



# **PRACTICE GUIDELINES FOR TELEBURN CARE**

---

**APRIL 2016**

---



## ACKNOWLEDGEMENTS

The American Telemedicine Association (ATA) wishes to express sincere appreciation to the ATA Teleburn Care Guidelines Work Group and the ATA Practice Guidelines Committee for the development of these guidelines. Their hard work, diligence and perseverance are highly appreciated.

### PRACTICE GUIDELINES WORK GROUP

Chair: **Lou Theurer**, Grant Administrator, Burn Telemedicine Program, Operations Manager, Department of Telemedicine, University of Utah Health Sciences Center

#### • Work Group Members •

**Cindy Leenknecht**, RN, BS, MS, Telemedicine Project Coordinator, Clinical Informatics Specialist, St. Vincent Healthcare Foundation

**Jackie Busch** BSN, Nursing, Clinical Services Director, InTouch Health

**Beatriz Cocco Word**, RN, NP, Wound Healing Nurse Practitioner, Marshfield Clinic

**Libba Reed McMillan**, PhD, RN, Assistant Professor, Auburn University

**Tom Brewer**, BSBA, MS, IPC, Virtual Health Solution Architect, Accenture

#### • Subject Matter Expert Reviewers •

**Jeffrey R. Saffle**, MD, FACS, Professor of Surgery, Director, University of Utah Burn Center

**Daniel Caruso**, MD, FACS, Chief, Burn Services, Arizona Burn Center

**Tam Pham**, MD, FACS, Associate Professor of Surgery, Harborview Burn Center

**Nathan Kemalyan**, MD, FACS, Oregon Burn Center, Legacy Health System

#### • ATA Practice Guidelines Committee •

Chair: **Elizabeth A. Krupinski**, PhD, Professor & Vice Chair for Research, Department of Radiology & Imaging Sciences, Emory University

• Committee Members •

**Nina Antoniotti**, RN, MBA, PhD, Executive Director of Telehealth and Clinical Outreach, SIU School of Medicine

**David Brennan**, MSBE, Director, Telehealth Initiatives, MedStar Health

**Anne Burdick**, MD, MPH, Associate Dean for Telemedicine and Clinical Outreach, Professor of Dermatology, Director, Leprosy Program, University of Miami Miller School of Medicine

**Jerry Cavallerano**, PhD, OD, Staff Optometrist, Assistant to the Director, Joslin Diabetes Center, Beetham Eye Institute

**Helen K. Li**, MD, Adjunct Associate Professor, University of Texas Health Science Center

**Lou Theurer**, Grant Administrator, Burn Telemedicine Program, University of Utah Health Sciences Center

**Jill M. Winters**, PhD, RN, President and Dean, Columbia College of Nursing

• Contributing Editor •

**Rashid Bashshur**, PhD, Senior Advisor for eHealth, University of Michigan Health System

• ATA Staff •

**Jordana Bernard**, MBA, Chief Program Officer

**Jonathan D. Linkous**, CEO

# **PRACTICE GUIDELINES FOR TELEBURN CARE**

## **TABLE OF CONTENTS**

<b>PREAMBLE</b>	<b>1</b>
<b>SCOPE</b>	<b>2</b>
<b>DEFINITIONS</b>	<b>2</b>
<b>INTRODUCTION</b>	<b>2</b>
<b>PRACTICE GUIDELINES</b>	<b>3</b>
Administrative Guidelines	3
Clinical Guidelines	7
Technical Guidelines	11
<b>APPENDIX</b>	<b>16</b>
References	16

## PREAMBLE

The American Telemedicine Association (ATA) is a membership-based organization composed of a diverse set of members including healthcare providers, academicians, researchers, program developers, industry representatives, and policymakers. ATA collaborates actively with related health professional organizations, as well as the public and private sectors, in promoting the safe and effective use of telemedicine to enhance the health and wellbeing of people.

ATA has embarked on a mission to establish guidelines in several areas of telemedicine practice to assure patient safety, adherence to standard protocols, uniformity and quality of services provided via telemedicine. The guidelines were developed by panels of experts in their respective fields, and are designed to assist providers of care in complying with ethical standards, legal requirements and sound business practices. In addition, they serve as guides for patients and their caregivers in assuring their rights and protecting their health.

The development of these guidelines entailed a rigorous process of peer review and analysis to ensure their appropriateness, relevancy, consistency, and comprehensiveness. They were enacted after full review and approval by the Board of Directors. In view of changing laws and regulations, research evidence, circumstances of practice and technological developments, these guidelines are reviewed periodically and updated as indicated.

Compliance with these guidelines alone will not guarantee accurate diagnoses or successful outcomes for patients. Practitioners are urged to rely on their best professional experience and expertise when faced with unique cases, unexpected circumstances or new developments in technology. When these conditions exist, telemedicine practitioners are strongly advised to document this information and the rationale for the actions taken in the patient record.

