health aide with consultation when required
• Telemedicine must address priority health problems to be cost/effective
• Communication with patients in hospital is important for family members in villages
• Administrative communication is also valuable for rural health care delivery
Lessons Learned...

• Conference circuit (shared audio channel) is valuable for continuing education
• Structured continuing medical education and patient education require commitment of time, plus resources for organization and content
• Computerized patient records can improve efficiency and accuracy of patient-tracking, especially where patients appear at multiple locations
• Operational system planning needs to reflect user needs (e.g. on-demand access, shared audio channel, high reliability)
• Planning for sustainability post experimental phase is critical
• Health care system can be “anchor tenant” for village communications
• Creative approaches to network design, operations, and maintenance can significantly reduce costs of rural communications for telemedicine and other services
THANK YOU
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