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VHA Teledermatology Toolkit
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Section 1: Introduction, Background, and Use of the Toolkit

Introduction

This toolkit has been produced as a collaborative effort between:

1. VHA staff and clinicians involved in delivering teledermatology services
2. The VHA Telehealth Strategic Healthcare Group

Background

Dermatology lends itself well to telemedicine since diagnoses are usually heavily influenced by the visual examination of skin. There are two major categories of teledermatology:

1. Asynchronous or Store-and-Forward teledermatology
2. Real-time interactive teledermatology

Store-and-forward teledermatology uses still photographic images of skin (e.g. lesions, moles, etc.) taken at a referring clinic that are interpreted by a consulting dermatologist at some later time and usually at another location.

In contrast, real-time interactive teledermatology allows the patient to be examined and interviewed at the local clinic or residence, via live interactive video images, by a dermatologist in a distant facility. This particular toolkit addresses teledermatology healthcare using both asynchronous store-and-forward and real-time videoconferencing modalities:

1. Between two VHA medical center facilities
2. Between VHA medical center facilities and Community Based Outpatient Clinics (CBOC's)

This toolkit will not specifically address home teledermatology services since home telehealth is addressed extensively in a separate VHA Home Telehealth Toolkit. Therefore, this Teledermatology Toolkit may be used in conjunction with the VHA Home Telehealth Toolkit in order to coordinate general teledermatology principles with home telehealth care services.

Internet resources for teledermatology include:

American Academy of Dermatology (www.aad.org)'s:

www.aadassociation.org/Policy/prescribing.html www.aadassociation.org/telemedicine.html
www.aadassociation.org/Policy/telemedicine.html

American Telemedicine Association's Teledermatology Special Interest Group

www.americantelemed.org/ICOT/icot.htm

Using this toolkit

The impetus to produce this toolkit was an attempt to harmonize the practices and procedures used in teledermatology in VHA for the benefit of patients and practitioners. This harmonization of processes and procedures applies to:

1. Establishing a new teledermatology health service
2. Revising or reviewing an existing service

The ideal way to use this toolkit is in conjunction with the establishment of a steering group with overall responsibility for tele dermatology health services. Typically such a steering group includes such persons as:

1. The lead clinician for the tele dermatology health services
2. The local telehealth coordinator (Facility or VISN)
3. Member of the Facility or VISN executive leadership team
4. A Facility or VISN representative from IT (Information Technology)
5. The local credentialing coordinator
6. A local representative from HIMS (Health Information Management Systems)
7. The facility Information Security Officer

This toolkit provides a framework to discuss essential items that should be considered when establishing tele dermatology services. It is important to begin this process by assessing:

1. What is the need for tele dermatology services (Section 2: Needs Assessment)?
2. How should the services be constructed (Section 3: Clinical Specifications, and Section 4: Technical Specifications)?
3. What is necessary to make the services operational and to ultimately sustain them (Section 5: Managing the Service)?
4. How will clinical effectiveness of the services be monitored (Section 6: Quality and Outcomes Measures)?

These sections will be supplemented by a number of additional items:

1. Hotlinks will be included throughout the text to facilitate direct connection to such items as VHA directives and vendor Web sites.
2. Additional policies and surveys will be attached and referenced throughout the text.
3. The content of the toolkit concludes with a checklist to help assess the readiness of the program as an operational service, together with a glossary and bibliography.

Many sections of this toolkit will have two parts; one for store-and-forward and one for real-time tele dermatology.

Section 2: Needs Assessment

Defining the reasons for considering tele dermatology health services

As the first step in exploring the creation of a tele dermatology program, the steering group should determine why tele dermatology is being considered as an alternative to face-to-face visits. Typically, tele dermatology health programs have been started in the VHA:

1. To increase access to dermatologic care in geographically remote areas where no current services exist
2. To augment dermatologic services in areas where it is difficult to recruit staff at the necessary or desired level
3. To increase efficiency in places where travel time for current VHA clinicians would significantly diminish their clinical time

The first 2 aims are primarily directed at meeting patient needs, while the last aim attempts to enhance clinician effort. However, regardless of the primary motivation for tele dermatology, both patients and clinicians can potentially benefit. It is desirable to meet special needs of both patients and clinicians as much as possible to encourage the use and growth of tele dermatology.

Performing the needs assessment

The steering group should oversee the determination of the patient need for tele dermatology health services as well as the needs and resources available to the clinicians involved.

Patient needs

This should define which patients would most benefit from tele dermatology services by asking:

1. Who are the patients that are currently receiving dermatologic treatment at existing VHA facilities who would instead be served by tele dermatology if it existed?
2. Who are the patients that receive other care at VHA, but are not receiving dermatologic treatment but would benefit from dermatologic consultation via telemedicine?
3. Who are the patients that might choose to begin services at the VHA if tele dermatology was available but who are not currently receiving VHA services?

Addressing the first question could begin by 1) Requesting a report from the VHA's Austin database on patients that are seen in non-surgical dermatology clinics at the existing parent VA facility, and then identifying those patients who have their primary care physicians at a remote CBOC or VAMC. These would represent patients who might benefit from having their care integrated into their primary care physician's setting. 2) Examining waiting times for appointments. This information can usually be obtained locally by clinic staff. Other performance standards for the dermatology service may also be examined to determine if they can be further enhanced by tele dermatology.

Addressing the second question might begin by surveying the primary care providers who work at locations without a dermatologist who is regularly physically available.

Addressing the third question above often begins by identifying eligible veterans with service-connected dermatologic diagnoses but are currently not vested. Some of these patients with primarily dermatologic problems might be willing to receive VHA treatment if dermatology services are located geographically closer to them.

Identification of the patients in the groups above can be merged with their geographical residence. This data can be obtained by VISN/Facility/CBOC location as a whole for which the tele dermatology service is being considered, then by Zip Code. Each facility or VISN usually have support staff that can obtain this information, as this has been readily done in already existing VA tele dermatology programs. The data can then be further imported to a geographical mapping software program that visually plots where such patients are clustered geographically.

Using these VHA databases one can identify which potential satellite tele dermatology sites (e.g. CBOC's and VET Centers) are likely to have sufficient patient numbers in what diagnostic categories (patient need) to justify developing tele dermatology services.

Assessing needs in this way gives the steering committee overall numbers and locations of patients that might benefit from tele dermatology services. This is important in deciding the "who", "what" and "where" of establishing tele dermatology services.

Clinician needs

It is also crucial to determine the needs of both the referring and consulting clinicians. Since referring providers and their staff and the dermatologist consultants are crucial components in the teledermatology transaction, identifying areas in which both of these groups would benefit from teledermatology is important to the success of the program.

The dermatology service or dermatologist who will serve as the teleconsultant should be consulted for their preference for store-and-forward or real-time interactive teledermatology. While both of these modalities have demonstrated diagnostic reliability comparable to face-to-face care, each has its advantages. The decision to use one or the other, or both, should be made in consultation with the clinicians who will actually be using the system.

