REPORT OF THE
VIRGINIA DEPARTMENT OF HEALTH

Report on Telemedicine Initiatives

TO THE GOVERNOR AND
THE GENERAL ASSEMBLY OF VIRGINIA

SENATE DOCUMENT NO. 28

COMMONWEALTH OF VIRGINIA
RICHMOND
2001

COMMONWEALTH of VIRGINIA

Department of Health
P O BOX 2448
RICHMOND, VA 23218

E. ANNE PETERSON, M.D., M.P.H.
STATE HEALTH COMMISSIONER

TDD 1-800-828-1120

January 8, 2001

TO: The Honorable James S. Gilmore, III

and

The General Assembly of Virginia

THROUGH: The Honorable Claude A. Allen
Secretary of Health and Human Resources

The report contained herein is pursuant to Senate Bill 1214 and Item 333 j of the 1999 Appropriation 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 $6,424. The study required 160 hours of staff time.

Respectfully submitted,

E. Anne Peterson, M.D., MPH
State Health Commissioner

Table of Contents

EXECUTIVE SUMMARY 1

AUTHORITY FOR THE STUDY 4

BACKGROUND 5

SUMMARY OF TELEMEDICINE INITIATIVES BY AGENCIES OF THE COMMONWEALTH 7

- TELEMEDICINE INITIATIVES 7
- USE OF TELEMEDICINE 10

ANALYZING THE COST-EFFECTIVENESS AND MEDICAL EFFICACY OF HEALTH SERVICES PROVIDED USING TELEMEDICINE 10

- CHALLENGES IN TELEMEDICINE EVALUATION 12
- EVALUATION DESIGN 14
- INTERVIEWS AND SITE VISITS 17
- DEVELOPMENT OF DRAFT INSTRUMENT 18

RECOMMENDATIONS REGARDING ANY IMPROVEMENTS NEEDED IN CURRENT TELEMEDICINE INITIATIVES 21

- KEY AREAS FOR IMPROVEMENT 21
- RECOMMENDATIONS 29

ACKNOWLEDGEMENTS 32

REFERENCES 34

APPENDIX A: AUTHORIZING LEGISLATION 36

APPENDIX B: COMMONWEALTH LEGISLATIVE STUDIES OF TELEMEDICINE 37

APPENDIX C: REPRESENTATIVES OF TELEMEDICINE SITES INTERVIEWED FOR THIS STUDY 39

APPENDIX D: RECOMMENDED PILOT INSTRUMENTS 40

Tables

TABLE 1. REFERRING SITES AFFILIATED WITH EACH HUB SITE. 9
TABLE 2. TELEMEDICINE CLINICAL CONSULTS, UVA AND VCU, BY SPECIALTY, 1995-2000 10
TABLE 3. DECICION MATRIX FOR COMPARING COSTS AND BENEFITS 15

Executive Summary

Introduction. Senate Bill 1214 (1999) and Item 333 j of the 1999 Appropriations Act direct the State Health Commissioner to study Telemedicine initiatives in the Commonwealth of Virginia. Specifically, the budget amendment provides for a study of the cost effectiveness and medical efficacy of the telemedicine projects in the Virginia Department of Health (VDH) which are located in Lancaster County, Scott County, and the City of Danville. The bill language is broader and requires an annual report to the Governor and the General Assembly on the status of telemedicine initiatives by agencies of the Commonwealth. The report requirements include a summary of telemedicine initiatives; an analysis of the cost-effectiveness and medical efficacy of telemedicine services; recommendations for improvements, and identification of additional opportunities for the use of telemedicine to improve access to care and health professions education.

This type of study requires comparable data, data that has been collected from different telemedicine sites using a uniform study instrument. There has been no previous statewide effort to collect data on telemedicine programs. The second annual report contained herein presents the results of the completion and field testing of the study instrument. For this study, twenty-one representatives of selected Virginia telemedicine programs were interviewed at their telemedicine sites during the spring of 2000. Based on the response of physicians, nurses, systems consultants, and administrators at these site visits, preliminary evaluation assessment instruments have been developed. These instruments can be used to begin a uniform data collection and will allow a cost-effectiveness evaluation of Virginia's telemedicine programs to begin.

The first report of this telemedicine study was presented to the Joint Commission on Health Care in October of 1999 (Senate Document 18, 2000). With the consent of the money committees and the Joint Commission on Health Care, the decision was made to combine the language and intentions of both Senate Bill 1214 and the budget amendment and to focus primarily on clinical applications of telemedicine rather than video conferencing and distance learning. This first report included a summary of the telemedicine sites associated with state agencies and presented the study design. VDH had contracted with the Division of Quality Health Care, Department of Internal Medicine of Virginia Commonwealth University to design the prospective study instrument with which all the telemedicine initiatives could be compared.

The Commonwealth supports, through specific appropriations and general funding, the operations of the institutions of higher education

that serve as hub sites and the state agencies and affiliates that serve as remote sites in telemedicine programs. The use of telemedicine in the Commonwealth is expected to expand in the number of sites involved, in the areas of medical education that can be addressed, and the clinical situations for which consultation is appropriate.

Telemedicine initiatives in Virginia. The hub sites of University of Virginia (UVA) and Virginia Commonwealth University (VCU) are the core of Virginia's telemedicine initiatives. UVA has arrangements with 30 separate remote sites for telemedicine activities and VCU has arrangements with 5 separate sites. Since 1996, UVA has performed 2,189 consults; since 1995, VCU has completed 2,139 patient consultations. Three other state agencies play important direct roles in the provision of clinical consultation in telemedicine. The Virginia Department of Corrections (DOC) is the primary source of financial support for telemedicine activities in the Commonwealth. The Virginia Department of Health (VDH) operates sites in three local health districts. The Virginia Department of Medical Assistance Services (DMAS) provides limited reimbursement for telemedicine consultations.

Challenges of cost-effectiveness evaluation. The analysis of cost-effectiveness and medical efficacy of these programs involves multiple challenges. A key requirement is that a minimum volume by medical procedure is needed to evaluate telemedicine cost-effectiveness. To date, especially in the VDH sites, sufficient volume for cost-effectiveness evaluation has not been achieved. Other challenges for evaluation include changing technologies and infrastructure, multiple perspectives of stakeholders, need for long-term analysis, and data collection burdens. Based on the site visits and interviews, obstacles to continued progress in Telemedicine were identified.

Four primary barriers confront telemedicine programs in Virginia as they seek to expand their capacity to improve access to health care and to reduce the costs of health care. The barriers are lack of adequate reimbursement and financing, technology integration needs, operational design, and physician acceptance of telemedicine. Reimbursement and financing are perceived to be the most important issues to be resolved before telemedicine programs can expand. Also, of special importance for future telemedicine programs is the need for a more rigorous community needs assessment, with close consultation with the local physicians, to determine their attitudes and perceived need for specific telemedicine initiatives.

Recommendations. To address these barriers and to continue the evaluation process, the investigative team made the following recommendations for the State Health Commissioner:

1. Use the recommended evaluation instruments to establish a baseline assessment of the telemedicine programs and initiate a continuous quality improvement and evaluation process.

2. Continue the Telemedicine Program Working Group at the Virginia Department of Health to direct the continuing telemedicine evaluation. This group can facilitate collaboration and development of Virginia's telemedicine initiatives and evaluate future needs, especially financing, and further opportunities for telemedicine initiatives by agencies of the Commonwealth.

3. For the Virginia Department of Health Telemedicine sites, ensure integration of technology through the use of an integrator.

4. Involve communities, especially local physicians, in the development and support of telemedicine programs.

Telemedicine is expected to grow 40 percent annually over the next 10 years. Telemedicine can increase access and distribute clinical, educational, and administrative health care resources by removing or reducing barriers imposed by time, distance, or geography in the provision of quality care. Financial and human resources investments required for telemedicine applications can be substantial. Evaluation for cost-effectiveness and quality will be essential to ensure efficient use of health care resources.

Authority for the Study

The Virginia General Assembly approved Senate Bill 1214 of the 1999 Session and the Governor signed the bill amending the Code of Virginia as follows: §32.1-19.1. *Reporting of Telemedicine Initiatives.*

The Commissioner shall annually report to the Governor and the General Assembly on the status of telemedicine initiatives by agencies of the Commonwealth. For the purposes of this section, telemedicine shall mean the use of telecommunications technology to deliver health care services and health professions education to sites that are distant from the host site or educator.

The report shall be issued by October 1 of each year and shall include, but not be limited to, (i) a summary of telemedicine initiatives by agencies of the Commonwealth; (ii) an analysis of the cost-effectiveness and medical efficacy of health services provided using telemedicine; (iii) recommendations regarding any improvements needed in current telemedicine initiatives; and (iv) identification of additional opportunities for use of telemedicine to improve access to quality health care and to health professions education for citizens of the Commonwealth.

The budget language as stated in Item 333 j of the 1999 Appropriations Act of the Commonwealth of Virginia states that

The Department of Health shall conduct a study of the cost effectiveness and medical efficacy of its telemedicine projects located in Lancaster County, Lee County [sic], and the City of Danville. The Department shall provide initial results of this study to the Chairmen of the Senate Finance Committee, the House Appropriations Committee, and the Joint Commission on Health Care prior to December 1, 2000. The final report shall be submitted prior to October 1, 2001.

The Virginia Department of Health decided to cover the two mandates in one prospective study that is expected to continue for at least two years until 2002. 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. The budget language requires a study of only the VDH telemedicine projects, with a final report due in October of 2001. VDH sites are just becoming operational. In addition, VDH decided to initially concentrate on the clinical applications of telemedicine rather than the use of the technology for distance health professions' education. 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.

Background

Telemedicine is the use of telecommunications technology to deliver health care services and health professions education to sites that are distant from the host site or educator. Despite previously slow growth, telemedicine is expected to grow 40 percent annually over the next 10 years. In 1999, telemedicine programs nationally conducted an estimated 74,000 telemedicine consultations (not including teleradiology) according to the Association of Telehealth Service Providers. This is a 44% increase over 1998. Telemedicine is expected to account for 15% of all US health care by 2010. (Association of Telehealth 2000; Telemedicine will Grow, 1999) This growth will be driven by changing demographics, the search for ways to reduce health care costs, consumer demands for more control over their health care, hardware price reductions and the growth of the Internet as an enabling technology.

Although the scope of telemedicine might be defined to include simple technologies such as telephone, email, and fax, this study concentrated on the medical aspects of telemedicine, i.e., initiatives for clinical consultation, often for advanced specialty care, between "host" and "remote" sites using technologies other than telephone or fax. The host site, or hub site, is known as the consulting site. The remote site, also known as the referring site, or the spoke site, is the location at which the patient or physician in need originates a consult.

