Teledermatology Practice Guide

...connections...

MARC E. GOLDYNE, MD
The California Telemedicine & eHealth Center (CTEC) is a statewide organization dedicated to improving the healthcare of underserved communities through the use of innovative health technology solutions.

CTEC is funded by the following Foundations:

The California Endowment
California HealthCare Foundation
Blue Shield of California Foundation

CTEC has supported a variety of eHealth Programs and networks statewide and also maintains a unique eHealth Resource Center that provides training and technical assistance to promote eHealth capacity and competency among providers.

For more information about CTEC, please visit our website at www.cteconline.org.
This Teledermatology Practice Guide has been developed with the intent of providing a valuable resource to individuals and organizations interested in developing Teledermatology programs. The purpose of this guide is to give current and potential Telemedicine providers a better understanding of the elements involved in developing a successful Teledermatology program. The California Telemedicine and eHealth Center (CTEC) has contributed to the production and distribution of this guide to further support its vision of increasing access to health services for rural and underserved communities by providing valuable resources on the development and expansion of eHealth programs statewide.

The term Teledermatology as referred to in this Guide is defined as the use of Telemedicine to provide dermatological care at a distance. Although the most common use of Teledermatology services has been though store and forward transmission of digital images and text, it may also be used through real-time consultation via videoconferencing.

This Guide focuses on Teledermatology provided by remote store and forward technologies, it should be noted that many programs use videoconferencing to establish a real-time connection as an alternative. We hope you find this Guide to be a useful resource in understanding the components involved in developing a successful Teledermatology program.

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Currently, Dr. Goldyne is a Clinical Professor of Dermatology at UCSF. He is also in private practice in San Francisco and served as the 2003 – 2004 President of the San Francisco Dermatological Society. He continues to serve as a store and forward dermatology consultant; to date, he has performed over 1000 remote consults with primary care providers throughout California. He is currently a member of the Teledermatology Special Interest Group of the American Telemedicine Association and also served on the Telemedicine Task Force of the American Academy of Dermatology from 2002 - 2005.

Other publications by this author include:


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INTRODUCTION

Teledermatology is the practice of clinical dermatology using the benefits of communication through public or private computer networks. Because of the computer’s ability to store, as well as rapidly forward, both visual and textual data, primary care providers can access dermatological expertise for their patients in a timely fashion previously unavailable.

“Store and Forward” (SF) Teledermatology is the most frequently used mode of computer-based communication between primary providers and dermatologists. A referring provider e-mails an encrypted electronic medical record containing digital images and relevant text data to a dermatologist at a distant site who, in turn, reviews the data and transmits back the requested diagnostic and therapeutic assistance. Unlike a Live-Interactive Video (LIV) consult (the other available modality), the SF electronic file can be compiled, sent, and evaluated at times that are most convenient for the individual providers’ and consultants’ schedules. Use of SF Teledermatology also precludes the need for scheduling of appointments, as is necessary with LIV consultations or in-person patient visits.

Although this guide focuses primarily on a store and forward approach, it should be noted that some programs use real-time videoconferencing. Programs that use real-time consultation technologies require the patient and the dermatologist to be present at the same time. Real-time teledermatology examinations are generally performed using two cameras: a high-resolution flex-arm camera for overall diagnostic viewing; and a general patient exam camera (with 50X lens magnification) for closer viewing. Some programs require patient information prior to the remote consult, but the dermatologist may also obtain the patient’s history and current concerns during the session. Real-time sessions are not routinely videotaped, but digital images should be included in the patient’s medical record to document the skin problem. The consulting specialists can remotely trigger a screen capture to obtain a digital image from the general exam camera of any view deemed clinically significant.

Teledermatology, whether it be delivered via store and forward or real time, provides unique benefits for both the patient and the primary care provider by addressing the scarcity of access to dermatologists by rural populations and by delivering point of care education for the non-dermatologist physician, nurse-practitioner, or physician’s assistant.

This Guide will address the three elements of a successful Teledermatology network:

- Hardware
- Software
- Peopleware
Introduction

The term “Peopleware” was coined by Nancy Lorenzi and Robert Riley in their text on Organizational Aspects of Health Informatics. They dedicated their book “to all those who have learned the hard way that hardware and software are not enough.” And this Guide echoes their claim that the success of a Teledermatology network resides in the peopleware. This means that managers in institutional clinics or primary practitioners in private settings need to truly support the effort to incorporate Telemedicine into their overall healthcare delivery efforts. A manager can not add the term “Telemedicine Coordinator” to an employee’s job description if there is no commitment to train and provide appropriate support for this employee. While this sounds self-evident, this author found in the early stages of establishing a Telemedicine network that this was more often the rule rather than the exception. Any healthcare provider (individual or institution) who states “we have the hardware, software, and DSL connectivity, so we’re ready to practice SF Teledermatology” will eventually learn that the fuel that runs a sustainable Telemedicine program is an enthusiastic, dedicated site coordinator. A good site coordinator regards the computer and digital technology like stethoscopes or blood pressure cuffs that, when properly used, allow providers to practice good medicine.

The information subsequently provided is to be understood as a “guide.” Various providers, as well as healthcare facilities, often develop their own style of practice. However, as long as all individuals involved in the Telemedicine network follow some basic procedures unique to clinical dermatology, SF Teledermatology becomes a powerful tool that allows dermatologists to assist primary care providers in delivering quality care for patients who would otherwise have no access to evaluation by a dermatologist.
POLICIES AND PROCEDURES

Policies governing SF Teledermatology involve two federally mandated principles applied to clinical practice in general: 1) safeguarding patient privacy (based on HIPAA regulations) and 2) obtaining patient consent prior to a teleconsultation. Each of these policies translates into procedures that insure mandated policies are upheld.

1) Insuring Patient Privacy: Since the computer is the vehicle through which SF Teledermatology is conducted, HIPAA rules require appropriate protection of such communications over the internet. The most straightforward approach to achieving this is through the use of a software application that automatically encrypts the data to be shared (HIPAA currently requires 128 bit encryption) so that only those network participants who have the ability to decode the information can view it.