Store-and-forward teledermatology is often useful when dermatologist time is at premium and technical and financial resources are also already scarce. Benefits: The consultant dermatologist can review at his/her convenience digital photos that were previously uploaded, and can render an opinion that is often more thoughtful and educational for the referrer than during a live session. The amount of dermatologist time spent per case is usually significantly reduced compared to a live patient interaction. No scheduling is involved, so the referring clinic can obtain and send photos as they acquire them or when convenient. A high quality, easy-to-use handheld digital camera can be obtained currently with minimal expense and does not encroach on clinic space. A high bandwidth connection is also not necessary. Challenges: However, this approach depends critically on the quality of training of the staff who obtain images and history sent from the referring clinic. Moreover, the patient is usually not available to immediately benefit from any recommendations but must be contacted by the referring clinic staff or rescheduled for a return visit for any additional diagnostic tests or photographs.

Real-time interactive teledermatology is comparable to a face-to-face session. Benefits: This modality allows the dermatologist greater control over which images are obtained and also allows queries directly to the patient. The patient also benefits from immediate recommendations at the end of the session. Challenges: This approach is essentially the same as doing a face-to-face clinic — the interaction must be scheduled for all parties involved, and the time required for the consultation or lost if the patient does not show is equivalent to time that the dermatologist would have spent seeing a face-to-face patient. This modality, therefore, may require the dermatology service to allot a certain amount of FTE specifically to teledermatology. The referring clinic must also set aside some space and clinician time for the teledermatology videoconferencing. The nature of the modality requires a reasonably high-bandwidth connection. An initial investment must be made for each clinic site to acquire and install equipment, although in many cases the basic telecommunications connections and equipment may already exist for administrative purposes or other telehealth programs.

Section 3. Clinical Services Specifications

Who will receive teledermatology health services:

In general, teledermatology should be a widely inclusive consult modality with few patient-centered restrictions on eligibility. However, resource availability, primarily the ability of the Dermatology Consult Service to handle teledermatology consult volume, must be considered when implementing a teledermatology consult system.

General Inclusion Criteria for Teledermatology Patients:

1. All patients eligible for dermatologic care in the VHA.
2. New and established patients (patients who have previously received clinic-based dermatology care).
3. Requests for diagnostic questions and/or management of existing conditions.
4. Site-specific criteria should be considered such as designating CBOCs or other affiliated clinics/medical centers that will participate in the consult process.

General Exclusion Criteria for Teledermatology Patients:

1. Patients who do not give verbal informed consent to participate in the teledermatology process.

What teledermatology services will be offered:

Teledermatology services can be divided into:

A. *Consultation*. Typically, this is a single consult whereby the consultant provides a diagnosis and treatment plan to the referring clinician. It is the responsibility of the referring clinician to implement these recommendations. The consultant does not assume care of the patient.

B. *Ongoing Treatment*. The consultant clinician provides care beyond the level of consultation only and assumes care of the patient.

The model for teledermatology consult services will almost exclusively entail the *consultation* option. The consultant dermatologists will provide a diagnosis or presumptive diagnosis and a treatment plan intended for implementation by the referring clinician. Follow-up care for a patient who has had previous contact with a dermatology clinic (an established patient) may also receive continuity care via the *consultation* mechanism, providing that the referring clinician remains responsible for implementing the recommendations.

The consultant teledermatologist may, additionally, request an in-person clinic visit. There are several reasons for requesting an in-person clinic, including uncertainty of the diagnosis, poor image quality, the need for a dermatologist-directed intervention, and other reasons. In this case, the dermatologist would assume *ongoing care* when the patient presents to clinic as would normally occur in a conventional clinic-based consult. Ongoing post-clinic visit care may be provided via the teledermatology consult mechanism, as described above, through either *consultation* or *ongoing treatment* services, as agreed upon by the referring and consultant clinician. In general, the *consultation* mode should be favored.

Where will teledermatology patients be treated:

The referring site, whether it be a store-and-forward or real-time interactive consult, will be the site of treatment. This would include any facility that is functioning as the referral site. Teledermatology patients that require an in-person clinic visit with a dermatologist will be under the care of the referring clinician until that patient presents to the dermatology clinic. Follow-up treatment can be arranged via clinic visits or teledermatology as agreed upon by the patient, consultant, and referring clinician.

When will teledermatology patients be treated:

Store-and-forward modality. Consultant recommendations that result from a store-and-forward consult are the responsibility of the referring clinician, unless otherwise agreed upon by both parties. Store-and-forward consults should be reviewed in a timeframe that is understood by both parties. The timeliness of treatment implementation by the referring clinician will be guided by the diagnosis and treatment plan offered by the consultant and cannot be uniformly proscribed. A mechanism should exist that alerts the consultant that a consult is pending and that alerts the referring clinician that a consult request has been answered. When using CPRS, the "View Alert" system can fulfill this role. Interfacility consults should adopt the interfacility consult mechanism in CPRS that allows for use of the View Alert system. If consults are being conducted outside the CPRS medical record, some mechanism analogous to the View Alert system should be implemented.

Real-time interactive modality. Because of the real-time nature of this consult modality, the referring clinician and/or a telepresenter (e.g., Physician's Assistant) receives immediate feedback on a diagnosis and treatment plan. While this allows for simultaneous implementation of the consultant's recommendations, the timing of implementation will still be guided by the diagnosis and treatment plan offered by the consultant dermatologist and whether the referring clinician is also the telepresenter or not.

Who will treat the teledermatology patients:

Store-and-forward

Originating Site Referring Clinicians

1. Any clinician with privileges to refer patients to a Dermatology Consult Service. This includes physicians, physician assistants, and nurse practitioners.

Distant Site Consulting Clinicians

1. Staff dermatologists
2. Resident dermatologists

Real-time interactive

Originating Site Referring Clinicians

1. Any clinician with privileges to refer patients to a Dermatology Consult Service. This includes physicians, physician assistants, and nurse practitioners.
2. Real-time interactive consults require a telepresenter. A telepresenter may or may not be the individual that initiates the consult. The telepresenter is responsible for the using the video-conferencing technology.

Distant Site Consulting Clinicians

1. Staff dermatologists
2. Resident dermatologists

For both consult modalities, responsibility for implementing treatment recommendations (e.g., biopsies, cryotherapy, etc.) by either the referring clinicians or the dermatologists should be discussed prior to initiating the teledermatology consult system. Since there is regional variation among sites regarding treatment implementation, this should be left to the discretion of the referring and consultant clinicians.