Telemedicine frequently requires sophisticated computer technology and a high-bandwidth communication infrastructure. As a result, financial and human resource investments in "high-tech" telemedicine applications can be substantial and a barrier to their implementation. The Commonwealth of Virginia has supported, through specific appropriations and general funding, the development of telemedicine initiatives by state agencies and their affiliates.

The Commonwealth has progressively developed a communications infrastructure as well as deployed telemedicine technologies to deliver healthcare services and to provide distance learning opportunities. "NET.WORK.VIRGINIA," an advanced, broadband network delivering ATM (asynchronous transfer mode) service throughout Virginia is the result of collaboration between Virginia Tech and Old Dominion University and the Virginia Community College System. This infrastructure facilitates the development of specific, local telemedicine initiatives.

The Commonwealth supports, through general funding, the operations of the institutions of higher education that serve as hub sites and the state agencies and affiliates that serve as remote sites in telemedicine programs. The Commonwealth has made direct grants to local health

districts of the VDH to implement specific telemedicine programs. Aside from the VDH sites, there has been limited direct grant support of telemedicine initiatives to agencies of the Commonwealth. The Commonwealth does help support telemedicine through Medicaid reimbursement of telemedicine consults. The DOC is the major source of reimbursement, and on a limited basis, the Virginia Department of Medical Assistance Services (DMAS) also reimburses for consults.

The use of telemedicine in the Commonwealth is expected to expand in the number of sites involved, in the areas of medical education that can be addressed, and the clinical situations for which consultation is appropriate. Telemedicine is perceived as a method to control health care costs. One way costs can be positively impacted by telemedicine is through improved access and prevention of more serious and costly medical interventions. Another cost reduction strategy for telemedicine, of special interest to organizations such as DOC, managed care organizations, and DMAS is the savings in transportation and escort costs. The cost of telecommunications and the hardware and software used for telemedicine is decreasing. With reduced costs of entry, more organizations, including home health agencies, may be interested in exploring the potential of telemedicine for health care provision. But these costs of entry (e.g., equipment purchase) must be balanced by cost savings (e.g. personnel costs and travel avoided) resulting from operations, and those savings must accrue to those financing the entry costs.

The Commonwealth has monitored and reviewed the development of telemedicine in Virginia through a series of legislative studies. (See Appendix A.) Although the Commonwealth's more established telemedicine initiatives have reported their success (McCue MJ et al., 1998; Sullivan E et al., 1996; Hampton CL et al., 1996), no methodologically-standardized, comprehensive evaluation of telemedicine programs in Virginia has been conducted. Thus, the expansion of sites and uses of telemedicine should be systematically evaluated to determine their value to the Commonwealth.

The report first summarizes the telemedicine initiatives of agencies of the Commonwealth. The report then discusses key issues in evaluation of telemedicine and outlines the approach and methods of the study including the development of draft instruments appropriate for an initial evaluation of telemedicine programs. It then describes program implementation issues and recommends further steps to evaluate and enhance Virginia's telemedicine programs.

Summary of Telemedicine Initiatives by Agencies of the Commonwealth

Telemedicine initiatives in Virginia have developed through a combination of private funding of specific initiatives, including grants from corporations and foundations (e.g. the Virginia Health Care Foundation); specific governmental initiatives, especially the Southwest Virginia Alliance for Telemedicine funded through the United States Department of Commerce; and contracts for services. A key funding source for the two main hub sites in Virginia, the University of Virginia (UVA) and Virginia Commonwealth University (VCU) has been the contracts and support received from the DOC. Another source of support is the limited reimbursement for clinical telemedicine available through Medicare and Medicaid.

Telemedicine Initiatives

The state agencies most active in telemedicine are the two academic medical centers that serve as the primary hub sites for provision of telemedicine services. (See Tables 1 and 2.)

University of Virginia

UVA's Telemedicine Program provides clinical consultation and medical education to patients and health care professionals in rural areas of western Virginia. Specific projects include UVA support of telemedicine initiatives in 8 correctional facilities throughout western Virginia, the Southwestern Alliance for Telemedicine, linking clinics throughout southwest Virginia to the medical resources at UVA, and participation in the Appal-link program, a program to provide mental health services to clients of nine mental health agencies (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).

Virginia Commonwealth University

VCU's Telemedicine program seeks to link medical students, residents, and practitioners in rural areas of southern and eastern Virginia to physicians and resources in the VCU Health System for medical education and patient consultation. VCU's Telemedicine Program provides clinical care to inmates in the DOC's Powhatan facility as an

alternative to transporting inmates to medical center hospitals for health care services.

By 2001, the number of referring sites is expected to increase to 34 separate sites. Table 1 shows the referring sites for UVA and VCU, including those under development. The network of telemedicine referring sites continues to evolve. Local health care organizations affiliate with the hub sites as they develop the need and resources to start up telemedicine programs.

Two other state agencies play important roles in the provision of telemedicine services. The DOC is the primary source of support for telemedicine activities in the Commonwealth. The VDH operates sites in three local health districts.

Department of Corrections

The DOC uses telecommunications for three purposes: telemedicine, teleconferencing, and telejustice. DOC is a key funding source for telemedicine initiatives in the Commonwealth. More than 3000 telemedicine consults performed by the consulting sites have been with DOC referring sites.

Virginia Department of Health sites

The VDH has implemented telemedicine in three health districts: Lenowisco Health District, Danville Health District, and Three Rivers Health District. These sites are developing their programs with funds authorized by the 1998 General Assembly.

TABLE 1. REFERRING SITES AFFILIATED WITH EACH HUB SITE.

Consulting Site	Affiliated Referring Site
UVA	• Department of Corrections (the Augusta, Buckingham, Coffeewood, Dillwyn, Fluvanna, Staunton correctional facilities, and, under development are Red Onion and Wallens Ridge correctional facilities) • Dickinson Health Center (expected September, 2000) • Lee County Community Hospital • Norton Community Hospital • Page Memorial Hospital (no clinical services yet) • Salem Veterans Hospital (no clinical services yet) • Saltville Medical Center (expected September, 2000) • Southwest Virginia Mental Health Institute Appal-link (involves 9 Community Services Boards) • Stone Mountain Health Services • St. Paul/Castlewood Health Center • Thompson Family Center in Vansant • Virginia Baptist Hospital • Virginia Department of Health Sites (Danville, LENOWISCO, and Three Rivers health districts) • Winchester Medical Center
VCU	• Blackstone Family Practice • Department of Corrections (Powhatan) • Mary Washington Hospital • Virginia Department of Health sites (Danville, LENOWISCO, and Three Rivers health districts)

Use of telemedicine

The hub sites of UVA and VCU are the core of Virginia's telemedicine initiatives. UVA has arrangements with 24 separate remote sites for telemedicine activities and VCU has arrangements with 6 separate sites. Since 1996, UVA has performed 2,189 consults. Since September, 1995, VCU has completed 2,139 patient consultations; the majority (67%) are infectious disease consults with the DOC. Table 2 shows the number of telemedicine patient consults by the hub sites from 1995-2000.

TABLE 2. TELEMEDICINE CLINICAL CONSULTS, UVA AND VCU, BY SPECIALTY, 1995-2000.

	UVA	VCU	Total
Specialty			
Infectious Diseases	936	1,429	2,365
Dermatology	408	81	489
Cardiology	18	353	371
Hepatology	326	101	427
Psychiatry	165	5	170
Oral Surgery	--	143	143
Gastro-intestinal	69	--	69
Endocrine	61	--	61
Pediatrics - Cardiology	57	--	57
Neurology	46	--	46
Ears, Nose, Throat	31	--	31
Other	72	27	99
Total	2,189	2,139	4,328

Analyzing the Cost-Effectiveness and Medical Efficacy of Health Services Provided using Telemedicine

Policymakers and researchers are interested in how to appropriately evaluate the cost-effectiveness and medical efficacy of telemedicine programs, but such evaluations have proven difficult (Sisk et al., 1998; McIntosh et al., 1997). Telemedicine's chief social benefit has been to

virtually, if not physically, decentralize scarce medical expertise and resources and improve access to care or education across time and distance. Thus, evaluation of both cost-effectiveness and clinical efficacy of telemedicine initiatives is primarily an assessment of 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.

Bashshur (1997) points out that evaluation is difficult for telemedicine programs in their early phases before they have reached an adequate volume of business such that an equilibrium has developed. Problems include rapidly changing target goals, a changing variety of programs, lack of adequate sample sizes to measure efficacy and compare with other sites, difficulty in accurate apportionment of costs, and limits of evaluation technology (McIntosh et al., 1997; Sisk & Sanders, 1998).

Evaluating telemedicine raises three questions for state policymakers:

- Can telemedicine achieve improved access for patients and providers?
- Is telemedicine a clinically efficacious method of health care?
- Is telemedicine cost effective?

The cost benefits and efficacy of telemedicine, in general, are still the subject of debate and scientific review (Shi et al., 1998; Bashshur, 1995; DeChant et al., 1996; Scott, 1994). Importantly, telemedicine initiatives cannot be evaluated in detail for clinical efficacy and cost-effectiveness apart from considering and evaluating the specific area(s) of care that are using telemedicine. A cost-effectiveness or clinical efficacy evaluation must concentrate on one specialty area at a time. Therefore, telemedicine initiatives must undergo clinical evaluation on a specialty-by-specialty, procedure-by-procedure basis. To produce valid results, these evaluations require mature programs with adequate volume for measurement.

In contrast, telemedicine initiatives in early stages must be evaluated in less specificity and detail, using a broad set of general, more qualitative measures. These measures can capture the diverse ranges of programs and services being offered, those being tested, or under development. In innovative start-up programs, evaluation of quality can proceed in a staged course following the Donabedian framework for evaluating quality of health care. (Donabedian, 1980) First, the evaluation can determine if the structural elements for care are in place (e.g. facilities, credentialed personnel, equipment, strategic plan, quality improvement system). The structure of new programs is the first element to be put in place and forms the bedrock of future development. This may be the extent of evaluation that can occur in the early stages of a program. Second, the

processes of care as designed and implemented can be evaluated. Third, outcomes, including cost-effectiveness, can only be reviewed once there is sufficient information on structure and process. One outcome measure of effectiveness is patient and physician satisfaction with telemedicine. Studies indicate that patients are generally satisfied with telemedicine, although certain aspects of patient satisfaction need further research with regard to the role of both patients and providers within the context of the telemedicine encounter (Mair et al., 2000).

