



# **Alaska ATS-6 Telemedicine Early Innovation Future Promise**

Charles D. Brady

## Obstacles to Health Care in Alaska

- **The geographic setting and climate of Alaska are significant barriers to health care.**
- **To diminish the effects, delivery systems involving outreach personnel (Community Health Aides, Physician's Assistants, and nurses) have been developed.**
- **The systems have had substantial impact, but their functioning has been hampered by communication and transportation problems.**



## Telemedicine in Alaska

- Probably first done when someone received medical assistance via HF radio.
  - Ionospheric disturbances frequently disrupt radio communications.
- In 1971 Lister Hill and the Alaska Area Native Health selected communities to use NASA's Application Technology Satellite 1 (ATS-1) for audio communications. The "Doctor Call" program was instituted via satellite.

### Broadband Communications

- On May 30, 1974 the NASA ATS-6 deployed its 30 foot dish.
  - This afforded the Indian Health Service the opportunity to test the feasibility of applying advanced communication technology to the complex problems of health care delivery in the Alaska environment.

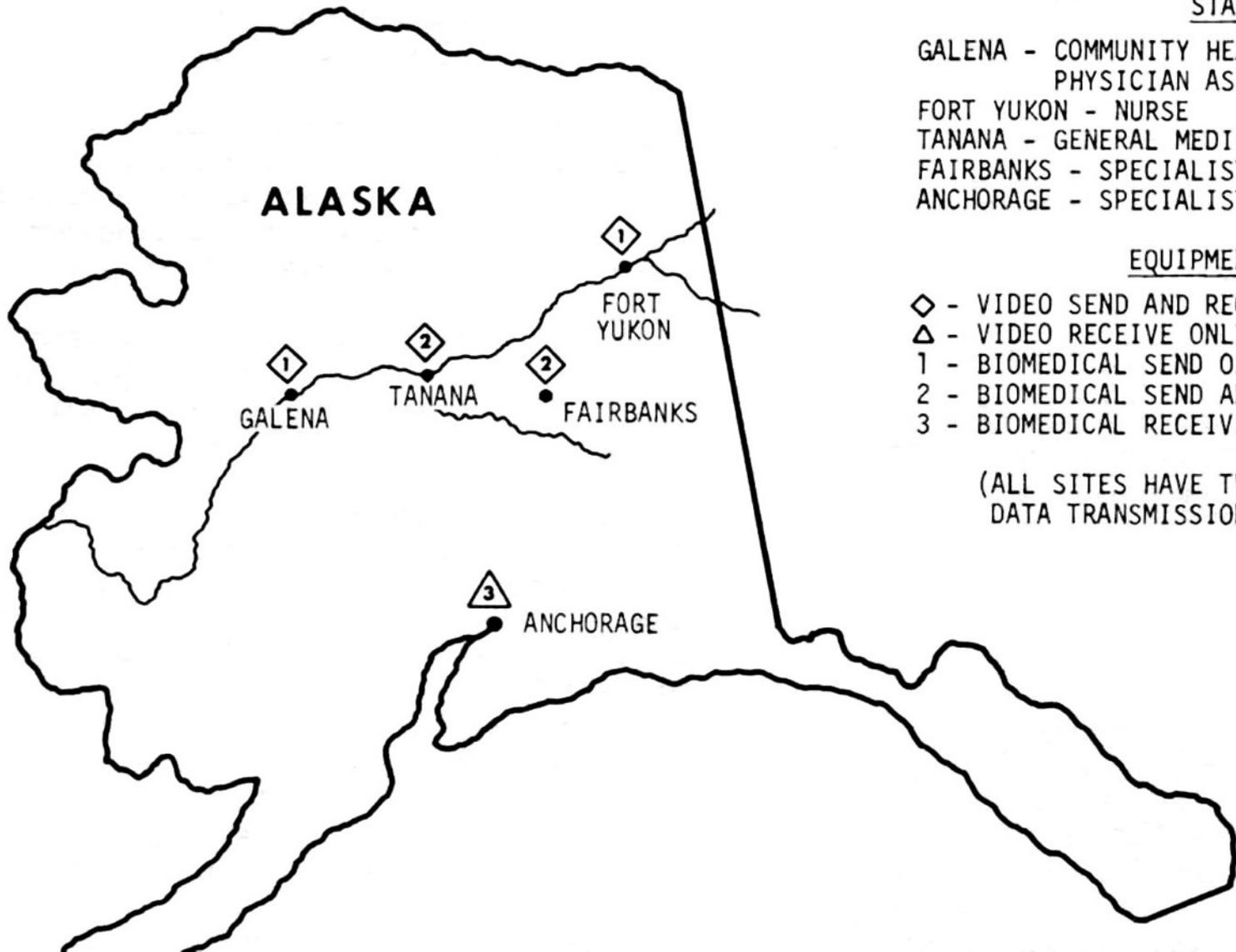
# THE ALASKA ATS-6 TELEMEDICINE EXPERIMENT