Section 4: Technical Specifications

Inventory of existing equipment

After deciding which sites will participate in the teledermatology program and which mode of delivery (store-and-forward and/or real-time) will be used, attention should be turned to the equipment and technology portion of teledermatology. Some of the intended sites may already have existing equipment used for other programs that can be used or added to and very little new equipment may be needed. Many CBOC's already have videoconferencing equipment used for administrative meetings, etc. that could be available for clinical use at certain periods of time. Before purchasing new equipment, a decision should be made on which peripherals will be used. This may determine the need for more equipment or a different videoconferencing system. The equipment should be in a room that meets the privacy and security needs of patients in a clinical setting. These issues should be addressed long before the clinic commences.

Purchasing the Equipment

If a telehealth steering committee has been formed in your medical center or VISN, they can help with contacts at the local or VISN level to help procure the equipment. There is usually a network administrator in IT at the VISN level who knows which sites have equipment. This person will be able to answer questions on availability of equipment or give contact information for the Informatics staff in the medical centers and CBOC's. The dermatologist should be included in the decision of what equipment to purchase in case they have a preference.

Informatics Support

It is imperative that the VISN and local Informatics Service Line is involved in planning any new teledermatology clinics, especially real-time clinics, from the beginning. The VISN and local CIO's support is critical to the success of telehealth initiatives. Develop a working relationship with these staff. They can help with questions and training with VISTA Imaging for store-and-forward. They will know current problems, future plans for the system, and the bandwidth available and will save the clinic coordinators many headaches. Bandwidth availability is very important for real-time dermatology clinics. If the system is competing for bandwidth with data traffic on the network, there will be disruption in video and audio and it will be hard to communicate effectively. The IT personnel should be available by phone at all times for technical problems. These are real clinics with real patients and if end users are not able to rely upon the technology, they will cease use of it and return to in-person clinics.

Information Security

The facility ISO should be involved in the planning stages to make sure the proposed teledermatology program is HIPPA compliant. This is also the contact for staff to receive access to other facilities if needed for a teledermatology clinic.

Modes of Delivery:

Store-and-forward modality

A complete guide to digital photography is beyond the scope of this toolkit. Cameras differ in their configuration and the camera manual will be the best guide to the user. Practice with using the camera is also very important in photography and the user should learn to operate and feel comfortable with the camera. There are many non-VA commercial online resources to learn all about digital photography.

Camera: High-resolution photographic images should be taken with a digital camera having a minimum resolution of 1024 x 768 pixels (J. Am. Acad. Dermatol. 1999; 41:749-56 and www.aadassociation.org/telemedicine.html). Much higher resolution point-and-shoot digital cameras can now be purchased at an affordable price (less than \$1000), but these resolutions are often not necessary, and are associated with longer transfer times and increased storage requirements. In general, a camera with at least 3 megapixels should offer enough flexibility in resolution to meet most clinical needs. Other important features of the camera:

- 1) Relatively easy to operate for an average person;
- 2) Macro mode allowing optical (not just digital) close-up view of skin;
- 3) Control of the flash or no flash; and
- 4) Method of image storage (e.g., flash card, other).

Various camera models with varying features and capabilities are available from several manufacturers. A good digital camera costs from about \$500 to \$1500.

Imaging Standards and Quality Assurance: Comprehensive pre-determined photographic standards are not possible due to features such as skin tone, lesion location, lesion size, and the nature of photography itself. Nonetheless, some attempt at accurately reproducing the features of the imaged skin lesion must be attempted (e.g., accurate representation of the colors present). Variables that can affect the final image include features and settings of the camera, the ambient light source or camera's light source, the software used for image adjusting and viewing, and the monitor used for viewing. The single most important factor for image quality assurance is to have a mechanism to immediately review images after they are obtained. This can include a built-in screen on the camera itself, however immediately uploading to a laptop or desktop computer is preferable. The most common event that negatively impacts image quality is lighting. The light source, particularly the camera's own light source often requires adjustments that can only be determined after reviewing the image. It is frequently necessary to adjust the light source and retake images for optimal quality.

Another consideration is color matching. Consultant dermatologists may be misled if the image they are reviewing does not accurately represent the color spectrum present in the actual lesion. Most digital imaging software packages allow for color corrections. A tool from traditional photography, a color chart, allows the imager to make software adjustments to the image that result in better color matching than the "stock" image directly obtained by the camera. Additionally, making sure that the screen resolution and color depth of the viewing monitor is set at adequately high levels to incorporate all the digital information that is contained in the image is important. Finally, many digital cameras are highly automated. However, should some features be adjustable, those settings should be determined and optimized prior to imaging. A previous publication describes how many of these issues were addressed in one application of teledermatology, however, these specific procedures may not directly translate to other settings.¹ The general principles of color matching and a mechanism for quality control are, however, universal features that should be considered.

Image Review Monitors: If the digital camera does not have a built-in screen to review image quality, it is desirable to have a computer that is available to quickly review the images at the referring clinic while the patient is still present. The computer used by the dermatologist should have a monitor sufficient for reviewing images, typically 1024 x 768 pixels and 24 bit color (J. Am. Acad. Dermatol. 1999; 41:749-56 and www.aadassociation.org/telemedicine.html). Of course, the computers should also be fully capable of supporting CPRS and Vistaimaging.

Uploading images to VistA Imaging server: If the computer is a laptop with a PCMCIA slot and the camera uses a standard PC card, transfer of images from the camera to the computer is relatively straightforward. Some cameras can also be directly connected to computers. However, depending on the type of memory media (e.g., flash card) used by the camera, it may be desirable to purchase a separate card reader that allows the card to be accessed by the computer. The advantage of these

¹ Whited JD, Mills BJ, Hall RP, Drugge RJ, Grichnik JM, Simel DL. A pilot trial of digital imaging in skin cancer. J Telemed Telecare 1998;4:108-112

readers is that clinic staff can continue to use the camera while previous photos are simultaneously processed.

Peripherals: If one obtains a good quality camera with macro mode ability, extra peripherals are seldom necessary. However, some dermatologists like the ability to evaluate lesions under polarizing light as well as using dermoscopy attachments. These accessories are available from various commercial vendors. However, the use of these peripherals increases the sophistication of training as well as the time required to image a patient.

Room conditions: Good lighting is important to illuminate the skin, but also since some digital cameras depend critically on adequate lighting in order to autofocus. Natural lighting from indirect sunlight is usually best, but fluorescent or incandescent room lighting can also be used as long as the skin is well-illuminated. Many digital cameras have the ability to adjust for different types of light, and this function can be optimized and agreed upon ahead of time with the dermatologist. A background of non-reflecting blue cloth (3' x 6') as well as smaller cloths (such as a blue surgical towel) for smaller areas on extremities are often useful in creating a uniform appearance as well as minimizing unwanted reflections and distracting backgrounds.

Labeling: Photos can be labeled with the patient's name; this may be required, depending on the site. Often these come with a ruler on them as well that aids the dermatologist in evaluating the lesion. These can be purchased from commercial vendors or designed locally and printed out (see appendix for example).