Although cost-effectiveness assessments are the most rigorous, they are a late-stage, comprehensive outcome that links costs of the service with successful outcomes. State oversight agencies do not always have sufficient resources to complete a full cost-effectiveness analysis. Thus, evaluations are necessarily limited in scope. Another hindrance is the ability and willingness of health care providers to collect extensive amounts of data when that data collection is perceived as reducing their limited resources for their core mission – patient care.

Challenges in telemedicine evaluation

Evaluation of telemedicine must contend with a number of difficult issues, including low numbers of participants; changing technologies and infrastructure; multiple perspectives of stakeholders; need for long-term analysis of certain expected benefits; and data collection burdens.

Low numbers of participants due to telemedicine's focus on sparsely populated areas

A strength of telemedicine is its ability to serve people in sparsely populated areas with limited health care resources. Unfortunately, this adversely affects evaluation efforts because small numbers of individuals use the service and a limited number of subjects are available to include in the evaluation. Low numbers of users prevent sample sizes of sufficient size to detect statistically significant differences between alternative approaches to care. Multi-site data collection can partially address the problem, but it also requires efforts to ensure that uniformity of protocols results in comparable health care interventions. This was a particular problem for conducting a current evaluation of the VDH sites because too few patients have been seen to date. (Effective December 1, 2000, ten patients had been seen in the VDH sites.)

Changing technologies and a developing infrastructure

Telemedicine is an innovation that combines computing and telecommunications and is at the center of rapid technological change. The cost of both the initial investment and upgrades for both equipment and telecommunications is decreasing. Development and enhancement of

the telecommunications infrastructure will affect the capabilities of the system, allowing more sites to use this technology. The evaluation of a program using today's technology may be rendered uninformative upon the adoption of a different technology. For example, if equipment manufacturers exit the telemedicine market, support for their products declines or the equipment may become obsolete. Evaluations must be robust enough to provide insights into telemedicine effects and costs, even though the program may have adopted new equipment since the previous evaluation.

To date, the development of telemedicine has focused on real-time, synchronous tele-consultations. Currently, considerable work is underway to expand the capability of "store-and-forward" technology, technology that is amenable to desktop personal computers. With store-and-forward technology, health care providers can exchange medical records, laboratory results, and other medical information at convenient times and locations. Coupled with the potential of e-mail and the Internet, medical consultations could be performed more efficiently and easily than under existing constraints.(Grigsby et al., 1998) This technology however raises substantive questions about the security of patient data transmitted over the Internet.

Multiple perspectives of stakeholders

Determining the effectiveness of telemedicine depends upon the viewpoint of the stakeholder. There are four viewpoints that a cost-effectiveness evaluation must accommodate. First, the broadest view is that of society. Societal concerns include access and equity in the location and provision of health care, the benefits of prevention, and the costs across multi-systems and health care providers. A societal perspective on the value of access for isolated populations may allow different cost inputs than one considering only the viewpoint of the payer or sponsoring organization. A second view, from the payers' perspective, varies with the anticipated timeframe that the patient may be in their system. Obtaining good care today may not save that payer money later if the benefits accrue to a different payer in the future. Benefits may include disease prevention, clinical efficacy, and effect on utilization. A program that costs less money for the patient may not be cost effective for the payer. Health care providers focus on the clinical efficacy, efficiency of use, and effect on their professional network. Their primary clinical concern is that the diagnostic validity in telemedicine is as accurate as an in-person consult. Finally, patients have concerns over access, clinical efficacy and costs of accessing care, especially travel and caregiver escort costs.

Need for long-term analysis of certain expected benefits

An important strength of telemedicine is the capability, through increased access, to identify health problems sooner and thus prevent exacerbation of disease that may reduce the patients' quality of life, increase costs to the payer, and require more patient care in the future. This focus on prevention benefits, the promise of reducing costs in the future by getting care now, requires a long-term evaluation. The benefits of prevention may not be evident for many years. Thus studies seeking to evaluate the effect of prevention must build in a long-term time frame, and the cost savings of the health care avoided later would need to be considered in the equation. Further, the longer it takes to accumulate sufficient data the more other factors could confound the evaluation.

Data collection

Data collection in telemedicine evaluation is complex. Multi-institutional cooperation is needed to agree on evaluation parameters and to ensure uniformity of understanding of elements under study and to obtain needed information in a timely manner. This is not anticipated as a problem in Virginia. For example, the evaluation of the VDH program requires the commitment of resources on the part of two hub sites, three remote sites, and the VDH central office. Evaluation activities would require information from the administrative components on costs of equipment and personnel, from the clinical components in terms of utilization and outcomes, and from patients in terms of costs and outcomes.

Evaluations of telemedicine continue as researchers and policymakers seek to understand the value of telemedicine and its usefulness in a variety of circumstances. One of the largest evaluations is currently in development through the Office of Rural Health Policy, Health Resources and Services Administration, US Department of Health and Human Services. Their instruments for evaluation are under development and, when validated, will be available for telemedicine programs to use.

Evaluation design

Key Areas to Evaluate

Cost-effectiveness evaluation in telemedicine is a comparison of the costs and benefits of alternative ways of providing health care. The benefits and costs of one method (telemedicine) are compared to the benefits and costs of another method (traditional face-to-face care). Table 3 helps answer the questions of whether or not the new method under consideration should be implemented. If the costs of the new method of service are the same or higher and the benefits the same or lower, then

the new service should not be implemented. If the costs are lower and the benefits the same or higher, then the new service should be implemented. In the remainder of the cases, the decision is not as clear and would require further examination.

TABLE 3. DECISION MATRIX FOR COMPARING COSTS AND BENEFITS

Higher costs	Same costs	Lower costs	
Lower benefits	No	No	Maybe
Same benefits	No	No	Yes
Higher benefits	Maybe	Yes	Yes

Note: adapted from Sisk and Sanders, 1998.

To make the decision posed in Table 3, extensive information is needed and a number of benefits and outcomes must be considered. Evaluation of telemedicine should look at benefits in terms of access to services; clinical efficacy; costs of equipment, facilities, personnel and expenditures; and outcomes.

Access

Improved access to care is one of the main benefits to telemedicine. Access can be measured in terms of ease of obtaining health services, by minimizing distance traveled to obtain care, as well as timeliness of care, including waiting time and time to get an appointment for care. Those interviewed (see Appendix B for a listing of interviewees) agreed that the elimination of the travel burden was a substantial benefit for most of their patients. To adequately measure access, information needs to be gathered from the patient regarding how long he or she did travel to the telemedicine site and how long the travel distance would have been for a face-to-face clinical encounter. Evaluators also need to consider the possibility that care would not have been obtained at all without the telemedicine site option. It is possible to speculate that ease of access to care may result in improved outcomes.

Clinical efficacy

Clinical efficacy in telemedicine should be evaluated on a service by service basis. Studies have indicated that procedures in dermatology, cardiology, HIV care, and mental health care have comparable efficacy. As can be seen from Table 1, Virginia telemedicine programs have concentrated their efforts in areas where clinical efficacy has been studied. These procedures indicate good correlation in diagnostics and

corroboration between telemedicine and in-person consultations. Still, evaluations of clinical efficacy continue on a procedure by procedure basis (Bergmo, 1997; Folsom, 1995; Gilmour et al., 1998; Lambrecht et al., 1998; Wootton et al., 2000).

Financial Support

As noted above, sources of support for telemedicine are varied. Equipment in use at the present time has been funded under many different initiatives over the past few years. An adequate consideration of the cost for telemedicine programs requires detailed apportionment of capital purchase and maintenance costs, program operating costs (including administrative and clinical support costs), clinician costs, and direct and indirect patient costs, and revenues.

Outcomes

Outcomes for telemedicine can vary and fall into two areas: access to health care and the effects of health care. Outcomes can be classified as intermediate or final. Outcomes in cost-effectiveness evaluation can include a volume indicator (e.g., number of consultations performed), access indicators (e.g., number of encounters, cases of disease diagnosed at early stage), efficiency of care (e.g., number of encounters, such as ER visits or hospitalizations, averted), cost burden (e.g. travel and escort costs avoided), and patient and provider satisfaction.

When designing an evaluation strategy the instrument developed must be able to encompass a variety of areas needing assessment (Virginia Department of Health, 1999, Senate Document 18, 2000). Yet, evaluations must consider the limited resources of the sites, both hub and remote, and data collection requirements should not be so extensive as to overburden the sites. As telemedicine is an innovation with little reimbursement support at this time, most programs have been developed with limited funding from a variety of sources and have few slack resources. Thus, the imposition of a data collection process for evaluation creates considerable stress on the program as staff seek to provide service and complete evaluation forms. Some site representatives perceived this as onerous unless financial support for data collection was forthcoming.

To minimize these problems, data collection should be streamlined, as non-invasive as possible with benefits for the respondent, and designed with respondent input. One solution is to integrate, whenever possible, evaluation questions into the health care encounter so the data collection becomes a seamless and valued piece of the medical care.

Interviews and site visits

The investigative team for this report decided to interview representatives of the major consulting sites (UVA and VCU), the DOC, the VDH, the Appal-link program and the VDH sites coming on line. The perspective of other referring sites was represented through the interviews with the major consulting sites. This selection was based on the need to balance an overall picture of telemedicine operations with the emphasis on VDH programs in the authorizing legislation. Hub sites without clinical telemedicine programs, such as Eastern Virginia Medical School's telehealth program, were not interviewed. The investigative team obtained the referring and consulting site representatives' initial perspectives on evaluation of their programs and on the draft instrument at the first interview. Subsequent follow-up interviews uncovered their thoughts on the issues brought up in the draft telemedicine evaluation instrument.

The investigative team met with the 21 representatives of the selected programs at their telemedicine sites during the spring of 2000. Subsequently, phone calls in the summer of 2000 were conducted to discuss further reactions to the proposed evaluation and any other concerns that the representatives had regarding telemedicine evaluation. Each interview took approximately 2-3 hours. These site visits elicited the different perspectives of physicians, nurses, systems consultants, and administrators. Those interviewed included managers, clinical personnel, and non-clinical and administrative personnel. The consulting sites have separate personnel for the clinical and non-clinical and administrative tasks. By contrast, the nurses at the VDH hub sites perform multiple roles providing clinical, administrative and non-clinical support services. Telemedicine involves persons in multiple roles, including clinicians, technical consultants, and administrators, and it requires a melding of clinical and technological perspectives. (See Appendix B for a listing of the people interviewed.)

