REPORT OF THE
VIRGINIA DEPARTMENT OF HEALTH

TELEMEDICINE STUDY

TO THE GOVERNOR AND
THE GENERAL ASSEMBLY OF VIRGINIA

SENATE DOCUMENT NO. 18

COMMONWEALTH OF VIRGINIA
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COMMONWEALTH of VIRGINIA

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STATE HEALTH COMMISSIONER

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December 14, 1999

TO: The Honorable James S. Gilmore, III

and

The General Assembly of Virginia

The report contained herein is pursuant to Senate Bill 1214 and Item 333 #6c of the 1999 Appropriations Act, agreed to by the 1999 General Assembly.

This report constitutes the response of the Virginia Department of Health (VDH) to study telemedicine initiatives of agencies of the Commonwealth.

The cost to VDH to complete this phase of the study was $2,665. The study required 80 hours of staff time.

Respectfully Submitted,

E. Anne Peterson, M.D., M.P.H.
State Health Commissioner

Virginia Department of Health

Telemedicine Study
Pursuant to
Senate Bill 1214 (1999) and Budget Item (333 #6c)

Introduction.

Telemedicine has been defined as "...the use of medical information exchanged from one site to another via electronic communications for the health and education of the patient or healthcare provider and for the purpose of improving patient care" (American Telemedicine Association). This is purposely an open-ended definition because telemedicine is such a rapidly expanding and changing field that to define it by the technology (e.g. full-motion-video) or by what is transmitted (e.g., x-rays) or by who is going to use the information (e.g., physicians, lab technicians, pharmacists) would blind us to substantive changes in the rapidly changing communications system which is transforming healthcare. With current developments in bio-sensing devices and in wireless transmission systems, a patient can be networked to a computer system that will provide a new level of access to health care and a personal "early warning system." This alone could transform what is meant by home health care. Is this telemedicine? To exclude it would be to impoverish our understanding of where the healthcare system is headed and distort our understanding of healthcare in the present information age.

The Virginia Department of Health, as both a provider of health care services and as a regulatory agency for health facilities is deeply involved in this telecommunications revolution. We are reviewing our responsibilities and expanding our horizons through our three "hands-on" telemedicine sites described in this document. We have learned much but continue to explore what this revolution will mean to the Commonwealth's public health sector. We do already know, however, that it is Virginia's isolated rural areas where the public health's telemedicine role will be the greatest and our technical investments will be concentrated. Telemedicine holds the promise of providing a more equitable distribution of health care expertise throughout the Commonwealth's rural medically underserved areas.

The Department is confident that, although in its infancy, the present state of telemedicine in the Commonwealth is basically sound. The three medical schools should be commended for their coordinated efforts. The Joint Commission on Health Care has, in addition, provided the appropriate analytical framework for telemedicine in the Commonwealth through its HJR 455 (1995) and HJR 210 (1998) reports. The Department takes this opportunity, in response to Senate Bill 1214 (1999) and Item 333 #6c of the Budget, to further these earlier groundbreaking medical school efforts and Joint Commission studies.

Two approaches to the research need to be stressed. The VDH study will be a prospective study, in that the Department will be initiating a broad implementation of evaluative criteria that will be needed to adequately evaluate telemedicine in the future. Many of the data elements that will be required are not presently collected. It is very difficult, for instance to determine the cost-effectiveness and medical efficacy of health services provided through

telemedicine, if detailed encounter and outcome data are not collected. The intent is to introduce a common set of evaluative measures that will facilitate annual reporting on the status of telemedicine initiatives and their efficacy and cost-effectiveness. Comparison of outcomes based on like criteria will be important in developing policy for this technology.