2) Patient Consent: As with patient privacy, consent of the patient to participate in a Telemedicine interaction is required and follows the same principals as medical consent forms for in-person care with additional information relating to teleconsultation. A sample consent form kindly provided by the Blue Cross of California Telemedicine Program is provided herein (Appendix A).
BEST PRACTICE MODEL

The model to be described in this guide has been used to successfully conduct SF Teledermatology consultations for over 4 years, representing more than a thousand consultations performed, as part of the Blue Cross of California Telemedicine Program. If all of the practice elements are followed, this model offers a very economical approach to providing enhanced specialty access without sacrificing the quality of patient care. In fact, based on the frequency with which the dermatologist needs to change the provisional diagnosis and associated therapy (60 - 80% of cases), the quality of care is significantly enhanced, as would be expected by providing specialist participation.

The “Open Access Model” (OAM), as it will be referred to, allows multiple referral as well as specialist sites to interact with each other. This model differs from the more traditional “Hub and Spoke Model” (HS) that employs a central specialist (Hub) site to which are connected multiple referral (Spoke) sites. The basic OAM unit consists of a referral site, a consult site, and the linkage that allows the two sites to electronically communicate.

Referral Site
An effective store and forward Teledermatology consult requires that the referral site provide enough information for the consulting dermatologist to provide effective diagnostic and therapeutic assistance. Because the dermatologist cannot directly interview and examine the patient, the challenge for the referral site is to provide: 1) the verbal information that dermatologists get from their patients before doing a visual assessment, and 2) the visual assessment of the actual skin lesions. Consequently the referral site needs to supply two data elements: 1) focused text, and 2) appropriate images.

Focused Text
A common misconception is that a dermatologist can diagnose any skin disease from a picture. In fact, the dermatologist often relies on verbal data (e.g. clinical history, previous therapies and their results, previous laboratory studies, concurrent illnesses, etc.) to provide critical guidance in interpreting visual information and in making therapeutic recommendations. When this selective verbal data (i.e., focused text) is combined with appropriate clinical images, a choice of possible diagnoses suggested by visual data alone can be narrowed to a specific diagnosis or the information may help identify what further testing or procedures may be needed to reach a specific diagnosis.

The importance of focused text can be illustrated in the following example. A referral was e-mailed to a dermatologist for evaluation and management suggestions. The referring provider stated the skin problem did not respond to topical anti fungal therapy. The dermatologist however, felt that the images were,
in fact most compatible with a fungal infection, but assumed that the reported failure of anti fungal therapy ruled out this diagnosis. The dermatologist provided a differential diagnosis (i.e., what other skin diseases needed to be considered that could look like a fungus infection). A biopsy was suggested by the dermatologist. Examination of the biopsy subsequently documented a fungal infection.

If this patient had a fungal infection to begin with, why was there no response to the anti fungal medication? What possible information could have prevented an unnecessary biopsy? The answer to both questions lay in the referring provider’s documenting for how long the anti fungal medication was applied; he or she assumed, as did the dermatologist, that the medication was properly used. Had the provider inquired, he would have found out that the patient stopped the medication after 1 week because he didn’t notice much response. In fact, 4 - 6 weeks of therapy would be necessary to eradicate the fungal infection. This type of outcome underscores the importance of documenting patient compliance with previous therapy. Consequently, the dose and length of time a patient uses any medication for a skin condition should be part of the focused text in a Teledermatology referral. Similar experiences have taught the dermatologist what information, in addition to images, is most important for evaluating the majority of skin diseases.

A “Skin Evaluation Form” (see section on a sample store and forward referral and consult) is one vehicle designed to assist the non-dermatologist provider in regard to what questions to ask a patient who presents with a skin complaint. This 1-page form contains 11 questions related to the patient’s history that help dermatologists make a diagnosis and suggest appropriate therapy. It can be filled out by the patient or used as a guide by the referring provider. The completed form can also be scanned or digitally photographed and included in the e-mailed referral.

**Appropriate Images**

When a dermatologist examines a patient in person, he or she assesses three characteristics of any skin lesions: 1) their location, 2) their size, and 3) their surface features (e.g., are they flat or raised, flesh-colored, pink, or pigmented, lighter or darker than the normal skin, etc.); in addition, the dermatologist may feel the lesion(s) for consistency. Therefore, the digital images captured for a skin problem should at least be able to convey the location of the lesions, their size, and their surface features. The consistency of a lesion (e.g., firm, soft, rough, greasy, not palpable, etc.) can be described in the referral note to the consultant. While the above information may seem self-evident, the two most frequently occurring problems with SF referrals for dermatology are: 1) images are slightly out of focus, so that details cannot be appreciated, and 2) only close-up images of a skin lesion are provided, with no way of assessing lesion size or location.
Best Practice Model

It must be understood that an image that is out of focus is of no use to the dermatologist and could also be of medico-legal consequence. Therefore, no image should be incorporated into a Teledermatology referral unless it has been previewed and the focus is sharp. This may appear as self-evident but too often, Telemedicine technicians using very good digital cameras assume an auto-focus camera will provide in-focus images and fail to review each image; this is an unacceptable approach because no camera is fail-safe.

In regard to close up images, these need to provide some idea of the size of the skin lesion as well as the location. Referrals are often sent where the size and location of a lesion is not provided. For the dermatologist, the size and location of a lesion can be critical. Please refer to Appendix B at the end of this guide that addresses optimizing images for SF Teledermatology.

Consultant Site
A teledermatologist should be expected to: 1) identify the skin problem or indicate what needs to be done (e.g., a biopsy or laboratory test) in order to provide a specific diagnosis, 2) offer therapeutic guidance in treating the skin problem if the diagnosis can be made, and 3) provide a follow-up framework to insure that the patient is appropriately responding to therapy. In addition, recommendation may be made for an in-person consultation in particularly complex skin problems.

Communication between Referring and Consultant Sites
How the referring and consulting sites communicate is critical to a functional SF Teledermatology network. For sustainability, it should be economical, efficient, secure, and reliable so as to provide the participants at each end with an easily accessible electronic record of every patient encounter. To date, the most economical, efficient, and reliable way to communicate is the internet. HIPAA-level security can be provided by encryption of data before the information is sent over the internet.

