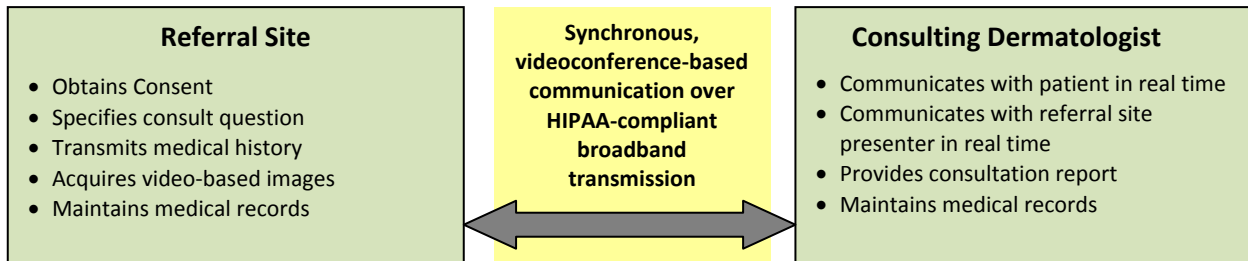


Quick Guide to Live-Interactive Teledermatology for Referring Providers

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1. WORK FLOW



Introduce who is present and the role of the coordinator if one is present.

2. EQUIPMENT

A. Videoconferencing Equipment

To conduct live-interactive teledermatology, recommendations for videoconferencing units include the following:

- H.264 video compression standard or better
- H.323 compliant
- H.261 video compression standard compatibility
- G.711 audio compression standard or better
- Live Video resolution 4CIF (704x480) or higher
- Content resolution XGA (1024x768) or higher
- Capable of connecting at 384kbps running 4CIF @ 30fps

B. Video-Format General Examination Cameras

Video-format general examination cameras are peripherals attached to the videoconferencing units that allow for close-up examination of skin lesions. Recommendations for video-format general examination cameras include the following:

- Standard definition or high-definition
- Able to scan, zoom, auto focus, and freeze-frame capture skin lesions
- Contains internal lighting source to illuminate skin lesions
- Image polarization feature preferred but not generally required

C. Connectivity

Because connection speed has a profound impact on video image quality, a connection speed of at least 384 kbps between the referral and consultant sites is recommended. Most live-interactive teledermatology programs have transitioned from ISDN to internet protocol (IP). Currently, most high-speed lines have connectivity speeds of at least 1.5 Mbps.

3. CAPTURING VIDEO-BASED IMAGES

Image quality in live-interactive teledermatology can vary significantly depending on a multitude of factors, including connection speed, operational experience of the teledermatology coordinator, and whether freeze frame is used. General tips on capturing high-quality video-based images are detailed below:

- **Connectivity** - Minimum of 384 kbps connection speed between referral and consultant sites is recommended.

- **Lighting** - Because the illumination device on the video-format general examination cameras may not provide sufficient illumination on its own, we recommend additional indoor lighting using fluorescent daylight or full spectrum bulbs.
- **Views** - Hold the camera at a distance initially to show the general distribution of a rash or location of a skin growth before obtaining close-up images. When moving the camera to show the general distribution of a rash, the coordinator should obtain feedback regarding the speed of camera movement from the dermatologist to ensure adequate image quality at the consultant's site.
- **Positioning** - If the dermatology camera does not contain an image viewer on the camera itself, it is important to position the patient in between the dermatology camera and the videoconference monitor in one line of sight such that the coordinator can easily see whether an image is captured correctly on the video monitor.
- **Verbalization of Body Regions Being Examined** - As the coordinator moves the skin examination camera, he or she needs to continuously verbalize the part of the body that is being captured. This helps to orient the dermatologist to the location of the lesions.
- **Focus** - For capturing close-up images, adjust the camera angle to ensure that the camera is perpendicular to the skin lesions. Hold the camera as still as possible to show the close-up images. Offer to take freeze-frame images if images from live feeds are unclear.
- **Freeze-frame Capture** - Most video-format general examination cameras are equipped with the freeze-frame feature. Using this feature produces still images that are highly useful for diagnosis. It is especially important to use freeze-frame capture when connection speed is low, which can result in degradation of image quality for moving video frames but not necessarily affect still images captured through freeze-frames. Freeze frames allow the dermatologist to appreciate fine surface features of the skin lesions and minimize much of the image degradation that occurs with scanning with the camera.
- **Other considerations** - Avoid distracting jewelry and clothing; in hairy areas, tape or press back to show underlying skin changes; use a chaperone if necessary; use measurement tools as appropriate.