The framers of these guidelines do not purport to establish strict legal standards for telemedicine services. Instead, they focus on the quality, safety and effectiveness of telemedicine encounters.

## SCOPE

These guidelines cover the provision of medical and related healthcare services using telecommunications technologies between patients and their providers as well as among providers (practitioners and specialists) for the diagnosis, treatment and follow-up of patients with burn injuries. Healthcare providers include individual practitioners, single and multi-specialty practices, hospitals and health systems, triage or call centers, and other licensed healthcare providers delivering telemedicine services. These guidelines do not address other communications between healthcare professionals and patients via short message service, email correspondence, social network sites, or online health “coaching”.

## DEFINITIONS

The guidelines address three aspects of service delivery: administration/management, clinical practice, and technical design and architecture. Under each aspect, the guidelines are presented in the form of three levels of expected adherence: **“Shall”** indicates required action whenever feasible and/or practical. **“Shall not”** indicates a proscription or action that is strongly advised against. **“Should”** indicates recommended action without excluding others. **“May”** indicates appropriate actions that are deemed appropriate but not mandatory to optimize the telemedicine encounter and the patient experience. These indications are presented in bold letters throughout the document to facilitate their visibility.

ATA urges health professionals using telemedicine in caring for burn patients in their practices to familiarize themselves with these guidelines, as well as other clinical guidelines or best practice standards issued by their professional organizations or societies and to incorporate both sets into their telemedicine practice. These guidelines pertain to healthcare services delivered via telemedicine when both patient and provider are within the United States (US). Other jurisdictions may use these guidelines at their discretion.

## INTRODUCTION

Several aspects of burn injuries and treatment are ideally suited for the practice of telemedicine.<sup>1-5</sup> Burns are cutaneous and typically visible injuries. Hence, in most instances they can be evaluated accurately and quantified as to both extent and depth by visual examination. The incidence of serious burns in the United States has decreased from approximately 10.2 per 1,000 annually in the 1960’s to 4.2 per 1,000 in the 1990’s.<sup>6</sup> The decline in burn injuries has led to a significant reduction in the number of burn centers around the country,<sup>7</sup> leaving segments of the population without convenient access to specialized burn care.<sup>8</sup> In 2015, the American Burn Association estimated that about 486,000 burns required treatment resulting in 40,000 hospitalizations and 3,240 deaths.<sup>9</sup> Certain populations are at increased risk of burn injuries, including children, the elderly, and rural residents. Hence, they suffer from limited access to appropriate care.<sup>10</sup> Many physicians receive little or no training in burn evaluation or management. This can lead to serious errors in burn evaluation,<sup>11-12</sup> over-treatment,<sup>13</sup> over-

triage, and/or over-use of expensive and inconvenient transport services.<sup>13-16</sup> This is ironic because the improved lower incidence and improved survival of burn patients in recent decades has created more demand for rehabilitation and long-term follow-up which are expensive and not widely available.<sup>7,17-18</sup> Telemedicine promises to fill the gap in meeting the need for specialized burn care at an affordable price even in locations where it may be logistically impossible.<sup>19-20</sup> In many other parts of the world burn injuries remain all too common sources of disability and death.

When properly implemented, telemedicine can provide ready access to qualified providers for optimal burn care.<sup>21-48</sup> This can be achieved in real time when time is of the essence or asynchronously when seeking expert opinion. Both real-time (synchronous) videoconferencing and asynchronous (store-and-forward) imagery can be implemented, depending on the condition of the patient.<sup>24-27</sup> Successful burn telemedicine programs have been described in the US,<sup>28-30</sup> other industrialized nations,<sup>31-33</sup> austere environments,<sup>34</sup> developing nations<sup>35</sup> and in international care.<sup>36-38</sup> The tools of telemedicine and mobile applications can enhance patient management, while saving costs and facilitating documentation. Mobile applications are gaining popularity in burn treatment, which argues for the need to develop and disseminate practice guidelines for teleburn care.<sup>39</sup>

Telemedicine can play a pivotal role in response to disasters, both natural and man-made. Calamitous events can exhaust local resources,<sup>43</sup> and may heavily tax the nation's capabilities to provide a timely response.<sup>44</sup> Telemedicine networks have the potential to deal with for such scenarios, which typically burn injuries.<sup>40-45</sup> Hence, it is important for professionals to be familiar with this modality of practice if we are to deal with such emergencies effectively.

Other benefits of telemedicine derive from the use of digital images as part of the medical record for monitoring und healing, evaluating the effectiveness of treatment, and documenting requests for reimbursement purposes.<sup>46-48</sup> Standardized telemedicine protocols are needed to ensure quality care and patient safety in the treatment of burn injuries and in facilitating communications between various providers rendering care who may have different levels of expertise and training.<sup>7</sup>

## PRACTICE GUIDELINES

### ADMINISTRATIVE GUIDELINES

The American Telemedicine Association's "Core Operational Guidelines for Telehealth Services Involving Provider-Patient Interactions" addresses the general administrative issues in telemedicine consultations. These guidelines **shall** be implemented where pertinent<sup>49</sup> However, the key core guidelines are repeated here together with additional administrative aspects that pertain to teleburn care.