## OBJECTIVES

*The ATS-6 experiment was planned to be smoothly integrated with the existing health care system and was designed in accordance with the following primary objectives:*

- **To test and assess in the Alaska environment the effectiveness of the various capabilities provided by video in assisting physicians to provide diagnostic support for primary care providers (Community Health Aides, Physicians' Assistants, and nurses) in a truly isolated and inaccessible environment.**
- **To test and demonstrate the ability of indigenous community health aides to effectively use broadband communications as a possible prelude to future studies of the trade-offs between technological capability and level of training.**
- **To evaluate the use of interactive video for continuing education of Service Unit hospital personnel and remote village practitioners.**

# ALASKA ATS-6 TELEMEDICINE EXPERIMENT SITES



## STAFF

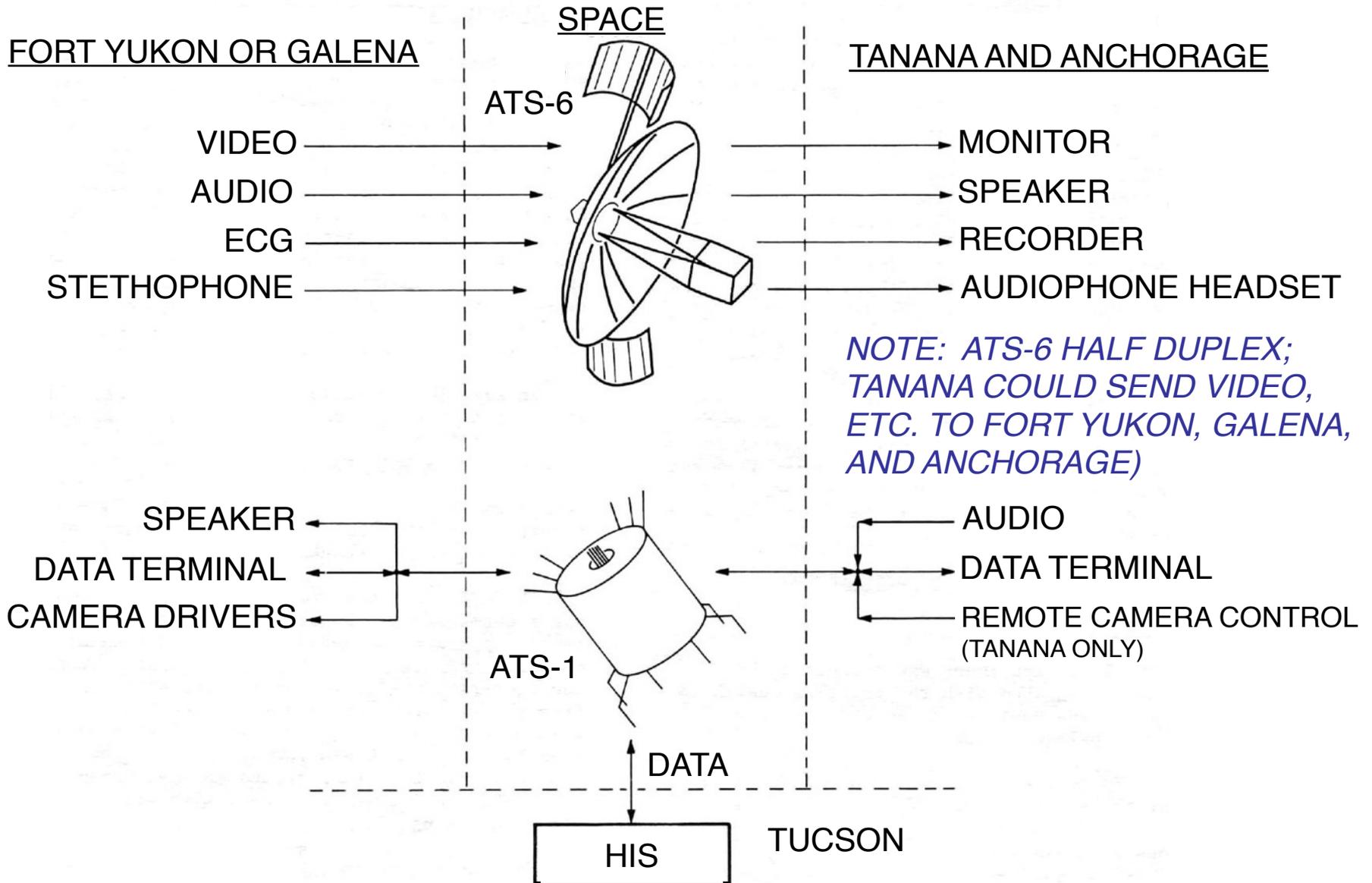
GALENA - COMMUNITY HEALTH AIDE AND  
PHYSICIAN ASSISTANT  
FORT YUKON - NURSE  
TANANA - GENERAL MEDICAL OFFICERS (GMO)  
FAIRBANKS - SPECIALISTS AND GMO'S  
ANCHORAGE - SPECIALISTS