In addition, the study team participated in the telephone conference calls of the VDH Telemedicine Group regarding the development and initiation of services at their 3 sites. The VDH Telemedicine Group is composed of representatives of VCU, UVA, VDH, and the three VDH Health District sites. The purpose of the group is to share expertise and experiences across sites, to coordinate approaches to care, and to standardize, as appropriate, telemedicine equipment and procedures. The initial focus of the group was to assist VDH in making their sites operational. The group had conference calls on February 11, March 15, May 25, and June 22, 2000. A meeting of the group was held on May 5, 2000 at UVA.

Development of draft instrument

The telemedicine programs in Virginia are in early stages of development and have limited volume per referring site, especially the VDH sites. The investigative team, in this preliminary evaluation, focused more on the structure of programs and the process elements of telemedicine care than on outcomes. The goal in visiting the sites and conducting interviews was to understand the current state of development of the sites and to develop and refine a draft instrument that could be used for further evaluation. The team specifically sought feedback from the sites regarding the appropriateness and scope of the draft assessment instrument.

Structural elements include the adequacy of plans for financing and developing the telemedicine program, the number and credentials of personnel in the programs, the delineation of appropriate program mission and scope, and the existence of quality assurance mechanisms, including appropriate treatment protocols. Process elements include the adequacy of the procedures of the telemedicine program for facilitating access to services, the provision of the actual clinical services, and the adequacy of follow-up tasks such as documentation and patient contact. For the purposes of this evaluation, outcomes include intermediate outcomes and consumer-based outcomes. Intermediate outcomes focus on utilization such as referrals and consultations. Consumer-based outcomes include clinical improvement in the patient's condition and patient and provider satisfaction.

The instrument was distributed to the representatives of the sites at the initial interviews with the investigative team. The instrument was discussed and the representatives were asked to review the instrument and provide comments back to the investigative team. The instrument covered the following topics: 1) General Information, 2) Start-up Expenditures, 3) Ongoing/Upgrade Expenditures, 4) Program Development and Planning, 5) Quality Assessment, 6) Clinical Personnel: Physicians, 7) Clinical, Technical and Administrative Personnel, 8) Health Care Utilization: Host/Consulting Sites, 9) Health Care Utilization: Remote/Referral Sites, 10) Telecommunications Capacity, 11) Patient Travel and Transfer.

Both hub sites indicated that they would be able to provide most of the information set forth in the draft assessment instrument. The hub sites also indicated that their remote sites would need considerable assistance from the hubs in filling out the assessment instrument, especially for equipment and cost questions, as the hub sites often supplied the equipment and software. The feasibility of the elements proposed and the capacity of the remote sites to supply the information was discussed with the local health department sites. Information on the basic identifying

information about each telemedicine program was readily available. In the following sections, the ability of the telemedicine programs to provide specific information is discussed.

Expenditures. To explore the best strategy to assess cost-effectiveness, questions about the level of expenditures for telemedicine equipment and personnel were included. Sites were questioned about start-up expenditures for the programs with the intent to gain an understanding of the program's initial costs. Expenses such as the investment feasibility analysis, the purchase of the equipment, and hiring personnel for beginning the programs can extend over multiple years. Site representatives felt that a clear timeframe was necessary for questions regarding these initial expenses. Further, some expenditures cannot be easily classified into either start-up or ongoing expenditures. For example, if a new diagnostic tool allowing a new specialty consultation were added once the program begins, how would that be best categorized? The remote sites would not be able to provide most of the information regarding equipment start-up costs as they did not purchase the initial equipment. Information on telemedicine training and personnel was also not easily identifiable, as it had been absorbed by other areas of the site's operations. Staff at the remote sites also noted that this information was not yet relevant as the operations were just beginning. However, the bulk of the information would have to be obtained from the sponsoring agency such as the VDH.

Program Development and Planning. Information on the sites' vision for the telemedicine program, as well as plans for future development and support, were included in the draft evaluation instrument. Again, local site representatives perceived this section to need substantial input from the sponsoring agency. It is important to note that the remote sites had relatively little information on marketing activities for their own sites. Specific needs assessments had not been done. Business and marketing plans were generally still under development. The VDH sites had not yet developed a detailed look at telemedicine that would compare costs against projected volume to determine a potential break-even point. The VDH sites, at the time of the interviews, were also still exploring how best to engage local physicians in the telemedicine programs.

Quality Assessment. Telemedicine quality assessment processes encompass both clinical quality assurance and technological quality assurance. The sites felt they could provide information regarding the quality of the program including documentation, system reliability, training quality, and quality assurance goals, as well as risk assessment, provider liability, and patient consent. Quality assurance protocols specific to the individual telemedicine programs were still under development.

Personnel. Telemedicine requires a variety of support personnel to help manage the patient-physician encounter. The proposed instrument included questions regarding the number of physicians working with the telemedicine program, by specialty, and the costs and reimbursements of the consults. The sites clarified what information they could provide (e.g., the numbers and types of physicians using the program) and what information would not be available (e.g. physician reimbursements). The sites could provide information on non-physician members of the telemedicine team. However, to obtain costs for each member of the team would require coordination with the sponsoring agency. Clear guidelines would be necessary if activities of support personnel at the sponsor or hub sites were to be allocated to the remote sites.

Health Care Utilization. The purpose of this section was to capture the volume of activities of the telemedicine programs. The hub sites and remote sites expressed little difficulty in obtaining the information proposed on utilization of the program. The sites keep logs of their consults by location and by specialty of provider, and information on diagnosis could be obtained. For the remote sites, diagnosis information would be more difficult to obtain.

Telecommunications Capacity. As the telemedicine technology and communications infrastructure expands, data on the systems and equipment used will be needed. This information is more easily obtainable from the hub sites and the sponsoring agency than from the remote sites.

Patient Travel and Transfer. To explore cost-effectiveness, information is required from the patient regarding the amount of time and effort saved through the use of local sites rather than travel to a distant care facility. The information in this section is patient level data and would have to be collected from each patient at the time of each consult. The suggestion was made to collect this data as part of a patient satisfaction instrument.

Revising the draft evaluation instrument

The initial instrument has been revised to reflect the suggestions of the representatives of the telemedicine sites who were interviewed. Recommendations have been made to the VDH (See Appendix D) for four instruments to be used in the next phase of the evaluation. One evaluation instrument is oriented to hub agencies such as UVA and VCU and sponsoring agencies such as VDH. A second evaluation instrument collects data from the referring sites. A uniform patient satisfaction instrument (the UVA Patient Follow-up Survey) is recommended for all telemedicine programs. Finally, the telemedicine programs should implement the pilot provider satisfaction instrument, developed from a variety of sources including the UVA Provider Follow-up Survey.

These pilot evaluation instruments, developed with the substantial input of the site representatives, can be used to continue an assessment of the telemedicine programs in Virginia. They should prove especially useful to the VDH remote sites to evaluate the experience of the clients and providers as they begin taking patients in their new telemedicine programs.

Despite the challenges that prevent implementing a full cost effectiveness evaluation, an evaluation strategy to assess the performance of telemedicine programs from the state perspective can continue. It is recommended that evaluation should proceed in a staged manner, designed at an appropriate level for the variety of programs and their level of development. Evaluation methods can result in continuous improvement in the information collected and in the capacity of the programs for self-assessment. In addition, the knowledge gained through program evaluation should be valuable to the programs as they market their capability to patients, physicians, and other health care providers in their communities.

Recommendations Regarding any Improvements Needed in Current Telemedicine Initiatives

Key Areas for Improvement

Based on the interviews, there are four primary barriers that confront telemedicine programs in Virginia as they seek to expand their capacity to improve access to health care and to reduce the costs of health care. The barriers are lack of adequate reimbursement and financing, technology integration needs, operational design, and physician acceptance of telemedicine. Some implementation issues continue to affect both new and existing programs. The issues identified by referral sites just beginning operations, such as the VDH sites, were, as expected, different from the issues identified by the experienced hub sites. The concerns pose significant challenges to the telemedicine programs, although substantial progress is being made in resolving many of the identified issues. These challenges derive from state, federal and professional approaches to telemedicine.

Reimbursement and Financing

Lack of reimbursement and the absence of solid financing remains the most important policy barrier to the expansion of telemedicine programs in the Commonwealth. The Commonwealth, through DMAS, has implemented a policy allowing Medicaid reimbursement of telemedicine consults on the same basis as traditional consults. Medicare reimburses only in certain geographic areas and private insurance companies do not

reimburse for telemedicine. First, reimbursement is needed to conduct the tele-consultations. Telemedicine is still not accepted by the mainstream health insurance industry as a viable substitute for traditional health care referrals and consultations.

Another barrier to successful development of telemedicine programs is limited physician interest and involvement. Reimbursement constraints that require physicians to travel from their offices to a site with telemedicine capabilities to conduct the consultation forces the physician to curtail other activities of their practice. The effectiveness of the sites is related to their ability to target medical conditions and procedures that meet a need identified by local physicians and that do not undermine local physician networks. Lack of support from community physicians will severely limit the volume of the telemedicine site. The result is low numbers of patients, especially Medicaid participants.

Second, the telemedicine infrastructure requires capital equipment and facility operational support. Currently telemedicine programs seek support from these sources:

1. Medicare

The federal Medicare program will reimburse for telemedicine consultations if that care does not usually require personal contact between patient and physician, such as radiology and pathology services. Also, under the Balanced Budget Act of 1997, reimbursement for other tele-consultations can occur in rural areas designated by the US Department of Health and Human Services to have a shortage of medical personnel (Health Professional Shortage Areas). The designated counties are primarily rural areas and existing telemedicine programs have limited services in those areas. The Health Care Financing Administration has established demonstration projects to evaluate the cost-effectiveness and clinical efficacy of telemedicine. It is currently using the results of that study to determine the feasibility of expanding reimbursement for telemedicine services.(Berenson, 2000) In addition, pending federal legislation may expand availability of Medicare reimbursement for telemedicine (see discussion later in this report).

2. Medicaid

Virginia is one of 13 states in which Medicaid reimburses for telemedicine. DMAS covers telemedicine on a limited basis. Practitioners in both the hub and the spoke sites can receive reimbursement for a telemedicine consultation. The reimbursement policy mirrors the traditional Medicaid consultation. To date, billings under this Medicaid reimbursement have been limited. Staff at telemedicine sites perceived the obstacles to Medicaid reimbursement to be a lack of referrals from

physicians and an apparent lack of identification of clients who are eligible for Medicaid and who also could benefit from telemedicine services. The lack of physician referrals may have been due to the reimbursement constraints (i.e. the requirement that the telemedicine consult be a physician to physician consult). This model requires referring physicians to travel away from their office to the telemedicine site in order to participate in the 'face-to-face' consult at the telemedicine site. Further information on the status of the Medicaid Telemedicine Pilot Project is available in the Fall 2000 DMAS report to the General Assembly.