It is worth noting that VDH took this particular approach to the study by combining the language and the intentions of both Senate Bill 1214 and Item 333 #6c of the 1999 Budget. SB 1214 requires a study very broad in scope in a very short time frame and encompassing all agencies of the Commonwealth that are using telemedicine. The budget language requires a study of just the VDH telemedicine sites in Lancaster and Lee counties and the City of Danville, with a final report due in October of 2001. As these sites are not yet operational, the decision was made to study these sites as well as all other sites operated by Virginia agencies in a prospective study that is expected to continue for at least two years. This approach will allow VDH to apply the same study design to all the telemedicine sites and will permit uniform data collection on all the sites. VDH staff met with staff of the Joint Commission on Health Care and the Senate Finance Committee to enlist their approval of the proposed study design in advance of beginning the study.

The mission of the Virginia Department of Health is to "...achieve and maintain the optimum personal and community health..." within the Commonwealth. Telemedicine is shaping, defining and renewing our commitment to ensuring access to quality health care for all Virginians so that our mission can be fulfilled.

Background.

Telemedicine, in the broadest sense, refers to the application of any telecommunications technology to the provision of healthcare services.[1] However, for this discussion telemedicine refers to communication for clinical consultation or education between "host" and "remote" sites using technologies other than telephone or fax. These technologies frequently require sophisticated computer technology and a high-bandwidth communication infrastructure, but are also implemented more modestly.

Investment in "high-tech" telemedicine applications can be substantial, and an increasing literature defines mechanisms for appropriate evaluation of cost-effectiveness, although valuation of health and social outcomes is difficult.[2-3] Telemedicine can potentially serve to decentralize scarce resources and provide access to care or education across barriers of time or distance. Thus, evaluation of both cost-effectiveness and clinical efficacy of telemedicine initiatives relates to the capacity of telemedicine to increase access and distribute clinical, educational, and administrative resources by removing or reducing barriers imposed by time, distance, or geography in the provision of quality care.

The Commonwealth of Virginia has been progressive in developing a communications infrastructure as well as in the deployment of telemedicine technologies for delivery of healthcare services and for distance learning. "NET.WORK.VIRGINIA," an advanced, broadband network delivering ATM (asynchronous transfer mode) service throughout Virginia is the result of collaboration between Virginia Tech in association with Old Dominion University and the Virginia Community College System. Active telemedicine initiatives are especially associated with each of the medical schools, but also involve other institutes of higher education and agencies of the Commonwealth.

The use of telemedicine continues to expand in the number of sites involved, in the areas of medical education that can be addressed, and in the clinical situations for which consultation is appropriate. Although the Commonwealth's more established initiatives have reported their success in the literature, no methodologically-standardized, comprehensive evaluation of telemedicine programs in Virginia exists.[4-7]

Telemedicine Initiatives in Virginia.

Major telemedicine initiatives of Commonwealth agencies include:

The Commonwealth of Virginia Telemedicine Network based at the University of Virginia serves as a home for the "Southwest Virginia Alliance for Telemedicine" involving the Thompson Family Health Center in Vansant; the Lee County Community Hospital in Pennington Gap; the Stone Mountain Health Clinic in Castlewood; and Norton Community Hospital. In addition the University of Virginia provides telemedicine services to Salem Veterans administration Hospital, Middlebrook Family Practice, Augusta Medical Center, and Rockingham Memorial Hospital. A third initiative, the Appal-link telepsychiatry program, links with 9 mental health care centers including New River Valley Community Services Board at Radford, Mt. Rogers Community Services Board at Wytheville,

Highlands Community Services Board at Abingdon, Planning District One Community Services Board at Big Stone Gap, Southwestern Virginia Mental Health Institute at Marion, Dickenson County Community Services Board at Clintwood, Cumberland Mountain Community Services Board at Cedar Bluff, Blue Ridge Community Services Board in Roanoke, The Laurels, and the Clearview Center. The University of Virginia also hosts the "Telehealth Program" providing consultation to the Department of Corrections.

The Eastern Virginia Telemedicine Network (EVTN) is a health professions' distance learning, teleconsultation, and clinical telemedicine network established by the Eastern Virginia Medical School (EVMS) and the Eastern Shore Rural Health System, Inc. The system links to hospitals, health departments, community health centers, community colleges, and multi-physician private practice groups in eastern Virginia.