## EQUIPMENT KEY

- ◇ - VIDEO SEND AND RECEIVE
- △ - VIDEO RECEIVE ONLY
- 1 - BIOMEDICAL SEND ONLY
- 2 - BIOMEDICAL SEND AND RECEIVE
- 3 - BIOMEDICAL RECEIVE ONLY

(ALL SITES HAVE TWO-WAY VOICE AND  
DATA TRANSMISSION)

# ALASKA ATS-6 TELEMEDICINE EXPERIMENT SPACE SEGMENT



# **ALASKA ATS-6 TELEMEDICINE EXPERIMENT EQUIPMENT**

- **MONOCHROME VIDEO CAMERA**
- **REMOTE CAMERA CONTROL**
- **VIDEO TAPE RECORDERS**
- **VIDEO AND AUDIO SCRAMBLERS**
- **ECG**
- **STETHOPHONE**
- **SIMPLIFIED CONTROL PANELS**
- **HUMAN INTERFACE DEVICES:**
  - **MICROPHONES, LAVALIER MIKES**
  - **HIGH RESOLUTION MONOCHROME MONITORS**
  - **COLOR MONITORS FOR CONSUMER AND CONTINUING EDUCATION.**



**ALASKA NATIVE HOSPITAL, TANANA**  
**3 GENERAL MEDICAL OFFICERS (GMOS)**



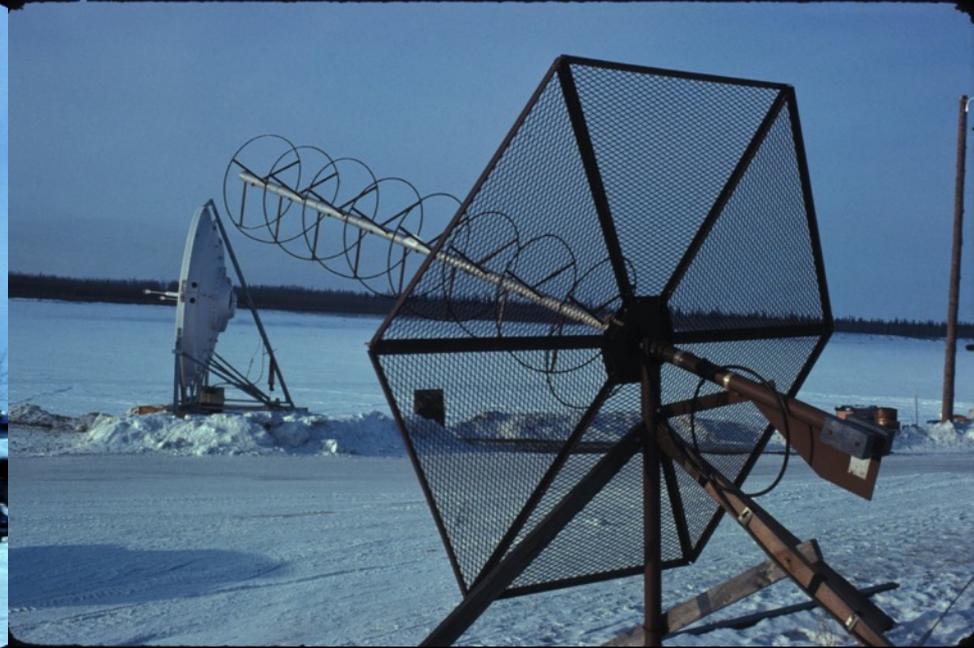
GMOs consulted with villages and presented to Anchorage. (GMOs preferred presenting from radio room rather than examining room when examining table not needed.)