4. BEFORE AND AFTER A LIVE-INTERACTIVE TELEDERMATOLOGY CONSULT

A. Before a Live-Interactive Teledermatology Consult

- Ensure that the dermatologist has received patient history and referral forms.
- Arrive early to establish videoconference connection, connect the peripheral attachments, and check all equipment to ensure proper functioning.
- Review the patient's referral form to identify body areas that will need to be uncovered and imaged for examination.

B. After a Live-Interactive Teledermatology Consult

- If the camera has a probe, place a thermometer condom on the probe during patient examination and change the thermometer condom after each patient.



LIVE-INTERACTIVE TELEDERMATOLOGY SETUP

Figure 1: Patient at referral site communicates with consulting dermatologist in real time.

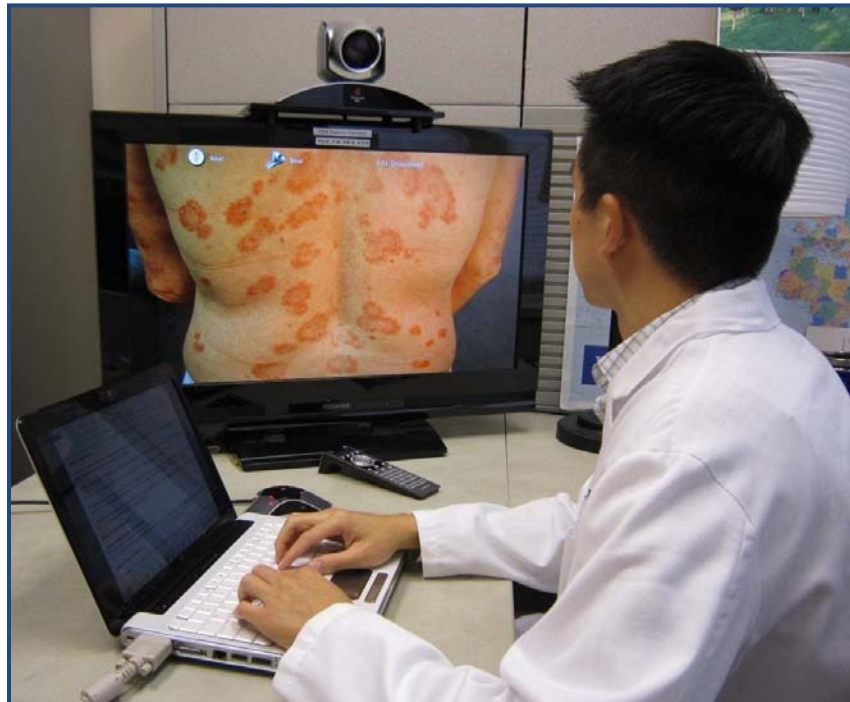
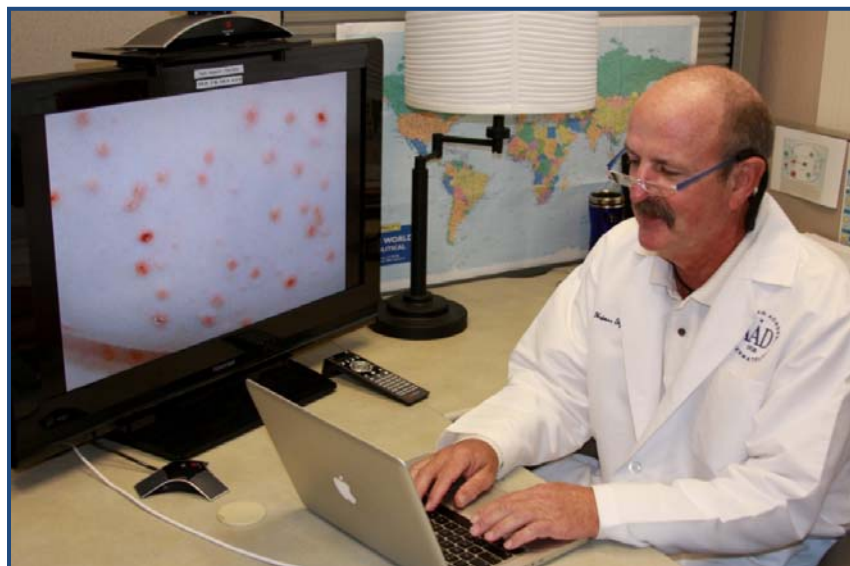


Figure 2: Consulting dermatologist evaluates patient skin lesions in real time.



REFERENCES

- Krupinski E et al. American Telemedicine Association's Practice Guidelines for Teledermatology. *Telemedicine and e-Health* 2008 (April): 14: 289-302.
- Goldyne ME and Armstrong AW. The Teledermatology Practice Guide. Available by request via California Telemedicine and eHealth Center, <http://www.cteonline.org/publications.php#program>.