Each site in the SF Teledermatology network in which this author participates uses the same commercially available software program to create their electronic consult referrals. For each patient, the software creates an electronic folder containing a demographics form, referral form, and image viewer. The referring group fills in these electronic forms, imports the accompanying clinical images, and then sends the patient’s electronic record to the dermatologist as an e-mail attachment. The consulting dermatologist will find the referral in his or her e-mail box, download the attachment to the computer “desk top” or into a previously created “new patient” folder. Opening the attachment will automatically launch the software on the consultant’s computer so the patient file can be viewed. The consultant then enters his or her diagnostic opinion and therapeutic recommendations in a consult form that is then e-mailed back to the referring site as an encrypted attachment.
Best Practice Model

When opened by the referring group, the consult is automatically transferred to the appropriate patient’s referral file. Now both sites have copies of the complete patient file.

Each participating health care facility has a dedicated computer that is linked, ideally with a broadband connection for fast uploading and downloading, to the Internet. But if necessary, even a modem connection can work. Uploading and downloading just require more time.

A major advantage of this system is that it is adaptable to each user, as well as portable. A laptop or desktop computer can be used. A network can consist of federal, state, and community-supported clinics and hospitals, as well as private group practices—each with their own specific operational needs. From a consultant’s point of view, none of these differences matter because the software presents the same user interface (i.e., visual format) for all electronic referrals while allowing each referring site to enter any unique information they require within this consistent format. In addition, a billing application is available that allows a standard 1500 form to be created and maintained in each patient’s folder so that reimbursement issues can be handled and maintained within each patient’s electronic record, both at the referral and consultant sites.
HELPFUL TOOLS

In recognizing the need for reliable sources of comparison for those seeking new or upgraded equipment and services in support, information on various resources is provided below.

The American Telemedicine Association has developed a detailed and unbiased Buyer’s Guide that is a useful resource for product comparison. The ATA Buyer’s Guide highlights products and services of particular interest to the Telemedicine industry, and covers a wide range of vendors. The Buyer’s Guide is available online at: http://www.americantelemed.org/news/buyersguide.htm

Although a wide variety of equipment and peripherals may be employed as part of a Telemedicine program, depending on clinical and communications needs, the majority of store and forward Teledermatology programs rely principally on the use of digital still cameras to produce images for clinical diagnosis and consultation, and various software design to store, catalog, and/or transmit those images.

Cameras
Photography of skin problems has long been an established tool for diagnosis and record keeping among Dermatologists. In recent years, the success of Teledermatology has been greatly facilitated by the continuing reduction in cost and increase in quality of digital cameras. Currently, a wide variety of digital still cameras are available that may be suitable for Teledermatology use, depending on the specific needs of the program and its practice guidelines. Commercial digital cameras are available as fixed lens point and shoot (PAS) or digital single lens reflex (DSLR) systems. Costs vary widely, and in addition to the quality of the lens system, it is important to take into account such key features as megapixel rating (a rough indicator of maximum effective picture quality based on the number of million picture elements present on the camera’s image sensor chips(s)), white balance control, optical versus digital zoom, etc.

The minimal features that a digital camera should have in order to capture optimum images for Teledermatology are: 1) at least a 1.3 megapixel image size, and 2) a macro setting for close-up images. Ideally, images should be acquired without flash using natural (window light). It is no longer necessary to have a $1000+ digital camera to capture adequate clinical photos. A more-than-sufficient camera can now be purchased in the $300 - $500 range. A number of reputable manufacturers make cameras that are suitable for Teledermatology.

In addition to commercial digital still cameras, examination cameras have been developed specifically for Telemedicine applications. Depending on clinical need, these cameras can offer considerable flexibility through their ability to interface with a wide variety of peripherals and communications systems. In addition to
taking still pictures, general exam cameras may be capable of transmitting full motion video of patient exam site, which can facilitate real-time Teledermatology consultation.

Although it is essential to carefully select camera equipment suitable for the clinical application, it is also important to keep in mind that the majority of the problems encountered with digital images are not due to the camera, but to the training and expertise of the photographer. The photographer for a Teledermatology referral site should know the details of operating a digital camera just as a radiology technician knows the details of how to properly acquire an MRI or CT scan. It is essential to develop standardized policies and procedures that describe the range of angles, depth of field, reference scales, etc., required to produce clinically useful photographs and ensure all personnel involved in the photography process are familiar with these procedures. In addition, the consulting dermatologist must be familiar with the optical qualities of the chosen camera equipment. Because digital cameras, unlike their film-based predecessors, do not react to light in the same non-linear fashion that the human eye does, it is important for the clinician to become familiar with how the specific camera manufacturer’s built-in firmware handles white balance, interprets color, and deals with zoom and noise, so that proper interpretation of images, and especially of color and shading, can be made.

**Software**
Depending on the scope of the Teledermatology program, software needs may vary from a simple means of file encryption coupled with an off-the-shelf e-mail system to a full suite of Picture Archiving and Communication System (PACS) software. Somewhere in the middle of these extremes there exists a number of quality software solutions designed with Teledermatology in mind, which easily facilitate image handling, cataloging, transmission, and even the appendage of associated notes for inclusion in an electronic health record system. The ATA Buyer’s Guide referenced above is a useful source of information on companies currently marketing such systems to the industry.

In this guide, one such system is used to illustrate the basic uses for such software in a Teledermatology program. Although the author and CTEC do not endorse specific vendors or products, they would like to offer sincere appreciation to Second Opinion Software (www.2opinion.com) for the use of screen captures of their products to illustrate examples within this guide.

Many such image management solutions in common use among Teledermatology programs today can easily function on the standard P based systems that occupy the majority of medical facilities. Therefore, it may not be necessary to purchase any computer hardware other than what is currently operating, with the possible
Helpful Tools

exception of commercially-available video capture cards, which may be required by some applications. Except for the software, the required parts for a fully functional SF Teledermatology site can be purchased “off the shelf” from your local computer and digital camera store. Ultimately, as stated in the introduction, it is the “peopleware” that are the key to the success of a Teledermatology network.
SAMPLE STORE AND FORWARD REFERRAL AND CONSULT

Descriptions of processes like store and forward consults can sometimes be intimidating because of all the words needed to describe the process. Sometimes, the best way to convey the whole in a less intimidating way is to provide an example. What follows is a sample case that will tie in all of the elements discussed above in an optimal SF Teledermatology consult. What the reader will see is the user interface of the Second Opinion System, but the same data could be presented in another format as long as it is consistent.