ALASKA NATIVE HEALTH CLINIC,  
FORT YUKON

**NURSE**





**ALASKA NATIVE HEALTH CLINIC,**  
**GALENA**

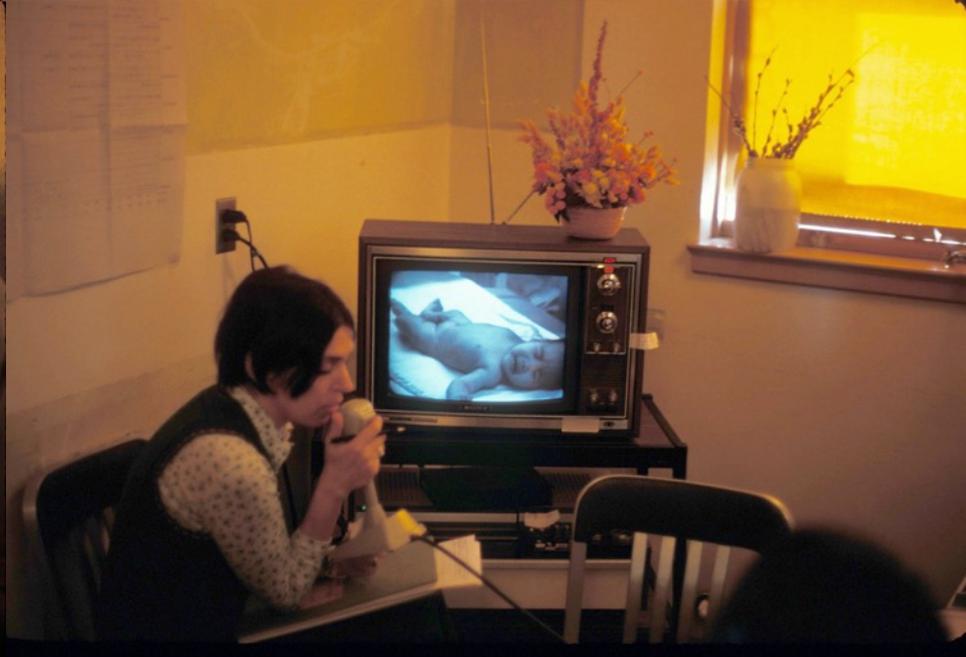
**COMMUNITY HEALTH AIDE**  
**PHYSICIAN ASSISTANT**





**ALASKA NATIVE  
MEDICAL CENTER,  
ANCHORAGE**

**SPECIALISTS AND  
DR. MARTHA WILSON,  
PROJECT DIRECTOR**



# **ALASKA ATS-6 TELEMEDICINE EXPERIMENT OPERATIONS**

- **The ATS-6 was available to the Alaska Health Care Experiment for one hour each Monday, Wednesday, and Friday.**
- **The Health Information System (HIS) was used to identify some of the patients to be seen.**
- **The Tanana physician normally controlled the network and the consultations.**
- **The HIS health summaries were available for supporting consultations.**
- **In some cases lectures video tapes and interactive discussions constituted program.**
- **There were 325 video consultations during 104 scheduled transmission days. The satellite was moved to a position over India after approximately 9 months of availability.**

# **ALASKA ATS-6 TELEMEDICINE EXPERIMENT**

## **RESULTS**

- **From the time the satellite and earth station equipment were made available the schedule of medical transactions was met without fail.**
- **A wide spectrum of medical problems were seen and evaluated.**
- **All ages and both sexes were represented.**
- **Specialists consulted included those in pediatrics, internal medicine, surgery, orthopedics, ophthalmology, gynecology, dentistry, otology, radiology, nutrition, and physical therapy.**
- **While some conditions (e. g., orthopedic problems, acute trauma, and cardiac conditions) lend themselves particularly well to telemedicine management, it became clear that many other kinds of problems could also be managed well in this way.**
- **Surprisingly much of the time was taken in management of urgent problems.**