Virginia Commonwealth University's Telemedicine Program provides support to rural practitioners including the Family Practice at Blackstone, VA. Additional projects include neonatal cardiac support to Mary Washington Hospital in Fredericksburg, and support for HIV-infected inmates at the Department of Correction's Powhatan facility. In addition, a distance learning initiative for allied health professions education of Western AHEC residents has recently been instituted.

The Virginia Department of Health (VDH) has initiated the development of telemedicine sites in the city of Danville, Lancaster county and Scott county.

Methods.

The Virginia Commonwealth University Team will design the methodology for collection and analysis of data for evaluation of telemedicine initiatives of agencies of the Commonwealth of Virginia. The VCU Team will provide data collection procedures, data specifications, and analytic recommendations to be implemented by the George Mason University investigators in the Center for Health Policy and Ethics. The GMU Team will conduct the evaluation and prepare a report detailing results and recommendations for action by the Virginia Department of Health.

Specifically, the VCU Team will:

- Enumerate and describe, quantitatively and qualitatively, state agency-associated telemedicine initiatives.
- Develop preliminary data inventory for assessment of telemedicine initiatives
- Present proposed evaluation methodology to the Joint Commission on Health Care of the Commonwealth of Virginia in coordination with VDH
- Visit selected telemedicine initiative sites for refinement of the inventory and preliminary field testing of the prototype instrument for data collection
- Refine instrument and conduct final field testing in conjunction with investigators selected by VDH
- Specify data collection standards for all data elements

- Recommend final analytic methodology for assessment and comparison of each data element and overall telemedicine initiatives

Evaluation of telemedicine requires a broad approach to capture the diverse implementation of programs and services that use telecommunications connected to health care. Elements in the evaluation will include:

1. Facility description
2. Finances and development plan including marketing and business plan
3. Personnel
4. Program scope and demographics of prospective and actual patients
5. Quality assurance program description
6. Utilization and Clinical Characteristics
7. Additional Cost-Effectiveness Variables
8. Hardware and technologies employed
9. Clinical and other outcomes (as available).

The VCU project team will design, prototype, and field test an instrument for collection of the data elements identified in Table 1. The final product will describe standards for collection of each data element. These standards will specify mechanisms for collecting and validating data as well as labeling data not meeting the collection standard. The standards will require identification of data that is unavailable as well as the reason for its absence. The format for standards for data collection will be modeled on those promulgated by the National Committee for Quality Assurance (NCQA) for use in the Health Plan Employer Data and Information Set (HEDIS) version 3.0.

The VCU project team will specify the methodology for evaluation of each data element by the subsequent VDH investigators, George Mason University Center for Health Policy and Ethics. The VCU project team will suggest how subsequent investigators should characterize non-quantitative data elements. Similarly, the VCU project team will suggest quantitative methodologies for remaining data elements, in keeping with the original proposal. Data collection and analytic methodology will constitute a framework for a report to the legislature in conjunction with recommendations, requirements, and preferences of the Virginia Department of Health.

In order to calibrate the capacity of telemedicine sites to provide requested data, and in order to incorporate the sites' varied capacities and experiences into the design of the assessment tools, site visits to a geographically diverse sample of initiatives will be necessary. At least 7 sites will be visited by two of the VCU project team investigators, and these will be distributed between sites serving as either the "host" site or "remote" site, respectively.

Development of the instrument proposed in the scope of this project will provide a common data collection and analytic methodology which will support a data set useful for ongoing assessment of cost-effectiveness, medical efficacy, and quality assurance of telemedicine initiatives. These data will serve to simultaneously identify individual and aggregate

strengths and limitations of the telemedicine infrastructure across Virginia, including utilization of the Commonwealth's digital communications infrastructure, as well as opportunities for improvement.

Next Steps.