Real-time modality

If a real-time teledermatology clinic is to be implemented, videoconferencing equipment such as that used for videoconferences between facilities should be acquired. The most important considerations for real-time teledermatology are:

- the videoconferencing systems located at collaborating sites are compatible.
- the systems use the same video application protocols.
- there is sufficient bandwidth for transfer of images/video/data between collaborating sites for the application

Equipment utilized must provide a high-resolution image for diagnostic purposes. Image quality is a function of refresh rate and resolution. At high bandwidths (512 kbps up to 1.922Mbps), these units can deliver TV quality, 60 fields video, for an outstanding video image and complete motion capture. Many CBOC's and most VA medical centers are equipped with T-1 lines (1.544 Mbps) for their video conferencing equipment over IP and this will provide the resolution needed. There are several videoconferencing equipment manufacturers with equipment currently in use in VHA facilities. These units sell for approximately \$4,000 to \$10,000. This is for the videoconferencing unit alone and does not include monitors, cables, installation, warranty, training, etc necessary to begin. The unit must be set appropriately for the bandwidth available. The local Informatics staff should be included on training when the unit is installed. You may wish to visit the Web sites of some of the companies manufacturing this equipment to get more information.

Peripheral Devices for real-time teledermatology:

There are several peripheral devices and cameras available for use in a teledermatology clinic. The consulting dermatologist should make the decision which of these devices they would like to use. There is no need to have all of these if the dermatologist does not want to use some of them. Make sure you order the necessary equipment to connect the peripherals to the videoconferencing

equipment. Your Informatics staff and the vendor can help with these decisions. You may want to think about involving your Biomedical Engineering department to help take care of your equipment.

General examination camera – Most real-time examinations will be performed using the regular room camera installed in the videoconferencing unit and a separate general examination camera (with x50 lens) for closer viewing. A good general examination camera combines power zoom, auto focus, freeze frame, and electronic image polarization in one camera. The General exam camera's freeze-frame function allows the consultant to study a selected area when it is difficult to hold the camera perfectly still. A tripod can also be used with this camera but is not essential. A general examination camera costs approximately \$6000.

Dermatoscope - Another camera available is a dermatoscope. It connects to the general examination camera. This camera is good especially for pigmented lesions as it lies on the skin. A millimeter scale in the contact plate allows lesion measurement. It is manufactured by various vendors and costs approximately \$1300.

Microscope – some dermatologists like the ability to use a microscope (which uses an attached video camera) to assist in the diagnosis of fungi or other organisms. It also connects to the general examination cameras. This can also be obtained from several vendors and the cost is approximately \$10,000.

Light Source - The analog camera and light source drive a wide variety of diagnostic scopes. The light source is usually manufactured and/or sold by the camera manufacturer and the cost is approximately \$7000.

Furniture – Furniture to outfit the examination room can often be bought through the camera or telehealth vendor, or separately from a 'furniture only' vendor.

Telecommunications bandwidth

Bandwidth is a term with dual meaning: it can be used to describe the speed at which information travels; or it can be used to describe the capacity to transfer information. In simple terms, bandwidth is the "pipe" along which all information (data/video/audio) necessary for telemedicine transfers from one location to the other. Having more bandwidth available, means more information can be transmitted across the circuit at any given time. Since the VHA uses the wide area network (WAN) for moving all types of digital data as well as video, there is competition for space on the network. This competition can lead to bursts of data traffic and loss of audio and/or video quality during a real-time clinic. It is preferred that the VHA WAN is used since it is already in place. If a site such as a VET Center or CBOC is used and the WAN is not available, the use of ISDN should be investigated. The VISN network administrator should be involved in the discussions before plans are finalized and equipment purchased. Equipment varies depending on ISDN or WAN capability.

Network Based LAN/WAN Videoconferencing - with network based videoconferencing, the key considerations are bandwidth and QOS (Quality of Service). A higher bandwidth gives you better video performance. However, QOS typically suffers if you do not have control over the bandwidth(data traffic interference). The current standard for this type of videoconferencing is named H.323.

ISDN Videoconferencing - ISDN based videoconferencing systems use digital phone lines to communicate. Each ISDN line has a combined bandwidth of 128k. Typical ISDN videoconferencing systems operate at 128k (1 ISDN Line) or 384k (3 ISDN lines). Real-time video transmission at 30

frames per second requires 3 ISDN lines (384k). The current standard for this type of videoconferencing is named H.320.

Contingency Plan

A backup plan for system downtime should be in place in case of equipment failure in a real-time clinic. It will eventually happen and you need to be prepared especially if there are problems with equipment at a distant site such as a CBOC. If the distant site can be reached by phone, the consultation can possibly be completed and the needs addressed on the current patient. If CPRS is unavailable, have progress note or consult sheets on hand for the dermatologist to complete and enter into CPRS at a later time. If the network is available to see the patient and only CPRS is unavailable, the consultant could, at his or her discretion, continue with the clinic and enter notes at a later time.

Room Conditions for Real-time tele dermatology

The clinical setting, lighting, and positioning of the cameras at the originating and distant sites are important for optimal communication.

Clinical setting: it is important to make the patient feel as much as possible that he is actually in the consultant's private exam room. An exam table should be provided where the patient can be examined by the telepresenter. The room should be large enough for the equipment, but not so large that the patient feels uncomfortable with the encounter. Ideally, the room should be used strictly for telehealth activities. Large multipurpose rooms, on either the patient or clinician end, do not convey the optimal clinical tone and are usually not suitable for confidential patient care encounters. Privacy is critical and neither the exam room nor consultant room should be accessible visually or audibly to walk-by traffic. For both privacy and control of lighting, it is best to place the tele dermatology clinic in a room without a window. The room should not be accessible to walk-in interruption. The clinician will need access to CPRS in order to answer the consult or enter a progress note as well as review medications, labs, etc.

Lighting: Florescent overhead lighting is usually standard in most exam rooms. This can cast a shadow on the faces of all parties and a source of light at eye level in front of the participants provides a warmer, more even tone. Cool lighting is supposed to be better for illumination than warm lighting. A window in the room will make the light difficult to adjust.

Sound: Microphones are extremely sensitive and pick up background noise very easily. Do not place a microphone close to a phone, on the desk near where papers may be shuffled, or near the keyboard as noise from all these things is distracting especially if the patient is hard of hearing. A room with no windows will cut down on outside noise and increase the level of privacy. Adequate soundproofing of the room with ceiling tiles, carpet (on the clinician's end) and a heavy door will also help.

Monitors: It is helpful to have two monitors on both the consultant and patient ends - a high-resolution monitor and a large screen television on the consultant end and two regular large televisions on the patient end. By placing two televisions on the patient end, the telepresenter and patient will know if they are in the camera's range of view. The dermatologist needs to make sure they are in the center of the picture, which can be achieved with a regular television. The high-resolution monitor is used for diagnosing.