The following sections include a sample demographics form, a referral form, and images that would make up a referral, as well as a consult form that would be returned to the referring provider. In addition, a sample of a CMS 1500 billing form with the sections highlighted that most third party payers require to be filled in order to reimburse the providers can be found in Appendix C. The reason for including this reimbursement form is that in a busy system, if the required billing data isn’t provided with the initial consult, literally hours of time can be wasted trying to track down this information, especially when dealing with multiple sites in a busy network.
USER INTERFACE OF AN ELECTRONIC REFERRAL

Access to the system requires a registered user name and password entry.

* Images reproduced with permission from Second Opinion Software, LLC, Gardena, California
Note the three tabs on top for Identification, Address, and Reference; clicking on each tab opens the required form (see below).
ADDRESS INFORMATION SCREEN

This information is necessary for billing.
This is used for identifying the primary provider and also for billing.
REFERRAL FORM

Note again 3 tabs and space for provisional diagnosis to be entered.
Relevant History:
A 58 year old male with a 1 year history of itchy plaques on arms and legs and anterior scalp. Has tried 1% hydrocortisone cream twice a day for 6 months and tar shampoo without benefit. Was given a two week course of oral Keflex 500 mg a day for 2 weeks in April without benefit. He states the lesions continue to slowly spread. There is no pain, just periodic itching. There is no family history of skin cancer. A brother with a similar problem was told he had eczema.

Relevant Physical Findings:
Scaly plaques on his elbows and knees. Some scales in his scalp and forehead.

Relevant Laboratory and/or Diagnostic Test Results:
Allergic to penicillin and morphine.
SPECIFIC QUESTIONS SCREEN

This is where the referring provider or patient (in this case) may provide questions they would like answered.

Specific Questions:
Patient wants to know if this is contagious.
# SAMPLE SKIN EVALUATION FORM

This is an example of a sample Skin Evaluation Form that the nurse fills out and scans into the patient’s electronic file.

## SKIN EVALUATION FORM

1. Name: [Name]  
   - Last: [Last Name]  
   - First: [First Name]  
   - Middle: [Middle Name]

2. Date: 07/11/04  
   3. Age: 58

4. Male [ ]  
   Female [X]

5. Drug Allergies:  
   - penicillin-hives

6. Skin problem has been present approximately (check one)  
   - X 1 week
   - ___ 1 month
   - ___ Less than 6 months
   - ___ 1 year
   - ___ More than 1 year
   - ___ More than 3 years

7. How does skin problem bother you? (Check all that apply)  
   - Appearance
   - Bleeding
   - Getting larger
   - Getting darker
   - Itching
   - Burning
   - Throbbing
   - Aching
   - Other

8. Skin Medications (list name, concentration, type [cream, ointment, or lotion] and total time used [use back of sheet if necessary])  
   1. 1% HC cream b.i.d. for 6 months
   2. Tar Shampoo q.4h. for several weeks
   3. [Blank]

9. Oral Medications (please provide dose and total time taken; use back of sheet if necessary)  
   1. Keflex 500 mg: 0.id. for 2 weeks 04/04
   2. [Blank]

10. Do you or anyone have a history of skin cancer or melanoma? (Circle one)  
    Yes [X]  
    No [ ]

11. Please indicate below with arrows or dots the location(s) of skin problem(s)
Consultation:
07/15/04 - Dear Kilgore and NP Strathmore: Based on the data provided, I concur with your diagnosis of psoriasis in this 58 year old male. This patient has a localized form of the disease with plaques typically located on the elbows, knees, and scalp. Lack of response to the therapies tried to date is understandable because 1% hydrocortisone is too weak an agent for psoriasis, and Kellex has not shown any primary benefit for psoriasis.

Recommended Treatment Plan:
Based on the above assessment, I would recommend the following:
1) Apply Clobetasol Ointment (NOT CREAM) b.i.d. to affected skin for 2 weeks; then use it q.h.s. for 1 week and then use it b.i.d. only on weekends.
2) Apply Dovonex Ointment b.i.d. (can apply it at same time as Clobetasol) until lesions are resolved.
5) For the scalp patches, apply some clobetasol (or Fluocinonide) scalp solution b.i.d. to affected scalp for 2 weeks and then q.h.s. for 2 weeks. Use T/gel shampoo every other night for washing scalp.

Recommended Follow Up/Additional Comments:
Follow-up locally in 4 weeks. Re-consult as needed. Thank you for allowing me to assist in the care of this patient. Marc E. Goldyne, MD, PhD; San Francisco; 415-XXXXXX.
REIMBURSEMENT FOR SERVICES

Reimbursement for services is an important element in sustaining a Teledermatology program. Reimbursement policies for Teledermatology services vary from state to state. In September 2005, the state of California passed legislation which broadened the definition of teledermicine services to include store and forward and expanded Medi-Cal reimbursement to include store and forward Teledermatology consultations.

Currently, real time interactive Teledermatology is reimbursable by Medicare, and in many states Medicaid. To receive reimbursement from Medicare, the Medicare beneficiary must be referred and be presented from an originating site (physician or practitioner office, hospital, critical access hospital, rural health clinic, or federally qualified health center) that is located in either a rural health professional shortage area (HPSA) or a county outside a metropolitan statistical area (MSA) according to the US Census. A growing number of private payers also reimburse for remote dermatology services.

Other programs that currently reimburse for Teledermatology services include: Health Net Medi-Cal, Blue Cross of California State Sponsored Programs, Blue Cross of California, and California Public Employees’ Retirement System (CalPERS).

More detailed information on reimbursement may be found in CTEC’s Telemedicine Reimbursement Handbook, available online at www.cteconline.org.
SUMMARY

With off-the-shelf computer equipment, a commercially available 1.3 to 3 megapixel digital still camera, software that provides a 128-bit encrypted electronic medical record, high-speed Internet access, and most importantly, trained individuals (Telemedicine Coordinators) comfortable with this technology, a SF Teledermatology referral site can be created. The consultant (ideally board certified in his or her given specialty) only needs a desk or laptop computer, high-speed Internet access, the same software as the referral site, and he or she is ready to provide consultation services to the referral site.

The elements that make up an appropriate Teledermatology SF referral include:
- A signed patient consent form in the patient’s referral site record;
- Focused text on the patient that addresses both the clinical skin problem (based on a Skin Evaluation Form), as well as billing information required for reimbursement of services; and
- Digital images of the patient’s skin problem that convey: 1) location of the skin problem(s), 2) size of skin lesions, and 3) surface features (details of characteristic lesions).