After design and testing of the evaluation protocol, these assessment strategies would constitute the basis for data collection, analysis and recommendations regarding improvements to or expansion of telemedicine initiatives of agencies of the Commonwealth. The GMU project team investigators will collect and analyze primary data from the telemedicine sites. The VCU project team will be available to provide interpretation as well as statistical and analytical assistance (especially in cost-effectiveness and cost-minimization assessment) at the request of VDH.

It is anticipated that recommendations would be made in the following areas:

A. Recommendations regarding any improvements needed in current telemedicine initiatives.
B. Identification of additional opportunities for use of telemedicine to improve access to quality health care and health professions education for citizens of the Commonwealth
C. Overview of policy-related evaluation components
D. Data collection considerations
E. Reporting objectives

Project Teams

In this study, the Virginia Department of Health will be assisted by a team of accomplished health services researchers with substantial knowledge and experience in informatics and telemedicine, as well as in cost-effectiveness and program analysis.

Virginia Commonwealth University Quality Health Care Team

Jonathan B. Perlin, M.D., Ph.D., M.S.H.A. Dr. Perlin has extensive background in telemedicine, information systems, and performance assessment. Dr. Perlin was the inaugural Chair of the Telemedicine Section at the Richmond Veterans Affairs Medical Center. In this role, he implemented a multi-state telemedicine system providing specialty consultation to rural primary care providers, distance learning opportunities for patients and practitioners, and support for decentralized health system administration. Dr. Perlin has extensive experience in analysis of program outcomes, both clinical and economic.

J. James Cotter, Ph.D., Assistant Professor of Medicine and Health Services Research in the Division of Quality Health Care at VCU, provides significant expertise in program evaluation, especially assessment of patient and provider satisfaction. Dr. Cotter has developed, managed and evaluated health and social service programs at the local and state levels since 1975. As Director for Programs at the Virginia Department for the Aging from

1987-1994, he gained experience in evaluating multi-site programs at 25 local agencies throughout the Commonwealth of Virginia.

Wally Smith, M.D. is Chairman of the Division of Quality Health Care at VCU's MCV Campus. Dr. Smith has 15 years of experience conducting research in medical informatics, cost-effectiveness analysis, and health policy. His research includes grants and publications on computer-assisted instruction (1988); a visiting professorship at Dartmouth Medical School on medical informatics (1989); a national editorship for the Computerized Medical Record Working Group for the American Medical Informatics Association; and consulting and reviewing telemedicine and informatics grants and publications for the Agency for Health Care Policy and Research, the National Library of Medicine, the American Medical Informatics Association, and the premier journal on cost-effectiveness in health, *Medical Decision Making*, for which Dr. Smith has served on the Editorial Board since 1996.

Kathy Gianola, M.D. is the current Chair of the Telemedicine Section at the Richmond Veterans Affairs Medical Center. Dr. Gianola brings extensive experience in clinical consultation using telemedicine and also in the logistical implementation of telemedicine host and remote sites.

Shantaram Rangappa, M.D. is a National Research Service Award Fellow in the Division of Quality Health Care / Department of Internal Medicine at MCV Hospitals. Trained at Cornell University and the University of Virginia School of Medicine, he completed a Residency in Internal Medicine at the Medical College of Virginia Hospitals as Chief Resident in Internal Medicine during 1998-1999. He is currently involved in research on clinical telemedicine as it relates to cardiology.

George Mason University Center for Health Policy and Ethics Team

Mary Wakefield, Ph.D., R.N., F.A.A.N. Dr. Wakefield is a Professor in the College of Nursing and Health Science at George Mason University and serves as the Director of the Center for Health Policy and Ethics. She has extensive experience in the evaluation of the effects of telemedicine policy and serves on the Medicare Payment Advisory Commission and on the Joint Working Group on Telemedicine, a workgroup formed by the Office for the Advancement of Telehealth within HRSA.

P.J. Maddox, Ph.D. Dr. Maddox, an Associate Professor in the College of Nursing and Health Science at George Mason University has substantive experience in the evaluation of health services programs and specifically the cost ramifications of the initiation of telemedicine services.

References.