Camera Placement: The room camera is usually either placed on top of or beside one of the monitors. The patient and consultant will typically sit about six feet away from the monitor, with their head even with the monitor. The idea is to have the patient and consultant look as much as possible as though

they are looking at each other. It is usually best to have the image of the consultant from the desktop up and naturally sized. The image should not be zoomed in too close or too far away. While the patient and consultant are talking, the image of the patient should also be of natural size.

For further information, the VHA's Telehealth Web site announces future satellite broadcasts on telehealth. An existing 20-minute video entitled VHA Telehealth's "Steps to Success" may be useful for setting up your teledermatology program.

Section 5: Management of the Service

Clinical and Business Management

Following identification of patients who will be treated by the service, along with the clinical and technological specifications, the steering group should assure that the service is properly managed clinically and has a viable business case that is sustainable long term. The steering group needs to continue to manage the overall strategy and design of the service. Ideally the project will have access to a telehealth coordinator who will help with the operational aspects of implementing the service. It is vital that the project has an identified clinical champion who will take ongoing responsibility for the service.

Credentialing and privileging

The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) addresses Telemedicine Credentialing and Privileging in Standards MS.5.16-MS.5.16.1. Additionally, JCAHO has drafted standards changes, to become effective January 1, 2004, which can be found on the JCAHO Web site at:

http://www.jcaho.org/accredited+organizations/hospitals/standards/new+standards/ms_xwalk_hap.pdf

Effective January 1, 2004, the JCAHO Telemedicine Standards will be reformatted and renumbered as MS.4.120-MS.4.130 Additional JCAHO Standard information is available online at

<http://www.jcaho.org/accredited+organizations/hospitals/standards>

For VHA telehealth, specific policies and procedures are addressed in VHA Directives that can be accessed at:

<http://www.va.gov/telehealth>

Credentialing and Privileging of telemedicine clinicians is explicitly addressed in:

1. VHA Directive 2001-055 "Credentialing and Privileging of Telemedicine and Telehealth Services Provided in Hospitals and Clinics"

<http://www.va.gov/publ/direc/health/direct/12001055.pdf>

2. VHA Directive 2002-042 "The Credentialing and Privileging of VHA Health Care Providers Remotely Delivering Health Care to Patients at Home, in VET Centers, and in Non-Health Care Settings via Telemedicine and/or Telehealth."

<http://www.va.gov/publ/direc/health/direct/12002042.pdf>

These VHA requirements for credentialing and privileging necessitate that the clinicians establishing the teledermatology service make a distinction between whether they are providing consultation or care to the patient at the originating site. The originating site is where the patient is physically situated at the time images are acquired. In the case of real-time interactions, there may or may not be a staff member in the room while the patient is linked to the practitioner at the distant site from whom he/she is receiving care/consultation. In most cases, the dermatologist will choose to serve as a consultant,

rather than assume care for the patient, and the referring physician retains the responsibility of implementing the dermatologist's recommendations and managing the patient's skin.

Training and competency

In addition to credentialing and privileging, competency with the equipment and the procedure should be verified for each clinician or staff member prior to his/her participation in teledermatology visits.

It may be desirable at each referring site to designate one person to serve as photographer or video operator/presenter, and one as a back-up. This should preferably be a staff person, such as a nurse or clerical support member, who is not primarily responsible for the patient's care. This minimizes the burden on clinicians, and fosters expertise and consistency in photography. Staff who have a personal interest in photography or telemedia are ideal candidates.

Training needs will vary depending on the modality of teledermatology chosen, although the principles of patient confidentiality and HIPAA regulations permeate all types of telehealth:

Store-and-forward teledermatology requires the following training:

For referring clinicians:

- The type of information to gather from the patient, such as palpability, and tenderness, that will optimize the chance of a useful consult. Other types of detailed patient history can be gathered by having the patient fill out a form that can be photographed and incorporated into the consult as another image.

For photographers:

- How to use the digital camera and its accessories in both regional and macro modes under proper lighting and backgrounds. There are no standards yet, but a bland blue background such as provided by a surgical towel is often used. A calibration of color periodically and necessary corrections to images may also be considered a part of training (see Section 4).
- How to obtain the proper series of image perspectives and magnifications for localized, regional, and generalized skin disease. Specific requirements may vary among dermatologists, and the dermatologist who will be interpreting images should be consulted.
- How to identify patients in the image with a label or by other means.

For support staff (can be the same as photographer):

- How to upload images with Vista Imaging or other image transmission software.
- How to enter consults
- How to confidentially archive and erase the digital camera's memory once the consult request is complete.

Real-time interactive teledermatology requires the following training:

- How to operate the equipment
- Logistical background (scheduling, security, support, coding)
- Using teledermatology (clinical protocols, confidentiality, informed consent, ethical standards, protocols and etiquette)

- Conducting the visit (telehealth interviewing techniques and tips to improve communication)

Examples of ways to document competency are:

- having the clinician demonstrate that he/she can use the equipment to someone experienced with telehealth
- having the clinician read this toolkit
- having the clinician view any of the VHA Employee Educational System (EES) satellite broadcasts
- having the clinician complete a similar or comparable training experience

Clinical protocols, policies and procedures

There are no absolute VHA diagnostic specific clinical protocols for delivering teledermatology. However, each steering committee is encouraged to develop their individualized clinical protocols based upon the anticipated treatments offered and the resources available.

A collection of useful protocols and guidelines for both store-and-forward and real-time teledermatology can be found at the American Telemedicine Association's Web site, in the teledermatology section of www.atmeda.org/ICOT/icot.htm.

Informed Consent

There are two types of informed consent: verbal informed consent and signature/written informed consent.

Currently there are two VHA documents providing guidance on informed consent for VHA telemedicine, including teledermatology. These two documents are VHA Handbook 1004.1 'VHA Informed Consent for Clinical Treatments and Procedures' at: <http://www.va.gov/publ/direc/health/handbook/1004-1hk1-29-03.pdf> (For guidance specific to VHA telemedicine/telehealth, see Part G of the Handbook's Section 9 entitled, 'Consent in Special Situations') and VHA Information Letter IL 10-2002-042 'The Credentialing and Privileging of VHA Health Care Providers Remotely Delivering Health Care to Patients at Home, in Vet Centers, and in Non-health Care Settings via Telemedicine and/or Telehealth' at <http://www.va.gov/publ/direc/health/direct/12002042.pdf> (For C&P guidance, see Attachment A entitled, 'Interim Veterans Health Administration (VHA) Guidance when using Telehealth to Deliver Health Care Services into Home and Vet Center Settings to Accompany Provider Credentialing and Privileging Requirements')

For VHA Telehealth in general, and VHA Teledermatology (either real-time or store-and-forward) specifically, these two documents indicate:

1. Informed consent is obtained after providing the patient with a full explanation of
 - i. the risks and benefits of teledermatology
 - ii. all alternatives for obtaining dermatology care through an in-person visit at the nearest VA dermatology clinic or in the community, if available
 - iii. patient's right of refusal, at any time, for any teledermatology treatment
2. Informed consent need only be obtained at the commencement of each treatment and/or care program and should be documented in the clinical record. Informed consent is not required for each individual episode of care within the program of treatment and/or care.