3. Department of Corrections

As noted above, the DOC provides the majority of support for telemedicine initiatives in the Commonwealth. The DOC contracts with UVA Health Care System and the VCU Health Care System to provide telemedicine consults to prisoners at nine correctional facilities. Two issues affect the DOC support. The DOC anticipates possible budgetary constraints that may adversely impact its telemedicine programs in the future. Also, representatives of the DOC expressed concern that the immediate savings attributable to telemedicine were limited as usage increased.

Telemedicine reduces the amount of resources devoted to transportation and security for prisoners in need of medical care, and thus, it increases the access to care. The increased access to medical care results in increased utilization and volume of services. Thus, the initial savings from transportation and security cost reduction have begun to level off as volume increases. DOC representatives did note that it was difficult to place a monetary value on the amount saved due to the way telemedicine helps avert breakdowns in security. The use of telemedicine helps to completely avoid such events because the prisoner remains within the secure environment of the correctional facility. In addition, both prisoners and managers of the correctional facility generally favored the use of telemedicine over more traditional medical encounters.

4. Foundations and Government Programs

Private foundations have supported the development of telemedicine initiatives in Virginia. The Virginia Health Care Foundation has funded The Southwest Virginia Alliance for Telemedicine to support an outreach worker to promote telemedicine and to obtain needed equipment and telecommunications infrastructure for the project. The UVA Office of Telemedicine was awarded a grant from the Telecommunications and Information Infrastructure Assistance Program (United States Department of Commerce) to support telemedicine activities in southwest Virginia. The telemedicine program of the VCU Health System has also

benefited from private foundation support. Support has been available in limited amounts from the universities that sponsor the program. The VDH sites were set up using state funding for capital purchase and initial development.

5. Private insurance

Private insurance coverage of telemedicine consults is still negligible. It is expected that private insurers will closely monitor the results of the HCFA studies of reimbursement and the pending federal legislation.

6. Indigent Care

The question was raised as to whether indigent care funds available to the hub academic medical centers could be used to provide care for eligible patients. Certain cases would seem to be amenable to such support: for example, while providers may donate their time to do telemedicine consultations, there is no source of support for the laboratory tests needed to supplement the diagnosis and treatment of the consultation. However, indigent care funds of the hub academic medical centers are not specifically designated to telemedicine programs. The need to determine who would support such costs remains.

Important Congressional efforts are underway that may expand the reimbursement for telemedicine consultations and change the requirements for face-to-face consultations. The Telehealth Improvement and Modernization Act of 2000 (S2505 and HR4771) revises telehealth payment methodology and eliminates the requirement for a physician telepresenter, extends reimbursement to Medicare recipients not residing in a Health Professional Shortage Area, extends telehealth eligibility to all physicians and practitioners, and accepts the use of store and forward technology. The Medicare Access to Telehealth Services Act of 2000 (HR 4841) seeks to amend the Balanced Budget Act of 1997 and changes reimbursement methodology, allows store and forward technology and expands the locations where a beneficiary can receive telehealth to all counties not in a Metropolitan Statistical Area and to medically underserved urban areas (Bloch, 2000). This legislation should be monitored. If this legislation were passed, implementation would significantly increase the attractiveness of telemedicine to health care providers.

Despite its policy on reimbursement, DMAS has been surprised by the low number of telemedicine claims filed. There are several possible explanations for the low numbers. Some clinics may not target Medicaid participants, and telemedicine procedures that the clinics perform may not be services in high demand by the Medicaid population. Physicians may perceive that the face-to-face consultation requirement involves too

extensive a time commitment. VDH sites may be able to target this population. Serving the low-income population without adequate access to health care is a central part of the traditional mission of the VDH. The opening of telemedicine programs within local health departments may improve the market penetration of telemedicine to the low-income and Medicaid-eligible populations, thus increasing access to care for these vulnerable populations.

Technology Integration and Equipment

As an area of rapid technological change, assessment and testing of new hardware and software is an ongoing responsibility of telemedicine programs. The equipment must be well integrated into the sites' telemedicine and clinical systems prior to testing the clinical acceptability of the equipment. For newly implemented systems, staff at the sites felt it was critical to have the system running well before attempts were made to demonstrate telemedicine facilities to local physicians and health care providers.

Compatibility and integration

Given the diverse methods of funding telemedicine programs and the idiosyncratic paths of development of telemedicine programs, compatibility issues between sites were likely. However, recent technological developments, coupled with the improvement in Virginia's telecommunication infrastructure, have led to a reduction in problems of compatible technology. Communication between separate organizational networks still needs the attention of telemedicine network administrators, but the issue is less related to technical compatibility and more to a data security concern. Security firewalls within an organizational network prevent full connection to a health care provider not part of the organization. For example, the VDH sites communicate through the VDH telecommunications network. The security for this network does not allow non-VDH sites to access the network. Thus, special arrangements to facilitate communication between the hub sites and the VDH referring sites are necessary.

Integration remains a concern for all VDH telemedicine sites. An integrator is a consultant or consultant organization that coordinates the hardware and software needed to combine voice, video and data over one network. The telemedicine system requires coordination of hardware (both computing hardware and clinical peripherals, such as digital stethoscopes), software (computing, telecommunications and medical) and telecommunication protocols. For example, an integrator must be able to ensure compatibility and functioning among a digital stethoscope, the remote site computing equipment, the telecommunications protocol, and the hub site's network and equipment. An integrator must be able to

identify the specific problem and be able to remedy the situation without causing interference detrimental to the performance of the other components. Hub sites usually have on-site technical support that fulfills the integrator function; referring sites often do not. Thus, referring site operation is dependent on the resources and technical expertise of hub sites or, in the case of the VDH sites, on VDH information technology personnel. The VDH working group, as of this report, has resolved the technical issues between the hub sites and the VDH sites for the current equipment configuration. All telemedicine initiatives should emphasize the role of the integrator to assure functionality of the program.

Technical Support

Manufacturers' technical support has been a problem for many sites, especially for the VDH sites. The corporation that was the source of the original telemedicine equipment for the VDH sites redirected its strategy away from telemedicine. The technical support available to VDH deteriorated over the course of program implementation. VDH staff indicated that this lack of technical support was the primary cause of delays in program implementation.

The lack of inclusion of an integrator in telemedicine program planning and operations hampers development of successful telemedicine programs at the remote sites. A lack of compatibility in equipment can also retard the development of these programs. Telemedicine equipment will evolve and policymakers must plan to upgrade, replace and expand telemedicine capabilities in a measured manner. An ongoing funding source is imperative so that new equipment can be purchased. Updated software and hardware and the development of more telemedicine-related equipment, even the "plug-and-play" equipment add-ons, will require a strong integrator function to ensure compatibility and coordination among sites.

Capitol Equipment Needs

Another area of concern for practitioners is the aging of telemedicine equipment, coupled with the lack of support for hardware and software replacement. The telemedicine programs continue to seek support from Federal and private sources. Still, telemedicine programs developed using a variety of start-up funding sources that often do not support ongoing capital equipment purchases. There is also not a funding stream from reimbursement at this time that can generate sufficient resources to replace aging equipment. And even with reimbursement, expansion of telemedicine will need additional capital funding.

Operations Design

Protocols

Site representatives interviewed noted that both clinical and administrative protocols are necessary. Administrative protocols are needed at each site to govern each consult, to reflect patient registration and provider information, and to initiate and hold the tele-consult. Clinical protocols include obtaining clinical information needed for the consult (medical history, current medications, lab results, vital signs) and guidelines on clinical activities to be performed during the consult and follow-up activities. Protocols are also need on how to store consult-related records at both the hub and remote sites. Although both sites generally keep documentation on the tele-consultation, interviewees felt that this was a process requiring discussion and agreement between the host site and the remote site. Payers such as DMAS would welcome uniform protocols.

Data security.

Another policy issue for telemedicine programs is the transmission of confidential patient information across telecommunication channels. Privacy concerns include disclosure of patient-identifiable medical information, the need for informed patient consent, and control of databases holding patient information. HCFA has developed regulations to address confidentiality of patient-specific information as authorized by the Health Insurance Portability and Accountability Act of 1996 (HIPAA). The VDH programs continue to refine their protocols for confidentiality.

As with all medical encounters, consumers need to understand the procedures they will undergo and give consent to receive medical care. In the case of new technology like telemedicine, consumers may need more than the usual amount of information about what to expect from the encounter. They also must sign the normal release of liability forms. Depending on the type of transmission used, there may be additional confidentiality issues. Transmission of information between sites is generally over secure lines. If transmission is done over "NET.WORK.VIRGINIA," confidentiality of information is secure. When other telecommunication options are used, such as open telecommunications lines, some of the site representatives expressed concerns over the confidentiality of information. Many medical practices use regular telephone lines to transmit data (e.g. fax machines) and telemedicine should not be treated differently. Though no programs are currently using the Internet to transmit patient data, some staff felt that the Internet would pose special challenges for keeping patient information private and secure. Security procedures and firewalls between organizations also impact protocols for communication.

Staff training

Hub site staffing has been relatively stable over the last few years. It was noted that remote site staffing can be more transitory, resulting in the need for recurrent training of remote site personnel for support of telemedicine initiatives. The loss of trained remote site personnel adversely affects the capacity of that site to continue to provide telemedicine services. In addition, for the new VDH sites, staff training is a significant component of successful implementation. Personnel at local health departments need to be able to perform multiple roles in telemedicine. Besides their traditional role of clinical support, the integration with the telemedicine technology entails a substantial learning curve for the hardware and software components. VDH site personnel have embraced the potential of telemedicine and contributed creative solutions to the challenges of establishing a telemedicine capacity.

Marketing/Physician Networks

Another barrier to successful development of telemedicine programs is limited physician interest and involvement. This barrier results from the sites' lack of targeting of medical conditions and procedures that meet a need identified by local physicians and that do not undermine local physician networks. Lack of physician support will severely limit the volume of the telemedicine site resulting in low numbers of patients, especially Medicaid participants. This point is critical given that the return on the Commonwealth's investment in Telemedicine will largely be in cost savings for the care and transportation of Medicaid patients as well as DOC inmates.

There are two phases to marketing telemedicine programs. For programs that plan on serving a community or specific geographic area, a preliminary needs assessment or market study should be done prior to development of a program. The primary goal of the needs assessment is to establish the level of interest of the local physicians in specific telemedicine areas. The chief medical services that should be considered for inclusion in the program should be determined at this point.