This electronic record is then automatically encrypted by the software and can be sent as an e-mail attachment to the consultant.

The elements that make up an appropriate Teledermatology SF consult include:
- A clinical diagnosis for each of the referred skin problem(s) if possible;
- A differential diagnosis if a single diagnosis is not possible with the data provided, and what tests or procedures may be required to arrive at a specific diagnosis;
- Therapeutic recommendations for each diagnosis provided;
- A recommendation for follow-up to assess therapeutic efficacy and clinical response; and
- A contact number for the consultant that will allow the referring providers or patients to contact the specialist if any questions arise.

This electronic consult is then returned to the referral site as an e-mail attachment.
GLOSSARY OF TERMS FOR TELEDERMATOLOGY

Analog
A means of transmitting data as an electrical replication of the original signal. The signal is represented by a continuous waveform that varies in direct proportion to variation in the original signal.
*Compare Digital*

Aperture
Controls the amount of light that reaches the digital camera’s charge coupled device (CCD). The diameter of an aperture is measured in “f-stops.” A lower f-stop opens the aperture to admit more light. Each f-stop doubles the amount of light available to the sensor. A combination of aperture and shutter speed determines exposure value. Most digital cameras have automatic exposure modes that control the aperture and shutter speed, although the automatic settings may not be ideal for all clinical uses.
*See Exposure Value, Shutter Speed*

Artifact
In digital imagery or video, an unwanted by-product of the image creation, compression, or transmission process. Especially with lossy compression techniques, errors can inadvertently appear in the compressed image that are perceptible to the viewer.
*See Digital Image Noise*

Asynchronous Communication
A mode of communication where the transfer takes place over a period of time, or in separate time frames, not requiring the transmission to take place simultaneously. Examples include e-mail or store and forward Telemedicine.
*Compare Synchronous Communication*

Bandwidth
A measure of the information-carrying capacity of a communications channel. The higher the bandwidth (the larger the “pipe”), the greater the amount of information or data that can be transmitted in a given time period. Bandwidth is usually measured in Kilobits (Kbps - thousands of bits) or Megabits (Mbps - millions of bits) per second. Higher levels of bandwidth allow video and audio data to be transmitted more rapidly from point to point, allowing the capture and transmission of movement with less “jerkiness.”
*See Broadband, Narrowband*

Bits Per Second (Bps)
A measure of transmission rate. Bps, also called “bit rate,” is concerned with the rate of data transmission, and should not be confused with the often seen term
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“baud rate,” which refers to the rate of the carrier signal, not the amount of data actually carried.

Bitmap
Also referred to as a raster graphics image, is a family of methods for storing digital imagery in a rectangular grid of pixels. A bitmap is generally described by its height and width in pixels, and the number of bits used to record each pixel ("color depth"), which determines how many colors may be displayed. The quality of a bitmap depends upon its resolution (total number of pixels) and its color depth. Bitmaps are not inherently "scalable" (i.e. enlarging a bitmap will often result in a perceptible loss of image quality).

Broadband
In networking terminology, a telecommunications medium capable of transmitting multiple data signals simultaneously. The term broadband is also used to describe media that transmit data at a high rate, generally comparable to T1 or better, and occasionally as a synonym for DSL. Television, microwave, and satellite telecommunications are examples of broadband media.
See Bandwidth, Digital Subscriber Line; Compare Narrowband

Charge Coupled Device (CCD)
Photosensitive cells used to record images by generating voltage in response to light. The quality of resolution achievable by a digital camera is determined by the number of CCDs ("chips") employed, and the number of cells on each CCD. The number of cells per chip determines the resolution in pixels that the camera can display. Greater resolution is achieved either through larger CCD chips, or by using a greater number of CCDs.

Checksum
In the process of data compression or transmission, a checksum is often employed as a mathematical method to determine if the data was correctly stored or transmitted. Checksums work by comparing a mathematical sum obtained when the file was created with the results of the same calculation once the file is compressed or transmitted.
See Compression, ZIP

Color Checker Chart
Industry standard color value reference chart used in still and video photography to identify and evaluate factors that may affect accurate color reproduction. Specific charts have been developed to evaluate white balance and color accuracy of digital cameras.
See White Balance
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Compression
This term refers to the mathematical means used to reduce bandwidth requirements for digital signals, enabling richer video and audio at a more manageable file size. A number of standards for both video and still picture data (e.g. MPEG, JPEG, and GIF) are in common use. Compression techniques are either "lossy" or "lossless."  
*See Lossless, Lossy*

Crop
The use of image manipulation software to remove unwanted portions of an image. Cropping allows a particular feature of the image to be emphasized, or eliminates distracting elements.

Depth of Field
Refers to how much of an image remains in focus from front to back as the camera focuses on the main subject. Depth of field is controlled by aperture and focal length of the lens. "Deep" depth of field is useful for panoramic shots. "Shallow" depth of field is more appropriate for close-up and portrait shots, and is most useful for clinical imagery. Shallow depth of field is produced by using a larger aperture and/or longer focal length (zoom lens).  
*See Aperture, Focal Length*

Digital
Data that has been encoded into a discrete series of binary digits ("bits"), as opposed to the continuous variable waveforms of analog signals.  
*Compare Analog*

Digital Camera
A digital camera is typically used to take still images of a patient. General Telemedicine uses for this type of camera include dermatology and wound care. This camera produces direct capture images that can be transmitted to a provider/consultant over a network without scanning or conversion. A wide range of digital camera types are available, from inexpensive commercially available models, to ultra high resolution devices with specialty lenses and peripherals. When developing a store and forward Telemedicine practice, it is important to consider cost and benefits of various models of commercial and specialty camera equipment to ensure the best fit of image quality per unit cost.  
*See Charge Coupled Device*

Digital Image Noise
Unwanted artifacts, such as randomly spaced pixels, which can occur in digital imagery. The possibility of image noise may be reduced by use of a lower ISO setting, use of the recommended flash settings in low lighting, and use of a tripod.
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when using slow shutter speeds. Noise reduction software is available to remove these unwanted artifacts, but care must be exercised to avoid removing clinically significant elements.
See Artifact, ISO Sensitivity

Digital Subscriber Line (DSL)
A dedicated broadband technology that uses the ubiquitous twisted pair copper wire connecting most homes and businesses today through the public telephone system to provide connectivity at relatively high speeds. DSL accomplishes this by dividing the existing telephone frequencies so that voice and data may be carried simultaneously without interference. Unlike a dial-up connection, DSL is always available. There are several different implementations available. The most common is called Asymmetric or Asynchronous (ADSL). An ADSL connection is characterized by a high-speed downstream channel, and somewhat lower speed upstream channel. Synchronous DSL is also available for business use. Distance from the subscriber site to the Telco’s Central Office (CO) is the main determinant of the actual performance of a DSL connection.