3. Verbal informed consent is the minimum requirement for all VHA telehealth programs, according to current standard of practice.
4. Signature informed consent must be obtained for either of these two scenarios:
 - a. **Anything Beyond VAMC or CBOC.** Delivery of any level or modality of teledermatology service to any public or private non-health care setting (e.g. patient's home, Vet Center, others) outside a VA Medical Center or Community-Based Outpatient Clinic (CBOC).
 - b. **Special Instances Within VAMC or CBOC.** Delivery of any level or modality of teledermatology service as described in 7c(2)(a) of 'VHA Informed Consent for Clinical Treatments and Procedures' summarized as those services that:
 - i. Involve the use of sedation
 - ii. Involve the use of anesthesia or narcotic analgesia
 - iii. Can be reasonably expected to produce significant discomfort to the patient
 - iv. Can be reasonably considered to have a significant risk of complication or morbidity
 - v. Require injections of any substance into a joint space or body cavity, including any non-vascular space
 - vi. Involve testing for human immunodeficiency virus (HIV);
 Or services described in Appendix A. of 'VHA Informed Consent for Clinical Treatments and Procedures' as:
 - vii. Surgical or invasive procedures, including but not limited to:
 1. Acupuncture;
 2. Anesthesia (except for low-risk local anesthesia);
 3. Aspiration of body fluids through the skin (e.g., arthrocentesis, bone marrow aspiration, lumbar puncture, paracentesis, thoracentesis);
 4. Biopsy (e.g., breast, liver, muscle, kidney, genitourinary, prostate, bladder, skin);
 5. Cardiac procedures (e.g., cardiac catheterization, cardiac pacemaker electrode insertion, electrical cardioversion);
 6. Central vascular access device insertion (e.g., arterial line, Swan-Ganz catheter, percutaneous intravascular catheter (PIC) line, Hickman catheter);
 7. Electrocautery
 8. Endoscopy (e.g., bronchoscopy, colonoscopy, cystoscopy, laparoscopy);
 9. Interventional radiology procedures (e.g., angiography);
 10. Laser therapy;
 11. Oral surgical procedures (including gingival biopsy);
 12. Sterilization of reproductive capacity;
 13. Thoracotomy;
 14. Tracheostomy; and
 15. Transjugular intrahepatic portal stent (TIPS)
 - viii. Blood product transfusion
 - ix. Dialysis (hemodialysis or peritoneal)
 - x. Electroconvulsive therapy
 - xi. Genetic testing.
 - xii. Hazardous drugs (e.g., cancer chemotherapy, disulfiram, methadone for narcotic dependence, naltrexone).
 - xiii. Photochemotherapy in combination with psoralens or other topical agents.

1. Radiographic contrast agents in high-risk patients (e.g., those with prior allergic reactions, renal failure or other risk factors) for Computerized Axial Tomography CAT scans, cisternograms, intravenous pyelograms and other procedures; and
 - xiv. Ultrasound therapy (e.g., lithotripsy)
 - xv. Home telehealth

5. Signature informed consent must include the elements that appear in section 9(6)(g) of 'VHA Informed Consent for Clinical Treatments and Procedures'

While more specific VHA guidance is likely forthcoming, current directives and/or standard practice are outlined as above.

Special Circumstances

In addition to home telehealth, there are two instances for which a signature consent must be obtained in the course of teledermatology interventions.

1. If, as a result of a teledermatology consultation, a patient's picture and/or voice recording is being disclosed to an entity covered by Department of Veterans Affairs (VA) Form 10-3203, Consent for Use of a Picture or Voice:

<http://vaww.va.gov/vaforms/medical/pdf/10-3203.pdf> then this document must be signed by the patient. This document is not a document of informed consent. Its function is to serve as a release of picture and/or voice information.

2. In the event that the telehealth delivery episode is part of a research study, signature (written) informed consent must be obtained per VHA Research Guidelines.

Coding and workload credit

A detailed description of the VHA coding for telehealth, and specific coding for teledermatology, is currently being drafted. Please contact John.Peters@hq.med.va.gov for the latest guidance on telehealth workload coding within the VHA.

Conducting the real-time teledermatology session

Verbal Communication: Verbal communication becomes more deliberate in telehealth. In normal conversation, there is a natural give-and-take, with either party cutting in, interrupting the other, completing the other's sentences, and so forth. This occurs naturally and without much thought. Due to the slight delay in transmission time and other technical limitations, this fluidity is limited in telehealth. Patients comment that the flow of conversation is similar to that seen on television when someone is speaking to astronauts in space. The flow of conversation becomes more deliberate, more punctuated, more formal. Both clinician and patient usually quickly learn to speak more clearly and more slowly. Both parties learn to speak in complete thoughts, then pause and listen. It is not effective to attempt to talk over one another. This more telegraphic style of conversing actually can lead to more orderly communication, but it can impair the expression of emotions.

Non-verbal Communication: It is important that non-verbal gestures not be too rapid. If a gesture's speed exceeds the system's ability to convey it, the patient sees only an odd flicker. Also, care must be taken to make hand gestures at mid-chest level or above, as gestures at the more customary lap level are out of the field of view of the camera.

It is sometimes helpful for non-verbal gestures to be more broad than usual. For example, when in person, one might communicate bewilderment by very slightly leaning back and tilting one's head. In telehealth, it is more effective to arch far back in the chair and actually scratch one's scalp in confusion. These grand, dramatic gestures may seem unnatural or even insincere at first, but they can be far more effective than more subtle gestures in teledermatology.

Casual Introductory Conversation: An introduction between the dermatologist and the patient is important. "Small talk" is a powerful tool of engagement in telehealth. A patient in a teleclinic may doubt whether the clinician can understand them or their world from where the clinician sits. Demonstrating an awareness of local events and geography can let the patient know that the clinician takes an interest in his or her world.

Clothing: Clothing choices are also a consideration. It is often helpful to wear clothing without patterns. A striped shirt, for example, can create interference patterns on the video image. Stark white clothing such as a lab coat can cause problems in balancing the contrast. When wearing clothing that is too bright, the clinician's face disappears into darkness. Patients that come to clinic wearing a hat can be asked to remove it, as the brim of a hat casts the patient's face into shadow from overhead lights. When the dermatologist is ready to examine the patient, the dermatologist may ask that the patient remove clothing. The patient should be given privacy when changing by directing the camera away from the patient or by allowing the patient to move to another part of the examining room.