Telemedicine programs should augment existing medical services and should fill in gaps in the health care system relative to populations or geographic isolation. Telemedicine needs will vary by geographic area and will be contingent on the local physician network and the medical services that have gaps in coverage. Telemedicine programs should not supplant existing resources and connections nor should they compete with local capabilities. The programs should complement the services available. If the programs attempt to substitute for existing services, local physicians will not refer patients. The established need drives the development of a telemedicine capability. For example, the LENOWISCO

Health District determined that physicians in their area had a need for the capability to perform colposcopy. Once this need was determined, the appropriate telemedicine diagnostic equipment could be purchased and personnel trained in its use.

Clinical personnel interviewed at the telemedicine sites visited interviewed described experiences with the disruptive effect of telemedicine capability on local physician networks. In some instances, telemedicine was seen as a threat to existing referral and use patterns. Physicians in that community approach the telemedicine program hesitantly, if at all. One physician noted that the community had recently recruited an academic medical center specialist to come to the community one day per week for consultation on cases. Telemedicine in that specialty would adversely impact this relationship so local doctors, in the interest of retaining and supporting the specialist, opposed the use of telemedicine.

The preferred method is to seek out the "clinician drivers" in the community, and implement telemedicine programs that reflect their interests and enthusiasm, combined with an understanding of the community needs (Yellowlees, 2000). Telemedicine is designed to meet the needs of those not receiving necessary health services. This strategy allows local physicians to support the program and generates referrals to the telemedicine program. Without this support referrals will remain low.

Recommendations

The following recommendations address the analysis of cost-effectiveness and medical efficacy of telemedicine, the improvements needed in current telemedicine initiatives, and additional opportunities for the use of telemedicine to improve access to health care and health education. The remaining funds in the 1999 appropriation for this purpose should be sufficient, and it is not expected that additional funds will need to be requested.

1. **Use the recommended evaluation instruments to establish a baseline assessment of the telemedicine programs and initiate a continuous quality improvement and evaluation process.**

The establishment of an ongoing comprehensive evaluation strategy by the State Health Commissioner should be supported. It is recommended that the Commissioner request the Telemedicine Working Group to convene in early 2001 to review the evaluation instruments developed from this study and to determine a strategy to use these instruments to establish a uniform, baseline database of information on telemedicine programs. The evaluation process would require each site supported with Commonwealth of Virginia resources to complete standardized reports on telemedicine activities.

The ongoing evaluation would ensure that the elements of structural quality are in place in each program. Second, the evaluation would create an evolving strategy for collecting and monitoring costs and outcomes of the programs, including patient and provider satisfaction. Instruments for this data collection should continue to be refined. Third, each new telemedicine program registering for Medicaid reimbursement or receiving state funds should complete a needs assessment and marketing study prior to approval of reimbursement or funding. Finally, a strong liaison should be established with the Office of Rural Health Policy of the US Department of Health and Human Services to monitor the results of the development of a Federal telemedicine evaluation strategy.

2. **Continue the Telemedicine Program Working Group at the Virginia Department of Health to facilitate collaboration and development of Virginia's telemedicine initiatives and to evaluate future needs, especially financing, and further opportunities for telemedicine initiatives by agencies of the Commonwealth.**

The State Health Commissioner should ensure the continuation of the Virginia Telemedicine Work Group to: 1) offer guidance on protocols and equipment needed to support Virginia's telemedicine programs, and 2) oversee the continuing evaluation of telemedicine programs, including compatibility of data collection and continuous quality improvement in telemedicine operations.

The work group composed of the two academic medical center hubs and the three local health district programs is an operational group that has facilitated the creation of protocols, the training of staff, and the exploration of the capabilities of current telemedicine equipment including the transmission and treatment technology. Such a group, engaged in sharing of information and development of guidelines and protocols, would be a resource for all telemedicine programs, but of special assistance to new programs struggling to become established. Given the rapidity of the change in technology, such a resource exchange group would be preferable to centralized, standardization of equipment rules.

The Virginia Telemedicine Work Group should be given the responsibility for overseeing the continued evaluation of Telemedicine. Collectively this group represents the core of all clinical Telemedicine in the Commonwealth. Their expertise will contribute substantially to an evaluation focused on the critical issues in this evolving technology as well as additional opportunities for use of telemedicine to improve access

to quality health care and to health professions education for citizens of the Commonwealth.

Telemedicine and telehealth education programs have the potential to proliferate in the near future as equipment costs decrease and demand increases. The Telemedicine evaluation could also determine state agencies' plans to implement telemedicine and tele-health education programs in the near future. Also, the Virginia Telemedicine Work Group should determine the amount of capital funding needed to replace and upgrade existing equipment. Of special concern is the age of the telemedicine equipment at the academic hub sites and the DOC.

3. For the Virginia Department of Health Telemedicine sites, ensure integration of technology through the use of an integrator.

The VDH sites need an integrator, a consultant organization that coordinates the hardware and software needed to combine voice, video and data over one network. The telemedicine system requires coordination of hardware, software and telecommunication protocols. An integrator must be able to solve the technology problem without causing interference detrimental to the performance of the other components. Telemedicine initiatives should emphasize the role of the integrator to assure functionality of the program.

4. Involve communities, especially local physicians, in the development and support of telemedicine programs.

A special focus is needed on the role of marketing to local physician networks. The support of the community and especially of local physicians is essential for the referral of Medicaid patients for whom transportation cost savings can be substantial.

The sites need to target medical conditions and procedures that respond to the needs of local physicians. Telemedicine sites should supplement not supplant existing referral arrangements. Physicians should be brought in to the planning process prior to the development of the telemedicine programs to assist with identifying needed services and designing a responsive program. Once the system is operational, marketing to physicians must occur again to demonstrate the functionality and viability of the specific telemedicine program.

Summary

Telemedicine programs are expanding and becoming a vital force in the provision of health care, especially for isolated populations who have difficulty accessing medical care. Agencies of the Commonwealth, led by UVA, VCU, and DOC have implemented telemedicine programs that involve two hub sites and 28 referring sites. Since 1995, over 4,000 consults have been performed.

The analysis of cost-effectiveness and medical efficacy of these programs involves multiple challenges. One important factor is that a minimum volume by medical procedure is needed to evaluation telemedicine cost-effectiveness. To date, especially in the VDH sites, sufficient volume for cost-effectiveness evaluation has not been achieved. Through interviews and site visits, draft evaluation assessment instruments have been developed. These instruments can be used to begin a uniform data collection from the telemedicine sites and will serve as the base for future cost-effectiveness evaluations.

Further development of telemedicine in Virginia will involve addressing issues of financing, equipment, operations, and marketing to physicians. The last issue is of special importance for future telemedicine programs. Telemedicine programs need a rigorous community needs assessment with close consultation with the local physicians to determine their attitudes and perceived need for telemedicine. Programs should appropriately coordinate the focus of their efforts to *supplement and not supplant* existing patterns of physician and health provider networks. Once the telemedicine programs have established their capacity, extensive marketing of the program to local physicians will be an important component of program success.

The VDH has established a Telemedicine Work Group to address these issues for its own local health district sites. This group's mission could be expanded to include a facilitation role for all telemedicine efforts in the Commonwealth. Areas of endeavor would include the financing of telemedicine, program protocols, marketing and planning for future needs.

Acknowledgements

The Virginia Department of Health contracted with the Division of Quality Health Care, Department of Internal Medicine, Virginia Commonwealth University to design the initial stages of the evaluation. This report summarizes the results to date. The study team would like to thank Ms. Margot Fritts, Senior Policy Analyst, Virginia Department of Health for her assistance and advice on the study. The study team would

also like to thank all interviewees for their contributions to our understanding of telemedicine in Virginia. The members of the study team were:

J. James Cotter, Ph.D., Assistant Professor of Medicine and Health Services Research in the Division of Quality Health Care, Department of Internal Medicine, Virginia Commonwealth University.

Wally R. Smith, M.D. Chairman of the Division of Quality Health Care Department of Internal Medicine, Virginia Commonwealth University.

Katherine M. Gianola, M.D. is an Assistant Professor in the Department of Internal Medicine at Virginia Commonwealth University and Chair of the Telemedicine Section at the Hunter Holmes McGuire Veterans Affairs Medical Center.

Shantaram Rangappa, M.D. is a National Research Service Award Fellow in the Division of Quality Health Care, Department of Internal Medicine, Virginia Commonwealth University.

References

Association of Telehealth Service Providers releases report chronicling industry growth and telemedicine development. (2000, May 1). Virtual Medical World.

Bashshur, R.L. (1995). On the definition and evaluation of telemedicine. Telemed.J., 1(1), 19-30.

Prepared testimony of Robert Berenson, MD., Director, Center for Health Plans & Providers, Health Care Financing Administration. (2000). Senate Appropriations. Agriculture, Rural Development & Related Agencies.

Bergmo, T.S. (1997). An economic analysis of teleconsultation in otorhinolaryngology. J.Telemed.Telecare., 3(4), 194-199.

Bloch, C. Federal Telemedicine News, July 24, 2000.

DeChant, H.K., Tohme, W.G., Mun, S.K., Hayes, W.S., & Schulman, K.A. (1996). Health systems evaluation of telemedicine: a staged approach. Telemed.J., 2(4), 303-312.

Donabedian, A. (1980). Explorations in Quality Assessment and Monitoring: The Definition of Quality and Approaches to its Assessment. Ann Arbor, MI: Health Administration Press.

Folsom, J.P. (1995). Clinical efficacy of telepsychiatry. Telemed.J., 1(3), 187-188.

Gilmour, E., Campbell, S.M., Loane, M.A., Esmail, A., Griffiths, C.E., Roland, M.O., Parry, E.J., Corbett, R.O., Eedy, D., Gore, H.E., Mathews, C., Steel, K., & Wootton, R. (1998). Comparison of teleconsultations and face-to-face consultations: preliminary results of a United Kingdom multicentre teledermatology study. Br.J.Dermatol., 139(1), 81-87.

Grigsby, J., & Sanders, J.H. (1998). Telemedicine: Where It Is and Where It's Going. Annals of Internal Medicine, 129, 123-127.

Hampton CL, Mazmanian PE, & et al. (1996). Telemedicine in use: The Medical College of Virginia, The Powhatan Correctional Center and the Blackstone Family Practice Center. Virginia Medicine Quarterly, 123(3), 167-170.

Institute of Medicine. Telemedicine: A Guide to Assessing Telecommunications in Health Care. (1996). Anonymous. National Library of Medicine.

Lambrecht, C.J., Canham, W.D., Gattey, P.H., & McKenzie, G.M. (1998). Telemedicine and orthopaedic care. A review of 2 years of experience. Clin.Orthop., (348), 228-232.