Digital Zoom
A method employed by many digital cameras to enlarge a portion of the image in order to simulate the effects of optical zoom (the use of lenses to bring the subject view closer). The camera crops a portion of the image and then enlarges it back to the required size. Digital zoom generally results in a loss of image quality, compared to a similar shot taken using actual optical zoom.

Direct Capture
The process by which images are created directly by a digital system, rather than being converted from the output of an analog device. This allows for efficient, high quality reproduction, without the loss of any data from scanning or conversion. Examples of digital devices capable of direct capture include MRI and CT systems.

Document Camera
A type of video camera designed to display documents and even 3-dimensional objects onto a monitor, or displayed via connection to a projector. Often thought of as the digital equivalent of an overhead projector, the document camera is capable of much greater functionality, allowing display of a wider range of objects in much greater detail, and enabling transmission of images across a network. Various peripherals are available for some models, including microscope attachments and visualizers for x-rays.
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Duplex
A system that allows data to be transmitted in both directions simultaneously. Using full duplex, the system is capable of transmitting and receiving in both directions at the same time. A voice conversation over the public telephone network is one example of this. Conversely, a half duplex system is capable of both transmitting and receiving information, but only in one direction at a time.

eHealth
The provision of healthcare supported by electronic processes and communication.  
*See Telehealth, Telemedicine*

Encryption
Encoding of information to protect it from unauthorized access. Encryption is one facet of electronic communications security, and is often used along with digital signatures and similar techniques to verify the integrity and authenticity of the communication. Common electronic encryption techniques include Public Key Infrastructure (PKI) for messaging and Secure Socket Layer (SSL) for transactions over the World Wide Web.

Exposure Values (EV)
Numeric values that measure the compensation necessary for the amount of light illuminating a subject, in order to control proper “exposure” (the amount of light that reaches the sensor (CCD) of a digital camera). Very light (“overexposed”) subjects require a lower EV, while overly dark (“underexposed”) subjects call for an increased EV.  
*See Aperture, Charge Coupled Device*

Focal Length
A measure of the optic properties of a camera lens. Lenses are generally categorized as “wide-angle,” “normal,” or “telephoto,” depending on their focal length. A “zoom” lens can have variable focal length for a range of uses. In digital photography, the size of the image sensor (CCD) also has an affect on equivalent focal length.  
*See Aperture, Charge Coupled Device, Depth of Field*

Freeze Frame
The transmission of individual video frames (still images) selected from a video feed or file.

Graphics Interchange Format (GIF)
A common lossless compression format for storage of digital images. GIF is generally
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limited to a depth of 256 colors, making it unsuitable for digital photography, but it is popular on the World Wide Web for diagrams and other design elements requiring sharp clarity with a small file size.

Hub Site
In Telemedicine, the location from which specialty or consultative services originate.
Compare Spoke Site

Integrated Services Digital Network (ISDN)
A dial-up digital connectivity medium used commonly for videoconferencing. ISDN can transmit voice, data, and video simultaneously over a connection. Since ISDN services are used on demand by dialing another ISDN-based device, per-minute charges accumulate at a contracted rate and then are billed to the site placing the call. This service is analogous to using the dialing features associated with a long distance telephone call - whoever dials pays the bill.

Interactive Video/Television (IATV or ITV)
Two-way transmission of digitized video images occurring in real time between users at two or more locations.

Interoperability
The ability of two or more systems (or components) to exchange information and to use the information that has been exchanged. Generally achieved through the implementation of standards.

ISO Sensitivity
Taken from the acronym for International Standards Organization, “ISO” is a term used in digital photography to denote how sensitive the image sensor is to the amount of light present. The higher the ISO, the more sensitive the sensor and the better suited it is for taking pictures in low-light situations.
See Digital Image Noise

Joint Photographic Experts Group (JPEG)
A series of image compression formats made popular by their small file size and suitability for digital photography. JPEG images are typically lossy when compressed, depending on the algorithm employed by the device or selected when creating the file.

Latency
Perceptible delay between transmission and receipt of data across a connection. Latency can be increased due to a high level of network activity, or a poor or slow
connection. A connection with high latency can produce unacceptable delays and lost data in video and audio transmission. Network management techniques often seek to improve quality of service by decreasing latency of audiovisual data. *Compare Shot-to-Shot Latency*

**Leased Line**
A line leased from a Telco for the exclusive use of one client. Also called a “dedicated line.”

**Lossless**
A technique for data compression that preserves all elements of the original. Lossless formats cannot always guarantee a high level of compression, but are necessary when it is important to reproduce an exact duplicate of the original (e.g., an executable file). Common lossless formats include GIF and PNG for graphics, and ZIP for data files. *See Compression; Compare Lossy*

**Lossy**
A technique for data compression that achieves a relatively high level of file size reduction by removing elements of the original deemed to be unnecessary or imperceptible to the intended viewer. Lossy compression is most commonly used when processing audio, still image, or video data to produce an acceptable quality presentation while minimizing bandwidth requirements. Common lossy formats include MP3 for audio, JPEG for still images, and MPEG for video. *See Compression; Compare Lossless*

**Megapixel**
A popular measurement of the potential resolution of a digital camera, in millions of pixels. The megapixel rating of a given digital camera can give the user a general idea of the maximum effective print size and image resolution that it is capable of, although many factors can affect the usefulness of a particular camera for a particular task. *See Pixel, Resolution*

**Modulator - Demodulator (Modem)**
A device that converts digital signals to analog tones, and vice versa, to enable data transmission over telephone lines. Commonly referred to as “dial-up,” modem connectivity is limited in theory to the 64 Kbps rate used for voice telephony, though effectively, a modem connection is limited to 56 Kbps or less due to overhead and latency.
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Narrowband
A term with various uses in communications and other fields, generally signifying a low-capacity circuit. Commonly used as the opposite of broadband, it often refers to a communications medium of relatively slow speed (significantly less than T1) without the capacity to handle multiple data signals simultaneously.
See Bandwidth; Compare Broadband

Patient Exam Camera
A camera typically used to examine the general condition of the patient. Types of cameras include those that are embedded in set-top videoconferencing units, handheld video cameras, gooseneck cameras, camcorders, etc. The camera may be analog or digital depending upon the connection to the videoconferencing unit.
See Digital Camera

Peripherals
Attachments designed to enhance the functionality of various electronic devices. Examples include blood pressure monitors, ophthalmoscopes, document cameras, etc.