Camera manipulation: The teledermatology session will usually begin with the general videoconferencing camera while the patient and dermatologist are speaking but, for the examination, the dermatologist can instruct the presenter to switch to the general exam camera that allows close-up views of the patient's skin. Following the exam, revert to the normal videoconferencing camera as the dermatologist discusses his or her findings and recommendations with the patient.

The business case

Put simply, the business case is constructed from the numbers of patients that need to be treated and the costs of providing this care via teledermatology as compared to other ways of doing so. Given the current demand for dermatology services in VHA, it is likely that the need for teledermatology will continue. With the ever-diminishing costs of telehealth equipment and telecommunications bandwidth, telehealth is an increasingly attractive solution.

Providing a real-time teledermatology service to a remote location with very poor telecommunications infrastructure may be prohibitively expensive at present. If this modality is still preferred over store-and-forward teledermatology, but teledermatology alone may not warrant the cost, the steering group may consider partnering with other clinical services to co-share the equipment and thus prorate the cost. In addition, teledermatology programs that involve service to/from rural locations may be entitled to funding, from non-VA organizations (e.g., USAC, www.rhc.universalservice.org).

Systematic reviews of cost effectiveness studies of telehealth in general and teledermatology are rare, although there is recent data to indicate that teledermatology provides an improvement in cost-effectiveness over traditional face-to-face dermatologic care. As the teledermatology health field work

group determines methods for analyzing cost effectiveness within the VHA, they will be shared in future versions of the toolkit.

Systematic reviews of cost effectiveness studies of telehealth are rare, however, there are several studies (all conducted outside the U.S.A.) that have addressed the economic impact of real-time teledermatology.^{2,3,4,5,6,7} The conclusions vary although, in general, real-time teledermatology has not been cost savings compared to usual care. Very little published information exists regarding the economics of store-and-forward teledermatology. One study found potential cost savings⁸ while another study did not show cost savings from the VA perspective.⁹ However, cost savings could be realized from a societal perspective and store-and-forward teledermatology was found to be a very cost-effective strategy for the VA to adopt.

² Loane MA, Bloomer SE, Corbett R, Eedy DJ, Evans C, Hicks N. et al. A randomized controlled trial assessing the health economics of realtime teledermatology compared with conventional care: an urban versus rural perspective. *J Telemed Telecare* 2001;7:108-18

³ Wootton R, Bloomer SE, Corbett R, Eedy DJ, Hicks N, Lotery HE, et al. Multicentre randomized control trial comparing real-time teledermatology with conventional outpatient dermatological care: a societal cost-benefit analysis. *BMJ* 2000;320:1252-56

⁴ Lamminen H, Tuomi M-L, Lamminen J, Uusitalo H. A feasibility study of realtime teledermatology in Finland. *J Telemed Telecare* 2000;6:102-07

⁵ Loane MA, Oakley A, Rademaker M, Bradford N, Fleischl P, Kerr P, et al. A cost-minimization analysis of the societal costs of realtime teledermatology compared with conventional care: results from a randomized controlled trial in New Zealand. *J Telemed Telecare* 2001;7:233-38

⁶ Bergmo TS. A cost-minimization analysis of a realtime teledermatology service in northern Norway. *J Telemed Telecare* 2000;6:273-77

⁷ Chan HHL, Woo J, Chan WM, Hjelm M. Teledermatology in Hong-Kong: a cost-effective method to provide service to the elderly patients living in institutions. *Int J Dermatol* 2000;39:774-78

⁸ Zelickson BD, Homan L. Teledermatology in the nursing home. *Arch Dermatol* 1997;133:171-4

⁹ Whited JD, Datta S, Hall RP, Foy ME, Marbrey LE, Grambow SC, et al. An economic analysis of a store-and-forward teledermatology consult system. *Telemed J* (in press.)

Section 6. Quality Outcomes and Evaluations

Four main areas of quality assurance and outcomes exist for teledermatology applications:

1. Diagnostic reliability and accuracy
2. Clinical outcomes
3. Clinician and patient satisfaction
4. Economic Analyses

Two methods of obtaining this data should be considered:

1. Formal research studies
2. Ongoing quality assurance and economic assessments of functioning systems

Both formal research studies and ongoing quality assurance are important features of teledermatology implementation. The foundation of teledermatology implementation should be built on formal research evaluations and continue through ongoing quality assurance programs.

1. *Diagnostic reliability and accuracy.* A fairly large body of evidence exists that demonstrates that both store-and-forward and real-time teledermatology applications result in comparable diagnostic reliability and accuracy (for store and forward applications) when compared to traditional clinic-based visits. Given that the consult procedures recommended in this Toolkit are followed, ongoing assessments of diagnostic reliability and accuracy are not warranted.

2. *Clinical outcomes.* Clinical outcomes of teledermatology consultations are not as well studied as diagnostic outcomes. While comparable diagnostic outcomes should translate into comparable or improved clinical outcomes, this has not been definitively demonstrated to date. A comparison of clinical outcomes with traditional care requires a randomized clinical trial to assure an adequate comparison. Results from such a trial would somewhat preclude the necessity of ongoing clinical outcomes assessments, however, some degree of clinical outcome assessments for functioning programs would still be recommended. Intermediate outcomes, such as time to diagnosis and treatment initiation could be surveyed. More definitive outcomes, such as time to resolution or significant improvement using disease-specific instruments could also be considered. More general quality assurance measures such as referring clinician compliance with the consultant's recommendations (e.g., need for skin biopsy) are also an important component of ongoing quality assurance.

3. *Clinician and patient satisfaction.* Several reports in the medical literature exist that assess both clinician (referring and consultant) and patient satisfaction. Currently, a validated and reliable instrument to assess satisfaction among teledermatology participants does not exist. A major goal of future teledermatology research should be dedicated to developing just such an instrument. Existing surveys are largely anecdotal assessments that rely on face validity – i.e., questions that the surveyors believe represent important domains. Nonetheless, these surveys can be useful to identify where problems may exist with functioning consult services. In the absence of a validated instrument, the surveys in Appendix 1 may be useful for satisfaction assessments. Adding or subtracting to the survey may provide a more appropriate site-specific instrument depending on particular needs or issues. Because patients are removed from the technology with the store-and-forward consult modality, satisfaction assessments would not include patient assessments of the technology for this consult technique. Patients do interact with the technology when real-time interactive consult methods are used and patient perceptions of the technology are relevant.

4. *Economic Analyses.* Maintaining a viable teledermatology consult system depends on that system delivering either (1) cost savings or (2) cost-effectiveness. Cost savings imply that teledermatology results in lower expenditures than traditional clinic-based care. Cost-effectiveness implies that teledermatology is the more costly alternative, however, teledermatology “buys” an improvement in effectiveness (e.g., quicker time to diagnosis, better clinical outcomes) in a ratio that makes implementation of the strategy compelling. Current research on the economic implications is somewhat preliminary. To date, teledermatology has generally been shown to be the more costly alternative. This is especially true for real-time interactive consultations due to the higher costs of equipment and wide bandwidth requirements. A VA-based study has suggested that store-and-forward teledermatology, while more costly, is a very cost-effective means of improving patients’ access to care. Ongoing economic assessments of functioning teledermatology systems are recommended.