Mair, F., & Whitten, P. (2000). Systematic review of studies of patient satisfaction with telemedicine. BMJ, 320(7248), 1517-1520.

McCue MJ, Mazmanian PE, & et al. (1998). Cost-minimization analysis: a follow-up study of a telemedicine program. Telemed.J., 4(4), 323-327.

McIntosh, E., & Cairns, J. (1997). A framework for the economic evaluation of telemedicine. J.Telemed.Telecare., 3(3), 132-139.

Scott, L. (1994). Will healthcare accept the 'virtual' doctor? Maybe, but telemedicine's cost-effectiveness remains in question. Mod. Healthcare., 24(48), 34-35.

Shi, L., & Singh, D.A. (1998). Delivering Health Care in America: A Systems approach. Gaithersburg, MD: Aspen Publishers, Inc.

Sisk, J.E., & Sanders, J.H. (1998). A proposed framework for economic evaluation of telemedicine. Telemed.J., 4(1), 31-37.

Sullivan E, & Rheuban KS. (1996). University of Virginia Telemedicine Program. Improving access. Virginia Medicine Quarterly, 123(3), 179-179.

Telemedicine will Grow 40 Percent Annually Over the next 10 Years. (1999, December 2). Business Wire.

Virginia Department of Health. (1999). Telemedicine Study Pursuant to Senate Bill 1214 (1999) and Budget Item (333 j).

Wootton, R., Bloomer, S.E., Corbett, R., Eedy, D.J., Hicks, N., Lotery, H.E., Mathews, C., Paisley, J., Steele, K., & Loane, M.A. (2000). Multicentre randomised control trial comparing real time teledermatology with conventional outpatient dermatological care: societal cost-benefit analysis. BMJ. 320(7244.):1252-1256.

Yellowlees, P. (2000, July). How Not to Develop Telemedicine Programs. Telemedicine Today.

Appendix A: Authorizing Legislation

An Act to amend the Code of Virginia by adding a section numbered 32.1-19.1, relating to duties of the Commissioner regarding telemedicine.

[S 1214]

Approved May 7, 1999

Be it enacted by the General Assembly of Virginia:

1. That the Code of Virginia is amended by adding a section numbered 32.1-19.1 as follows:

§ 32.1-19.1. Reporting of telemedicine initiatives.

The Commissioner shall annually report to the Governor and the General Assembly on the status of telemedicine initiatives by agencies of the Commonwealth. For the purposes of this section, telemedicine shall mean the use of telecommunications technology to deliver health care services and health professions education to sites that are distant from the host site or educator.

The report shall be issued by October 1 of each year and shall include, but not be limited to, (i) a summary of telemedicine initiatives by agencies of the Commonwealth; (ii) an analysis of the cost-effectiveness and medical efficacy of health services provided using telemedicine; (iii) recommendations regarding any improvements needed in current telemedicine initiatives; and (iv) identification of additional opportunities for use of telemedicine to improve access to quality health care and to health professions education for citizens of the Commonwealth.

* * * * * * * * * * * *

1999 Appropriations Act of the Commonwealth of Virginia

Item 333 j

The Department of Health shall conduct a study of the cost effectiveness and medical efficacy of its telemedicine projects located in Lancaster County, Lee County, and the City of Danville. The Department shall provide initial results of this study to the Chairmen of the senate Finance Committee, the House Appropriations Committee, and the Joint Commission on Health Care prior to December 1, 2000. The final report shall be submitted prior to October 1, 2001.

Appendix B: Commonwealth Legislative Studies of Telemedicine

Virginia Department of Health Telemedicine Study Pursuant to Senate Bill 1214 (1999) and Budget Item 333 j, October 1999.

The first report of the Telemedicine Study (Senate Document 18, 2000) summarized the telemedicine initiatives in the Commonwealth, recommended evaluative strategies recommended for the study and presented preliminary findings.

Report of the Secretary of Technology: A Joint Study to Establish Guidelines for Ensuring Compatibility Among Telemedicine Equipment, House Document No. 18, 2000

After reviewing the use of technology to support telemedicine, it was determined that existing standards were sufficient to support telemedicine initiatives. Improvement in applications standards for specific applications was recommended. Of particular interest in this study was Recommendation #7 suggesting a comprehensive analysis of costs and benefits of telemedicine in order to quantify the benefits of telemedicine and telehealth.

Virginia Department of Medical Assistance Services Telemedicine Report, October, 1999.

This study, pursuant to the 1999 Virginia Acts of Assembly Chapter 935 Item 335 required DMAS to evaluate current Medicaid reimbursement for telemedicine, to develop protocols for telemedicine services and to identify additional services appropriate for telemedicine reimbursement. DMAS concluded that telemedicine has significant potential to improve access to services but changes in reimbursement should be approached cautiously pending further evaluation.

Report of the Joint Commission on Health Care: Study of Reimbursement and Quality of Care Issues Regarding Telemedicine Pursuant to HJR 210, House Document No. 48, 1999

This study found that reimbursement was an obstacle to growth. The authority for the present study was derived from recommendations in this report that suggested the Commissioner of Health play a greater role in monitoring the state's commitment and progress in telemedicine

including assessment of the three local telemedicine programs sponsored by the VDH.

Report of the Council on Information Management: Barriers to the Implementation of Telemedicine in Virginia, House Document No. 31, 1997

This report identified lack of reimbursement, lack of community physician acceptance, and confidentiality, as well licensing and credentialing issues and malpractice liability, as the most important barriers to expansion of telemedicine.

Report of the Council on Information Management: Reimbursement for Telemedicine Services, House Document No. 51, 1997

This report concluded that health care payers did not support a policy of reimbursement for telemedicine services. However, telemedicine was believed to offer significant potential benefits to the Commonwealth's population and state efforts to evaluate and encourage telemedicine pilot projects were felt to merit continuation.

Report of the Joint Commission on Health Care: Study of Telemedicine Pursuant to HJR 455 of 1995, House Document No. 6, 1996.

This report concluded that cost-benefit analysis was difficult with telemedicine, especially considering use by the uninsured, and that the lack of reimbursement constrained telemedicine development. The report recommended that the Commonwealth review and consider a variety of ways to support the continued growth and evaluation of telemedicine development.

Appendix C: Representatives of Telemedicine Sites Interviewed for this study

- Virginia Commonwealth University Telemedicine Program: Carol Hampton; Dr. Lisa Kaplowitz; JK Stringer.
- University of Virginia Telemedicine Program: Dr. Karen Rheuban; Gene Sullivan; Wendy Novicoff; Carolyn Craig.
- Virginia Department of Health: Eletta Heath-Hanson.
- Three Rivers Health District: Joyce Lewis; Dr. Phil Winter.
- Danville Health District: Kathryn S. Plumb; Dr. M. Geoff Smith
- Lenowisco Health District: Ann Wu; Dr. Sue Cantrell; Lorraine Allen.
- Virginia Department of Corrections: Fred Schilling; Michael Dent; Angelo Celestini.
- Virginia Department of Medical Assistance Services: Jeff Nelson.
- Cumberland Community Services Board (Appal-link): Henry Smith; Ron Allison.

Mkf/1.19.01

Appendix D: Recommended Pilot Instruments

Host Site _____

1. General Information

Name of the telemedicine program?

What is the primary sponsoring agency?

When was the first patient seen in the program?

Does the telemedicine program have a mission statement?
If so, please attach a copy.

What type of site houses the telemedicine program (clinic, hospital, etc)?

2. Expenditures (Include information for the host site and the remote sites)

What telecommunication hardware (transmitting units, monitors, VCRs) do you use?

How much did the telecommunication hardware cost?

What digital diagnostic equipment (camera, electronic stethoscope, radiological light box, etc) do you use?

What was the cost of the digital diagnostic equipment?

What linkage do you use?

What was the cost to establish the linkage or get the lines installed?

What transmission capability do you use (T1, etc)?

What is the cost for use of the lines?

What is the cost of line maintenance?

Describe the line maintenance.

What hardware, software, and diagnostic/peripheral equipment have you upgraded since the site was begun?

What was the cost of the upgrade(s)?

Have the lines been upgraded since you began services?

Does the program have an integrator?

What ongoing training is provided to clinical support, non-clinical support, and administrative* staff?

What is the annual cost of the training?

*Clinical Support Positions (e.g. coordinator, nurse practitioners, physician assistants, nurses, technicians, therapists); Non-clinical support (e.g. systems/hardware consultants, integrators); Administrative (e.g. coordinator, accounting)

3. Program Development and Planning

Does the program have a capital budget?

What is the total capital budget for the next 5 years?

Has the program conducted a community needs assessment for telemedicine? If so, please attach a copy.

Does the program have a business plan? If so, please attach a copy.

Does the program have a marketing plan? If so, please attach a copy.

Describe the geographic area served by the telemedicine program.

Does the site host learning programs?

Are there monthly statistics available on the programs of the site? If so, please attach a copy.

4. Quality Assessment

Does the program have specific quality assessment/assurance protocols for the telemedicine program? If so, please describe.

Does the program have a policy on provider liability?

Has the program done an overall risk assessment?

Does the program complete patient satisfaction surveys? If so, please attach a copy.

Does the program have its own patient consent form?

Does the program conduct provider satisfaction surveys? If so, please attach a copy.

Does the program videotape telemedicine sessions?

How does the program handle documentation of the telemedicine visit?

How is the system reliability monitored?

What kind of quality assessment/assurance training is provided to telemedicine program staff and providers?

What are the primary quality assessment/assurance goals?

Host Site _____

5. Health Care Utilization: Host/Consulting Sites

Telemedicine service	Yr. Began	Tele-medicine Consults/Yr.	Unduplicated Patients Per Year	Amount of Telemedicine Hours Per Month	Most Common Diagnosis 1	Approved protocols on file	# of participating physicians	Average amount of time physician use tele-medicine per month
Radiology								
Pathology								
Cardiology								
Psychiatry								
Pharmacy								
Dermatology								
HIV								
Other								
Other								

Host Site _____

6. Clinical, Technical and Administrative Personnel

Clinical Support Positions (e.g. coordinator, nurse practitioners, physician assistants, nurses, technicians, therapists)	Licensure/ Credentials Required	% time on telemedicine	Contract or employee	Cost to tele-medicine program	Describe role
Position:					
Position:					
Non-clinical support (e.g. systems/hardware consultants, integrators)					
Position:					
Position:					
Administrative (e.g. coordinator, accounting)					
Position:					
Position:					

Host Site _____

7. Telecommunications Capacity

Specialty	Real-time capability	Still picture capability	Store and forward capability	Communication infrastructure	Other bandwidth available	List digital diagnostic equipment available
Radiology						
Pathology						
Cardiology						
Psychiatry						
Pharmacy						
Dermatology						
HIV						
Other						
Other						

Site _____

1. General Information

Name of the telemedicine program?