Pixel (Picture Element)
The smallest unit of a video display, used as a measure of resolution for video formats.

Portable Network Graphics (PNG)
A popular lossless compression format for still images. PNG files do not have the 256 color limitation of the earlier GIF format.

Plain Old Telephone Service (POTS)
The ubiquitous, partially analog phone system currently in public use worldwide. Also known as the Public Switched Telephone Network (PSTN). Although a relatively low bandwidth medium, POTS is sometimes a suitable medium for Telemedicine, based on ease of access and low cost. POTS videophones and telemetry devices are often used in Telehomecare.

Presenter (Patient Presenter)
Telemedicine encounters require the distant provider to perform an exam of a patient from many miles away. In order to accomplish that task, an individual with sufficient clinical background and training in the use of Telemedicine equipment must be available at the originating site to "present" the patient, manage the cameras, and perform any "hands-on" activities to successfully complete the exam.
See Hub Site, Spoke Site
**Glossary of Terms for Teledermatology**

**Raw Image Format (RAW/DNG)**
The original, uncompressed, unfiltered image captured by a digital camera. RAW image data may be useful for manipulation in certain clinical applications. In general, RAW formats are proprietary to the individual camera manufacturer. However, the Digital Negative (DNG) format is an emerging non-proprietary standard for raw digital imagery.

**Real Time**
In Telemedicine terms, conducting an encounter or consultation where both parties are available and interacting simultaneously. Real time Telemedicine is generally conducted via full motion videoconferencing.
*Compare Store and Forward*

**Resolution**
The level of detail a given device is capable of displaying, generally measured in pixels, dots per inch, color depth, or similar criteria.

**Shot-to-Shot Latency**
In digital photography, the physical time required to write a captured image file to internal or card memory produces a tangible delay in the frequency at which multiple shots can be taken.

**Shutter Speed**
Controls the amount of time the digital camera’s sensor (CCD) is exposed to light. At slower shutter speeds, moving object will appear to blur in the picture. “Shutter lag” is a common problem with low-end digital cameras, producing a perceptible delay between pressing the shutter control and exposure of the image.

**Spoke Site**
The remote site where the patient is presented during a Telemedicine encounter, or where the professional requesting consultation with a specialist is located.
*Compare Hub Site*

**Store and Forward**
A Telemedicine encounter or consult that relies on the asynchronous transfer of still digital images of a patient, or clinical data, such as blood glucose levels or electrocardiogram measurements, from one site to another for the purpose for rendering a medical opinion or diagnosis. Common types of store and forward services include radiology, pathology, dermatology, ophthalmology, and wound care.
*Compare Real Time*
Glossary of Terms for Teledermatology

Synchronous Communication
A mode of communication where the transfer takes place simultaneously. Examples include real time videoconferencing or standard telephony.
See Asynchronous Communication

T1/T3
High speed telecommunications lines that support digital voice and data communication. The T1 has a transmission rate of 1.544 Mbps. The considerably faster high volume T3 line operates at 44.736 Mbps. A T1 line consists of twenty-four 64 Kbps channels (the rate required for voice transmission), which may be “integrated” for dedicated use of a single customer, or often “fractionalized” into some portion of the 24 channels. A common cost-saving arrangement is to lease a fractional “Quarter T1,” operating at 384 Kbps, a preferred, though not standard, bandwidth for videoconferencing.
See Leased Line

Tagged Image File Format (TIFF)
A popular file format for digital images, known for its flexibility and adaptability. TIFF images are generally uncompressed, though there are options for the use of lossless compression. TIFF is often used for document imagery (e.g. fax and scanner applications).
See Bitmap, Lossless

Telco
Generic acronym for telephone company or telecommunications service provider.

Telecommunications
Transmission and reception of voice, video, or other data over a distance. A telecommunications system has several components: a transmitter (electronic device), a transmission medium (e.g. wire-based Telco or LAN, wireless antenna, satellite), and generally a specific channel (e.g. radio frequency, phone number, IP address). Telecommunications can be point-to-point (between two participants), multipoint (between three or more participants), or broadcast (one way transmission from a sender to multiple receivers).

Teleconferencing
Interactive communication between two or more individuals at geographically separated sites, via a telecommunications system. Teleconferencing may be audio only, include video, and/or support the transmission of various files, graphics content, and other information.

Teleconsultation
Consultation between a provider and a specialist at a distant location, utilizing either store and forward Telemmedicine or real time videoconferencing.
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Teledermatology
Specialist use of Telemedicine to provide dermatological care at a distance. Teledermatology has been found to be an effective use of store and forward transmission of digital images and text, though real time consultation via videoconferencing is also used.

Telehealth
An older term still in widespread usage, generally referring to the provision of healthcare and health information through the use of technological means rather than traditional clinical encounters.
*Compare eHealth, Telemedicine*

Telemedicine
The use of telecommunications and information technologies for the provision of healthcare at a distance. New methods continue to evolve over time, but this includes real time videoconferencing as well as store and forward methodologies.
*Compare eHealth, Telehealth*

Telementoring
The use of a telecommunications system to provide guidance and consultation between healthcare professionals.

Telepathology
Use of Telemedicine to view pathological specimens remotely in order to facilitate diagnostic testing.

Telewoundcare
Use of a telecommunications system to assess and manage a patient’s wounds at a distance. Remote assessment is often based on images of the patient’s wounds delivered to a consulting specialist via store and forward technology. Careful selection of digital cameras and peripherals to ensure high quality pictures and precise color reproduction are essential to effective Telewoundcare. Some providers have also found great benefits to conducting wound care management via real time videoconferencing, recognizing the importance of assessing the whole patient and having the opportunity to provide patient education on wound care at the time of the assessment.