# **ALASKA ATS-6 TELEMEDICINE EXPERIMENT**

## **PERCEIVED BENEFITS OF VIDEO**

- **Clues to . . .“ how sick the patient is.”**
- **Full motion video clues noted were eye movement, gait abnormalities, patient response to palpation, and visual evidence of patient distress, lethargy, etc.**
- **The ability for the nurse, CMO, and specialist to concurrently view and discuss an X-ray of sufficient quality to enable expedited definitive care.**
- **Increased sense of security both for the patients and for the remote practitioners.**

## **ALASKA ATS-6 TELEMEDICINE EXPERIMENT BENEFITS OF THE HEALTH INFORMATION SYSTEM**

- **All providers agreed that the HIS ability to provide an updated, problem oriented medical summary for each patient at the time of encounter is a substantial advantage in supporting and updating health care.**
- **The HIS was developed on the Papago reservation in Arizona and was implemented in the Tanana Service Unit to support this project.**

# **ALASKA ATS-6 TELEMEDICINE EXPERIMENT CONCLUSIONS**

**(AS SUMMARIZED BY DR. MARTHA WILSON)**

- **The capabilities provided by broadband satellite communications can be effectively used in treatment and care of medical patients in remote and isolated regions such as Alaska.**
- **Paraprofessional personnel such as Community Health Aides, having limited medical and technical training, are capable of successfully presenting patients for medical consultation.**
- **The experiment indicated that the use of the video for continuing education should result in a manifold increase in the effectiveness of the Community Health Aides.**
- **This telecommunications capability contributed to the tying together of the far-flung health team into a cohesive, effective, and the efficient unit.**

# **ALASKA ATS-6 TELEMEDICINE EXPERIMENT STANFORD UNIVERSITY EVALUATION**

*The Institute for Communications Research at Stanford University, under contract to the list Hill National Center for biomedical Communications, the value weighted the project and submitted an extensive final report.*

**The study concluded (see Executive Summary):**

- **Satellite communication can reliably provide audio and black and white television signals of sufficient quality to be useful in health care delivery in rural Alaska.**
- **Useful consultations for practically any medical problem can be conducted using satellite video channels.**
- **Satellite video consultation can be successfully carried out by health care providers at all levels of training.**
- **The unique capabilities of the video transmission may play a critical role in five to ten per cent of the case is selected for the video presentation. Otherwise, there was little measurable difference between the effect of the video and audio consultation.**
- **Health care providers were more concerned that reliable audio channels be acquired and retained. They were less concerned about having video because of cost.**
- **The H I S was considered to be a valuable addition and recommended it be extended to the rest of Alaska.**