[1] Institute of Medicine, Working Group on Telemedicine
[2] Sisk JE, Sanders JH, "A proposed framework for economic evaluation of telemedicine," *Telemed J.* 1998;4(1):31-7.

[3] McIntosh E, Cairns J, "A framework for the economic analysis of telemedicine," *J Telemed Telecare.*, 1997;3(3):132-9.
[4] McCue MJ, Mazmanian PE *et al.*, "Cost-minimization analysis: a follow-up study of a telemedicine program," *Telemed J.*, 1998;4(4):323-7
[5] Sullivan E, Rheuban KS., "University of Virginia Telemedicine Program. Improving access," Va Med Q 1996'123(3):179
[6] Hampton CL, Mazmanian PE, *et al.*, "Telemedicine in use: The Medical College of Virginia, The Powhatan Correctional Center and the Blackstone Family Practice Center," Va Med Q 1996;123(3):167-70.
[7] Grigsby J, Schenkler RE, *et al.*, "Analytic framework for evaluation of telemedicine," *Telemed J.* 1995;1(1):31-9

Table 1: Elements to be included in design of evaluation of telemedicine sites.

Background and Facility Description:
- Date Established
- Goals for Program (% operation as "Host" or "Remote")
- Location (Urban – Rural, Medical Center – Clinic)
- Facility (Mobile, stationary, square footage)

Finances & Development Plan:
- Start-up Capital Investment and Total Capital Investment
- FY 99 Capital Budget and FY 99 Operating Budget by category (Personnel, non-personnel)
- Revenues (Total and sources by category)
- Business & Marketing Plan

Personnel:
- Clinical FTE [Training (RN, MD, etc.), role, percent FTE]
- Non-clinical FTE (Training, role, percent FTE)

Program Scope & Demographics:
- Description of Community Health Needs Assessment
- Geographic catchment area
- Demographic profile of prospective & actual patients
- Clinical scope (referrals / consults) by specialty
- Distance learning programs by topic and audience
- Description of other programs (e.g. administrative)

Quality Assurance Program Description:
- Mechanism to validate telemedicine comparability to "on-site" services
- Assessment of patient & provider satisfaction

Utilization and Clinical Characteristics:
- Total referrals requested or consultations provided
- Total patient volumes (annually x 3 years, monthly x 1 year) & operating hours / month
- Volume of referrals requested by training & specialty
- Volume of consultations provided by training & specialty
- Referral diagnoses (by DRG, if available)

Additional Cost-Effectiveness Variables:
- Closest substitute specialty service *in lieu* of telemedicine
- Average patient travel distance to telemedicine site
- Avoided FTE for travel chaperones (clinical & security)
- Patient transfers averted, facilitated

Hardware and Technologies Employed:
- Real-time video, still, or store-and-forward
- Digital diagnostic equipment available (e.g. digital stethoscope)
- Special technologies (e.g. robotic telepathology)

- Communication infrastructure (Common carrier, Virginia ATM network, etc.)
- Lower bandwidth technologies (e.g. WWW via modem)

Clinical / Other Outcomes (as available):

- Patient and provider satisfaction
- System reliability
- Validation of clinical diagnoses
- Presence of needs assessment

Table 2. Project Timeline

Month:	Activity:
1 – 2	• Literature Review • Identify all Commonwealth-affiliated telemedicine initiatives • Refine preliminary data elements • Complete prototype survey instrument • Communicate with Telemedicine Initiatives to identify directors and arrange site visits • Provide report to VDH and legislature on evaluation of telemedicine initiatives
3 – 8	• Conduct site visits • Prototype data collection standards specification • Refine evaluation parameters and collection standards with input from sites • Provide "beta" version instrument to VDH and GMU investigators for comment
5 – 8	• Finalize survey instrument • Finalize data collection standards
9 – 12	• Collaborate with VDH and GMU investigators in implementation of evaluation survey instrument • Prepare final report on design phase of project • Receive incoming primary and aggregate data • Provide ongoing methodological, statistical, and analytic assistance to VDH as requested

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