Transmission Control Protocol/Internet Protocol (TCP/IP)
A series of protocols used to control communication across the Internet. TCP/IP uses two main protocols, TCP and IP. TCP enables two hosts to establish a connection and exchange packets of data. IP specifies the format and addressing scheme used for packets of data.
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Videoconferencing
Interactive teleconferencing with video capabilities. 
See Teleconferencing

White Balance
A setting on a digital camera that adjusts the brightest portion of the framed shot so it appears white. Although the human eye will see white objects as white regardless of lighting conditions, a digital camera will not always do so. Most digital cameras are equipped with white balance settings to compensate for different lighting conditions (e.g. daylight, clouds, fluorescent, incandescent). See Color Checker Chart

Wireless
Refers to a wide range of communications technologies along the radio frequency spectrum. Applications specific to Telemedicine and eHealth take advantage of wireless technologies including cellular telephony and wireless networking. Wireless networking has become increasingly common. Especially in rural areas, some companies are taking advantage of wireless technologies to provide broadband service where wired access is impractical or cost prohibitive.

ZIP
A popular format for compressing one or more files into a single archive. ZIP archives can be useful for transmitting large amounts of data, by reducing overall file size and ensuring complete receipt of an entire set of files through the use of checksums. The ZIP format uses lossless compression techniques, and cannot always guarantee smaller file size, especially when archiving highly compressed originals (such as JPEG images). See Compression, Lossless

A  Sample Authorization and Consent Form
B  Optimizing Images for Store and Forward Teledermatology
C  Health Insurance Claim Form
Authorization and Consent to Participate in a Telemedicine Consultation

Patient Name:
Date of Birth:
Patient ID Number:
Provider Name:

My doctor or his/her representative has recommended the use of a Telemedicine consultation for my medical condition. He/she has explained to me what will happen during the consultation. I have also been told and given written explanation of:

The risks and benefits of the consultation
The risks and benefits of other choices
The results of not having the consultation

A patient receiving a store and forward consult shall be notified of the right to receive interactive communication with the specialist. If requested, interactive communication with the specialist may occur at the time of the consultation or within 30 days of the patient's notification of the results of the consultation.

My signature below shows:
I have read and understood the information described in this form.
I have had a chance to ask questions about the consultation.
I have received satisfactory answers to my questions.
I understand that I may stop or take away my consent to the consultation at any time for any reason; this will not change my right to future care or treatment; this decision will not change my rights to benefits under my insurance program.
I understand that all confidentiality protections apply to the Telemedicine consultation.
I understand that my medical records and medical information are private and confidential to the extent permitted by law.
I understand that there are not guarantees about the results of the consultation.
I consent _____ do not consent ________ to having any identifiable images or information from the consultation shared with researchers or other entities.
I understand that all existing and applicable state and federal laws regarding patient access to medical information and copies apply to this Telemedicine consultation.

Signed: ____________________________ Date: ______________
Patient/Legal Guardian

If signed by other than patient, indicate relationship: ____________________________

Signed: ____________________________ Date: ______________
Witness

This consent form will become a part of your medical records.
Take a copy of this consent form with you for your records.

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APPENDIX B - OPTIMIZING IMAGES

Images sent to a dermatology teleconsultant must provide the following visual information for skin problems: 1) location(s), 2) size, and 3) surface features.

1. **Location:** A picture must allow the consultant to identify the anatomic part(s) where the skin problem exists (Figs. A & B). If the whole body is involved, capture front, side and back views.

A.

![Image A](image1)

B.

![Image B](image2)
Appendix B - Optimizing Images

2. Size: If there is a single skin lesion, use an adhesive millimeter tape or ruler placed near the lesion that will give the consultant an idea of the size of a given lesion (Figs C & D). If multiple lesions exist, place an adhesive rule within the picture field as a guide to lesion sizes (Fig. E).

C.

D.
Digital photo of several moles on a patient’s back with a millimeter tape to provide a reference guide to the size of the moles.
3. **Surface features**: Use your camera’s macro capability to take a picture as close up as possible while keeping the whole lesion within the picture field. Use a raking light or window light from the side that will, by casting slight shadows, give a sense of elevation or texture to the image. (Figs. F & G).

![Surface features image](image-url)
### HEALTH INSURANCE CLAIM FORM

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Patient's Name and Claim Number</td>
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<tr>
<td>2.</td>
<td>Insurer's Name</td>
</tr>
<tr>
<td>3.</td>
<td>Policy Number</td>
</tr>
<tr>
<td>4.</td>
<td>Date of Service</td>
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<tr>
<td>5.</td>
<td>Diagnosis Code</td>
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<tr>
<td>6.</td>
<td>Procedure Code</td>
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<tr>
<td>7.</td>
<td>Medicare Number</td>
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<tr>
<td>8.</td>
<td>EIN of Provider</td>
</tr>
<tr>
<td>9.</td>
<td>State of Service</td>
</tr>
<tr>
<td>10.</td>
<td>Distance to Service</td>
</tr>
</tbody>
</table>

1. Some insurances require a "Barrier to service = _____ miles" entry in section 10.
2. Some insurance groups require a Telemedicine "modifier" code in section 24D.

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**Store and Forward Teledermatology Practice Guide**
ACKNOWLEDGEMENTS

CTEC would like to thank Marc Goldyne, MD for authoring the Teledermatology Practice Guide and for allowing CTEC to provide this guide as a resource to others.

This publication was reviewed and edited by the staff of the California Telemedicine & eHealth Center, including:

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Special thank you to members of CTEC’s Advisory Committee who also contributed to the review of this guide:

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David Springer, MD, Area Manager/Psychiatric Consultant, California Area Indian Health Services

Jan Patterson, Director of Operations, TATRC

Jorge Cuadros, OD, Director of Informatics Research, University of California, Berkeley, School of Optometry

CTEC would also like to acknowledge the following experts in Teledermatology who generously provided ideas and feedback for this publication:

Hon Pak, MD, Chief Information Technology Engineering Division, USAMRMC/TATRC

Karen Edison, MD, Associate Professor and Chair of Dermatology, University of Missouri Health Care