What is the primary sponsoring agency?

When was the first patient seen in the program?

Does the telemedicine program have a mission statement?
If so, please attach a copy.

What type of site houses the telemedicine program (clinic, hospital, etc)?

2. Expenditures

What telecommunication hardware (transmitting units, monitors, VCRs) do you use?

What digital diagnostic equipment (camera, electronic stethoscope, radiological light box, etc) do you use?

What linkage do you use?

What transmission capability do you use (T1, etc)?

What hardware, software, and diagnostic/peripheral equipment have you upgraded since the site was begun?

Have the lines been upgraded since you began services?

Does the program have an integrator?

What ongoing training is provided to clinical support, non-clinical support, and administrative* staff?

What is the annual cost of the training?

*Clinical Support Positions (e.g. coordinator, nurse practitioners, physician assistants, nurses, technicians, therapists); Non-clinical support (e.g. systems/hardware consultants, integrators); Administrative (e.g. coordinator, accounting)

3. Program Development and Planning

Has the program conducted a community needs assessment for telemedicine? If so, please attach a copy.

Does the program have a business plan? If so, please attach a copy.

Does the program have a marketing plan? If so, please attach a copy.

Describe the geographic area served by the telemedicine program.

Does the site receive learning programs?

Are there annual or monthly statistics available on the programs of the site? If so, please attach a copy.

4. Quality Assessment

Does the program have specific quality assessment/assurance protocols for the telemedicine program? If so, please describe.

Does the program have a policy on provider liability?

Has the program done an overall risk assessment?

Does the program complete patient satisfaction surveys? If so, please attach a copy.

Does the program have its own patient consent form?

Does the program conduct provider satisfaction surveys? If so, please attach a copy.

Does the program videotape telemedicine sessions?

How does the program handle documentation of the telemedicine visit?

How is the system reliability monitored?

What kind of quality assessment/assurance training is provided to telemedicine program staff and providers?

What are the primary quality assessment/assurance goals?

Site _____

5. Health Care Utilization: Referring Sites

Referring Site Specialty	Yr. Began	Tele-medicine Consults/Yr	Unduplicated Patients Per Year	Amount of Telemedicine Hours Per Month	Most Common Diagnosis 1	Approved protocols on file? Y/N	# of participating physicians	Average amount of time physician use tele-medicine per month
Radiology								
Pathology								
Cardiology								
Psychiatry								
Pharmacy								
Dermatology								
HIV								
Other								
Other								

Site _____

6. Clinical, Technical and Administrative Personnel: Referring Sites

Clinical Support Positions (e.g. coordinator, nurse practitioners, physician assistants, nurses, technicians, therapists)	Licensure/ Credentials Required	% time on telemedicine	Contract or employee	Cost to tele-medicine program	Describe role
Position:					
Position:					
Non-clinical support (e.g. systems/hardware consultants, integrators)					
Position:					
Position:					
Administrative (e.g. coordinator, accounting)					
Position:					
Position:					

Site _____

7. Telecommunications Capacity

Specialty	Real-time capability	Still picture capability	Store and forward capability	Communication infrastructure	Other bandwidth available	List digital diagnostic equipment available
Radiology						
Pathology						
Cardiology						
Psychiatry						
Pharmacy						
Dermatology						
HIV						
Other						
Other						

Virginia Department of Health Telemedicine Study
Virginia Telemedicine Assessment Project: Provider Satisfaction Survey

Patient _____ Provider _____

What were the primary reasons for the session? (Check all that apply)

- ☐ Advice on plan of treatment
- ☐ Routine diagnosis consult
- ☐ Medication management
- ☐ Patient education
- ☐ Other outpatient management
- ☐ Second opinion
- ☐ Pre-admission consult
- ☐ Treatment

If this telemedicine site were not available, would you have:

- ☐ seen patient in my office
- ☐ admit to hospital
- ☐ send to ER
- ☐ refer to specialist
- ☐ refer to primary care provider
- ☐ other _____

Did the session result in a diagnosis on the condition?

☐ yes ☐ no

Were you comfortable with the validity of this diagnosis?

☐ yes ☐ no

Did the session result in a change in plan of treatment?

☐ yes ☐ no

The next follow-up care will be provided via:

☐ telemedicine ☐ face-to-face

Please rate how well the telemedicine equipment was functioning at the site:

- ☐ very well
- ☐ inadequate – session terminated
- ☐ a few problems but care was not affected
- ☐ other _____

How easy was it to use the telemedicine equipment at the site?

- ☐ very easy
- ☐ very difficult
- ☐ a few difficulties but care was not affected
- ☐ other _____

The session fit conveniently into my schedule

☐ yes ☐ no

Overall, I was satisfied with this telemedicine session

- ☐ very satisfied
- ☐ satisfied
- ☐ somewhat dissatisfied
- ☐ very dissatisfied

Patient _____ Provider _____

If you were not satisfied with the telemedicine session, please note why (check all that apply):

- ☐ presenter abilities not adequate
- ☐ inadequate physical exam/labs
- ☐ equipment difficult to use
- ☐ other _____
- ☐ connection to other site was poor
- ☐ patient appeared uncomfortable
- ☐ equipment malfunction

Please rate:

The consultant skills were:

- ☐ excellent
- ☐ good
- ☐ average
- ☐ inadequate
- ☐ very inadequate

The overall clinical encounter:

- ☐ excellent
- ☐ good
- ☐ average
- ☐ inadequate
- ☐ very inadequate

The quality of the telemedicine transmission:

- ☐ excellent
- ☐ good
- ☐ average
- ☐ inadequate
- ☐ very inadequate

The setting/environment of the telemedicine encounter:

- ☐ excellent
- ☐ good
- ☐ average
- ☐ inadequate
- ☐ very inadequate

The communication of the consultant with you:

- ☐ excellent
- ☐ good
- ☐ average
- ☐ inadequate
- ☐ very inadequate

Will you use this telemedicine facility again:

- ☐ yes
- ☐ not sure
- ☐ no

Comments:

_____

_____

Virginia Department of Health Telemedicine Study

University of Virginia Telemedicine Program
Patient Post-Session Survey

Patient number _____

Patient Post-Session Survey

This section will be filled out by clinic or hospital staff. Please proceed to the first question.

Name of site: _____

Patient age and sex: _____

Date of consult: _____

Consult initiator: _____

Consulting provider: _____

1. Was this your first telemedicine consultation? O Yes O No

2. Overall, how satisfied were you with this telemedicine visit?
   - O Very satisfied
   - O Somewhat satisfied
   - O Neutral
   - O Somewhat dissatisfied
   - O Very dissatisfied

3. Rate the following aspects of this telemedicine visit:

		Very Good	Good	Average	Poor	Very Poor
a.	The telemedicine consultant's treatment of you	O	O	O	O	O
b.	The local provider's treatment of you	O	O	O	O	O
c.	Local staff's treatment of you	O	O	O	O	O
d.	Overall quality of care	O	O	O	O	O
e.	Quality of telemedicine pictures	O	O	O	O	O
f.	Quality of telemedicine sound	O	O	O	O	O
g.	Adequacy of privacy	O	O	O	O	O
h.	Level of personal interest taken in you by the telemedicine consultant	O	O	O	O	O
i.	Your local provider's participation with you during the telemedicine visit	O	O	O	O	O

4. How was the quality of care you received during this telemedicine visit compared to an in-person visit?
   - O Much better
   - O Better
   - O Same
   - O Worse
   - O Much worse

Patient number _____

5. Compared to an in-person visit with a consultant, how comfortable were you during this telemedicine visit?
   - O Much more comfortable
   - O Slightly more comfortable
   - O About the same
   - O Slightly less comfortable
   - O Much less comfortable

6. All things considered, would you prefer to have a local telemedicine visit like the one you just had or to travel to see a health care provider in person?
   O Telemedicine visit O See health care provider at their usual place

7. Would you recommend telemedicine care to someone who needed to see a consultant?
   O Yes O No

   Why? _____

8. After today's session, I would use telemedicine again
   - O Yes, any time my provider advises that I seek a telemedicine consult
   - O Yes, only if in-person care were not available in a timely manner
   - O Yes, only if I would otherwise have to travel further for in-person care
   - O Yes, I prefer telemedicine to an in-person visit
   - O Other (specify) _____
   - O No

   If you answered no, why not? _____

The next questions ask what kind of transportation and other plans you made so you could be here today.

9. How did you travel to the telemedicine visit today (check all that apply)
   - O Walked
   - O Personal vehicle
   - O Taxi or other hired vehicle
   - O Public transportation
   - O Ambulance
   - O Other (specify)_____
   - O Not applicable (for example, inpatient)

9a. About how far did you travel one way for this telemedicine session? _____miles

9b. About how long did it take you (one way)? _____hours _____minutes

10. Did you or will you have to pay for your transportation today?
    O Yes If yes, how much? $ _____
    O No

    Did you or will you have to pay for child or dependent care to attend this session?
    O Yes If yes, how much? $ _____
    O No

Patient number _____

12. Did you or anyone else take time off from work or school so that you could keep this appointment.
   - O No one took time off from work or school
   - O I took time off from work
   - O I took time off from school
   - O Someone else took time off from work
   - O Someone else took time off from school
   - O Someone was required as part of his/her job to accompany me to this session
   - O Not applicable

12a. If you or someone else had to take time off from work or school, please estimate the amount of time. ____ hours, ____ minutes

13. For this same problem, could you have seen a health care provider who visits your community regularly instead of the telemedicine visit? (check one)
   O Yes O No O Don't know

14. Without telemedicine, would you have had to wait longer to be seen for this problem?
   O Yes O No O Don't know

14a. If yes, how much longer? Estimate number of days_____

15. Without telemedicine, would you have had to travel further than you did today to be seen for this problem?
   O Yes O No O Don't know

15a. If yes, how much further? Estimate number of miles, one way_____

15b. How would you have traveled?
   - O Walked
   - O Personal vehicle
   - O Taxi or other hired vehicle
   - O Public transportation
   - O Ambulance
   - O Other (specify)_____
   - O Not applicable (for example, inpatient)

16. If you had been referred out of town to see a consultant instead of telemedicine, how much more would it have cost you, not counting the physician's charges? Include transportation costs, missed income from work, extra costs of meals, and other costs. $_____

17. This form was filled out by
   - O Patient
   - O Representative accompanying patient
   - O Data collector/staff

If applicable, please specify why patient did not complete this form.

_____