Glossary of terms: This is a partial listing of the most commonly used words or phrases to describe teledermatology activities, equipment or requirements.

Analog – Information electronic or otherwise that is created and transmitted as a continuous stream. Compare this to digital information generated by computers. Most Home Telehealth devices require the use of analog (direct dial, not through the PBX) not digital phone lines to operate.

Bandwidth – The capacity of an electronic transmission to transmit data per unit of time. The higher the bandwidth, the more data can be transmitted. Typically measured in kilobits (kb) or megabits per second (Mbps). Standard telephones are low bandwidth devices with cable TV being high bandwidth.

Baud rate – Is the ring rate or line power of the telephone line providing service into a given structure (home). Most Home Telehealth devices require a minimum baud rate of 14,000 to make successful video capture. However, the lower the Baud rate the likely disconnections will happen.

Component video – This type of video yields better image quality, higher lines of resolution, and better color.

Cost analysis – an accounting of the cost, irrespective of effectiveness or benefit, of an intervention(s).

Cost effectiveness analysis – an analysis that compares the incremental cost and incremental effectiveness of two or more interventions. The units of effectiveness are non-monetary measures.

Diagnostic Reliability – the repeatability or reproducibility of an examination finding or other diagnostic assessment. It is also known as agreement or precision. Two examiners that independently reach the same diagnosis are displaying diagnostic reliability.

Diagnostic Accuracy – describes whether the diagnosis offered is correct or incorrect. Typically, accuracy is evaluated using a gold standard test. The gold standard test is considered to be the best available test for classifying the presence or absence of disease.

Digital – Information coded in numerical values (bits). Digital data streams are less susceptible to interference like analog streams are. They can be more easily integrated with other data streams such as voice/video/data.

Digital camera – Captures images (still or motion) digitally and does not require analog to digital conversion before the image can be transmitted or stored in a computer. Most Home Telehealth equipment uses digital video cameras.

Distant Site – is the site where the provider providing the professional service is located. The DS may be one of 2 kinds. The first kind of DS is one where the DS shares the same STA3 (Station Number) as the OS e.g., a CBOC affiliated with a VAMC. The second type of DS is one where the DS and the OS have different STA3's (Station Numbers) e.g., a CBOC and a VAMC within the same VISN are not affiliated or where the DS and OS are in separate VISN's.

Economic Perspective – a consideration of the economic impact from a specific point of view, such as, total societal costs versus cost borne only by the health care system.

Encryption – A mathematical transposition of a file or data stream so that it cannot be deciphered at the receiving end without the proper key. Encryption is a security feature that assures only the appropriate parties participate in a video visit or data transfer.

Firewall – A computer connected both to the Internet and the local hospital network that prevents the passing of Internet traffic to the internal hospital network. Provides an added security layer.

Frame rate – Frames per second (fps) displayed on a video unit. A frame rate of 25-30 is considered full motion. Anything less than that is noticeably “jerky.” Slower frame rates may be inadequate for some assessments such as gait and balance activities.

HL7 – Health Level 7. A standard interface between hospital information systems.

Internet – A loose gathering of thousands of computer networks forming an enormous worldwide area network.

Intranet – A “private Internet”, or internal web that employs certain communication protocols used over the Internet. The Intranet may be linked to the public Internet through tightly managed gateways.

ISDN – Integrated Services Digital Network, a low-to-medium speed technology for digital telephone. Some Home Telehealth is ISDN based and can be used where available.

Local Area Network (LAN) – A computer network linking computers, printers, servers, and other equipment within a system. Can support audio, video, and data exchange.

Modem – Modulator/Demodulator. Enables transmission of digital data over standard analog phone lines and cable video systems.

Network – An assortment of electronic devices (computers, printers, scanners etc.) connected by wires or wireless for mutual exchange of digital information.

Originating Site – is the site where the patient is physically located at the time the telehealth service is provided. It is the site requesting consultation advice or care management support from a provider located at the distant site (DS). Each episode of care that is coded at an OS must be paired with the corresponding component of care that is coded at the DS. An OS site may be a CBOC, VET Center or VAMC.

PBX – Private Branch Exchange (a.k.a. the switchboard) is a telephone system (i.e., switchboard, telephone lines, switching computer) within a VHA facility/campus that switches internal phone lines between VHA users, who actually share a certain number of external (outside) phone lines. Having a PBX saves money by reducing the number of lines required to connect all VHA facility telephones to the telephone company’s central office.

Peripheral devices – Attachments to videoconferencing systems to augment their communications or medical capabilities. Examples include electronic stethoscopes, blood pressure cuffs, glucometers, and weight scales.

Pixel – A picture element/cell with specific color or brightness. The more pixels an image has, the more detail or resolution it can display.

POTS – Plain Old telephone System. The analog, public-switched telephone network in common use throughout the world. Most Home Telehealth products rely on POTS.

Real-time interactive – a telehealth technique that uses video-conferencing technology to send and receive audio/video/data with little or no perceptible delay. Participants are separated only by space, not by time.

Resolution – The level of image detail that can be captured or displayed. Pictures are made up of dots of color called pixels, and there is a direct correlation between the number of pixels and the clarity of the digital images produced by a camera, displayed on a monitor, or printed by a printer. The more dots you have, the sharper the hard copy image will appear, particularly in larger (8"x10") prints. More dots (or pixels) also means a larger file, which has image file storage and transfer implications. For video monitors resolution is measured in pixels X lines X bit depth.

Store-and-forward – a telehealth technique that uses asynchronous still digital image/audio/video/data technology for communication, analogous to an e-mail system. Participants are separated by time and space.

Telehealth – The electronic provision of health care and information services for the direct benefit of patients and their families.

Thumbnails – Miniature pictures of images using very small, low-resolution data files. These download for display very quickly.

Transmission rate – Amount of information/unit of time that a technology such as POTS or digital ISDN phone line, satellite or wireless technology, or local area network can transmit.

Wide area network (WAN) – Wider in geographic scope than a LAN. Provides digital communications (voice/video/data) over switched or un-switched networks.

Contacts

Web sites for telehealth organizations have been provided as well as VHA contacts to help answer any questions that might arise in the process of planning for and implementing a VHA Tele dermatology program.

Web sites:

VHA Telehealth

www.va.gov/telehealth

Telemedicine Information Exchange

<http://tie.telemed.org>

Organizations:

American Telemedicine Association

www.americantelemed.org

American Telemedicine Service Providers

www.atsp.org

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