# **ALASKA ATS-6 TELEMEDICINE EXPERIMENT**

## **STANFORD UNIVERSITY EVALUATION**

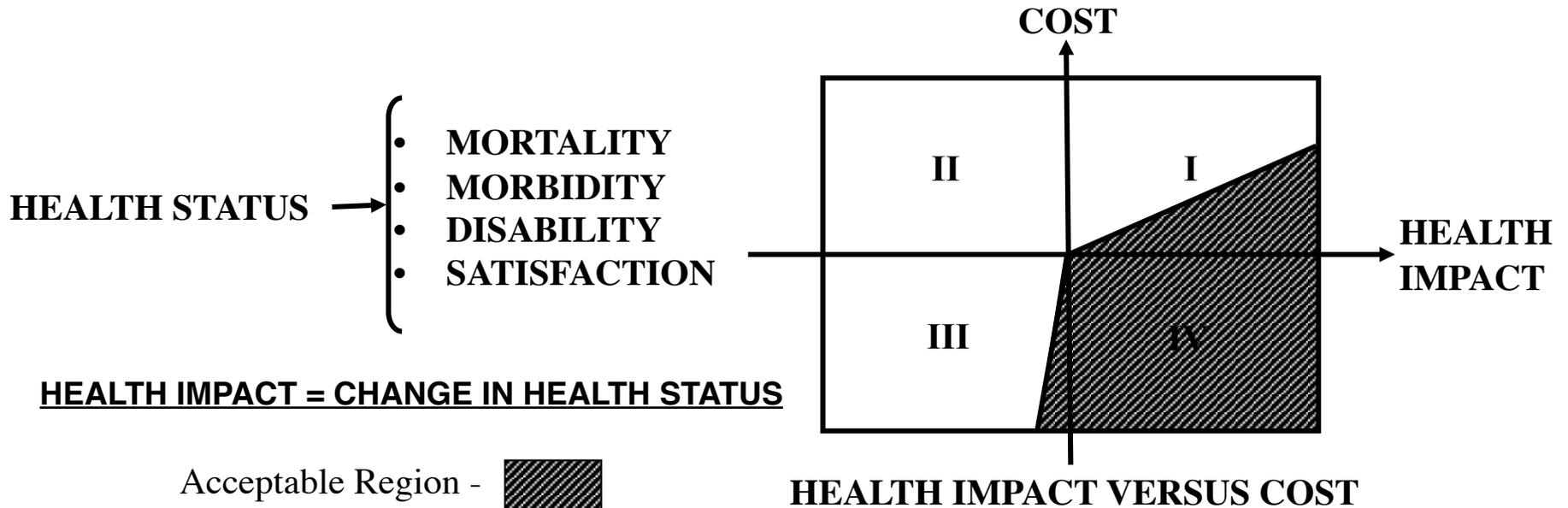
### **Comments**

- **The Stanford effort was exhaustive. The report included an historical chapter to give context and a final chapter on the implications for an operational service and future research. An effort was made to quantitatively evaluate the effectiveness of the project.**
- **In the final analysis, the quantitative values (e. g. , the five to ten per cent critical role value given above) relied on subjective data.**
- **The participating physicians and observers were requested to estimate the effects of consultation on the long term outcome for each encounter. (1, critical; 2, much better than audio; 3, slightly better; 4, no different than audio only; 5, worse than audio only).**
- **This presenter noticed a reluctance on the part of the General Medical Officers to admit that video made a significant difference in some cases in which it seemed obvious. This was supported in the Stanford report where it is noted that observers in Anchorage judged the video to be critical or much better than audio twice as often. (Of course they may have had their own biases.)**
- **This could have been because of the great concern to always have good audio which was not at that time a certainty in Alaska. Perhaps they felt that saying video was critical would be tantamount to saying that they would have been doing less than the best for the patient if the video were not available.**

# **ALASKA ATS-6 TELEMEDICINE EXPERIMENT EVALUATION**

- **Ideally, telemedicine would decrease cost and improve health impact.**
- **Realistically, telemedicine increases cost and, if done well, improves health impact.**
- **Therefore, evaluation becomes the problem of weighing cost (measurable, computable) against improvement in health impact (not easily quantifiable).**
- **Health impact can be measured in terms of morbidity, mortality, disability, and satisfaction.**
- **The difficulty of quantifying morbidity, mortality, disability, and especially satisfaction remains an obstacle.**
- **For discussion purposes this concept can be depicted in a diagram.**

# TELEMEDICINE ECONOMICS



- The big question is, “Who pays for the increase?” However, assuming there is money available, there are other questions.
- How does one quantify health impact?
- What is it the maximum slope that can be accepted in Quadrant I?
- What is it the minimum slope that can be accepted in Quadrant III?
- Is any move into Quadrant III acceptable? (A question for HMOs?)
- If one could quantify health impact, what dollar value could be assigned to a unit of health impact?
- In what areas of health care is the slope in Quadrant I the lowest?
- Are there guidelines or heuristics for answering these questions?

Charles D. Brady

# **ALASKA ATS-6 TELEMEDICINE EXPERIMENT**

## **FUTURE PROMISE**

### **Rural Health**

- **There is now considerable interest in applying telemedicine rural regions.**
- **The Indian Health Service/Alaska Area Native Health Service model of using indigenous people as primary care providers (i.e., Community Health Aides) as well as other health team members would have direct applicability in many areas, especially in the Third World.**
- **Enhanced communication technology can today enable any care provider to be linked to the any necessary specialist or knowledge source.**
- **The Alaska satellite telemedicine projects have demonstrated that the inclusion of a Health Information System in a comprehensive health care delivery system can significantly improve health status of a community.**
- **An alternative definition of telemedicine could be helpful in understanding how care providers at various education levels in widespread, even isolated, locations can be tied together in a more comprehensive and effective health care delivery system.**
- **The following, final slide is an alternative definition submitted for discussion.**

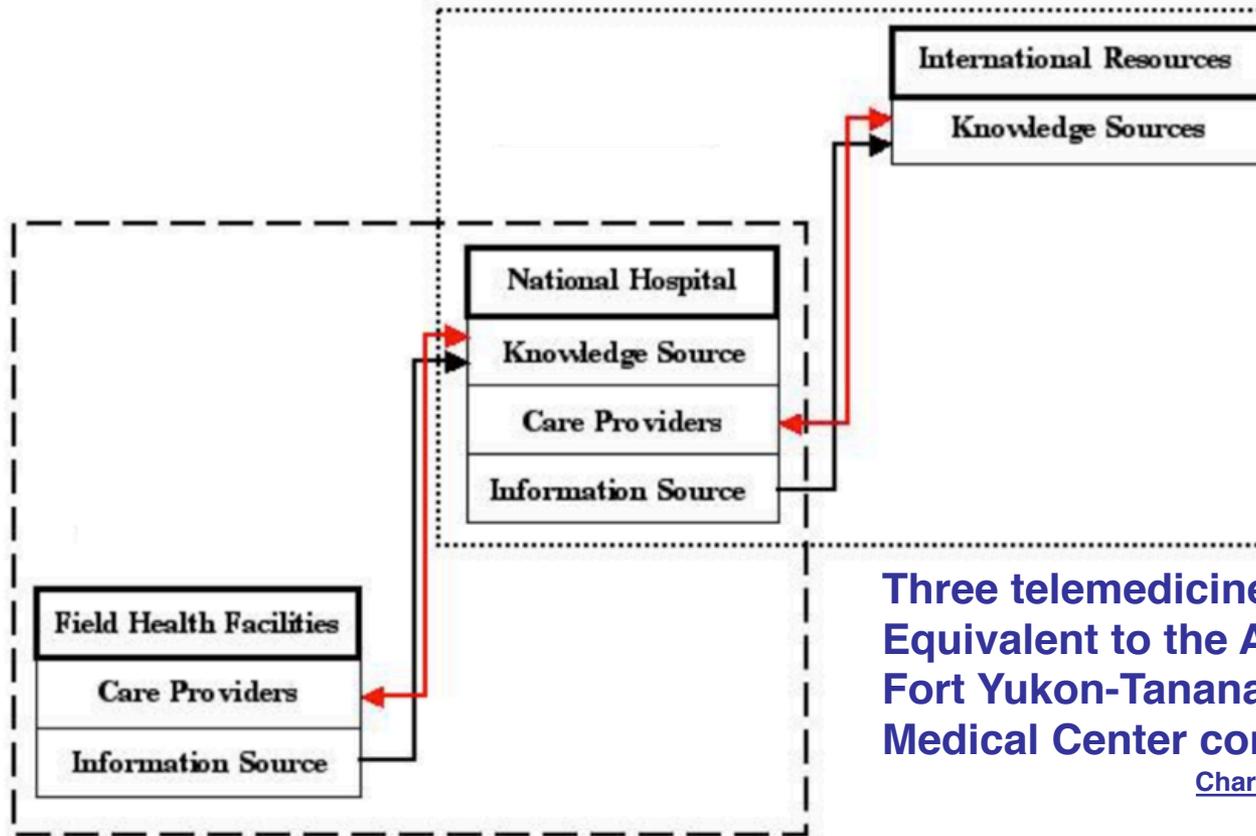
**Charles D. Brady**

# ALASKA ATS-6 TELEMEDICINE EXPERIMENT

## FUTURE PROMISE

### Alternative Definition

Telemedicine - The practice of medicine through the use of telecommunications to enable the transfer of health care information from the information source (usually the patient's location) to a knowledge resource for evaluation. The telecommunication capability enables the knowledge resource and care providers at the information source to interact and effect a remedial course of action.



Three telemedicine consultation levels.  
Equivalent to the AANHS model (e. g.,  
Fort Yukon-Tanana-Anchorage Native  
Medical Center consultation linkage).

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