#### A. Organizations and Other Provider Entities

1. Organizations and other provider entities providing teleburn services (hereafter organizations) **shall** ensure compliance with all relevant local, state and federal (or

international if appropriate) laws and regulations, with respect to medical and other healthcare services provided, including but not limited to informed patient consent, protection of patient identifiable information use of human subjects in research, and all prevailing regulatory restrictions required by the state medical board in the state where the patient is located, including relevant prescription practice and substance(s).

2. Organizations **shall** observe and follow the policies and standard operating procedures of the governing institution. If the telemedicine program is an independent entity or part of a solo practice, the entity or solo practice **shall** establish policies and procedures to govern all administrative functions including the following provisions:
  - a. The organization **shall** ensure that all providers engaged in telemedicine have the proper training, are credentialed to provide burn services, and have a clinical oversight and evidence-based continuous quality management program.
  - b. The organization **shall** ensure that privacy and security of protected health information (PHI), records, documentation, transmission and storage is in compliance with all relevant local, state and federal regulations.
  - c. Organizations that employ other parties to handle their patient records **shall** have in place a Business Associate Agreement with these parties that binds them to HIPAA obligations.
  - d. Organizations **shall** review relevant Federal, state, local, and other regulatory and ethical requirements **shall** to determine their implications for providing burn care via telemedicine when the patient and provider are not in the same location and/or when the patient is located at home without a tele-presenter or facilitator.
  - e. Ownership of patient data and/or records **shall** be defined with attention to OBRA (Omnibus Budget Reconciliation Act) and COBRA (Consolidated Omnibus Budget Reconciliation Act) requirements for documentation sharing with referring providers and care team members.
  - f. Patient and clinician rights and responsibilities **shall** include the consulting provider, tele-presenter or facilitator and patient.
  - g. Reference materials on the use of equipment, devices and technology including peripheral devices, network hardware and associated software, and electronic health records **shall** be available to all parties participating in the teleburn encounter.
  - h. Fiscal management of the teleburn program **should** be considered even when financial considerations are not the prime objective of a program. A business case (such as return on investment ROI) for initial development and ongoing maintenance and support **should** be developed, periodically reviewed and updated as indicated.
3. Organizations **shall** have in place an explicit continuous quality management program and performance monitoring that complies with all organizational, regulatory, and accrediting requirements for outcomes management. This process shall be reviewed periodically and updated as appropriate.
  - a. Clinical consultations **shall** be reviewed according to practice standards for clinicians conducting burn care the same as in-person care.



- b. Patient visits **shall** be reviewed regularly to ascertain network technical performance and the ability of providers to complete all components of the encounters with patients.
  - c. Communication of quality performance results **shall** be communicated to the participating patient sites while observing patient confidentiality.
4. Organizations **shall** have an established process to assure the implementation of standard operating procedures, including patient informed consent, and patient rights and responsibilities with respect to the use of telemedicine in their care. This applies regardless of whether the patient is at a healthcare institution or at home, school or work. This also includes a process for communicating complaints.
  - a. The information **shall** be provided in simple language that can be easily understood by the patient, which is particularly important when discussing technical issues like encryption or the potential for technical failure.
  - b. Prior to initiation of a teleburn encounter, the provider or designee **shall** inform the patient (either in writing or verbally) about the unique nature of telemedicine services, its benefits and limitations compared to in-person care, including but not limited to:
    - i. Privacy, security and confidentiality when relying on electronic communication
    - ii. Potential for technical failure and alternate procedures for completing the encounter
    - iii. Emergency plans (particularly for patients in settings without clinical staff immediately available)
    - iv. Conditions under which care services may be terminated and a referral for in-person care
    - v. Timing of services (e.g., frequency, appointment times)
    - vi. Record keeping and mandatory reporting
    - vii. Scheduling arrangements
    - viii. Credentials of the distant site provider
    - ix. Billing arrangements
    - x. Procedures for coordination of care with other professionals
    - xi. Protocol for contact between sessions
    - xii. Information specific to the nature of the interaction (e.g., store-forward transmission of data/images, videoconferencing)
5. Organizations **shall** establish a mechanism for informing healthcare providers at both the originating and remote of their rights and responsibilities with respect to using telemedicine in their practice, including the process for communicating and addressing complaints, where appropriate.
6. Organizations **shall** apply integrate them into existing operational procedures for obtaining consent for treatment from patients. Additional informed consent for providing services via telemedicine is not required unless mandated by local, state, federal or other regulations.

4. Organizations **shall** have an established process to assure the implementation of standard operating procedures, including patient informed consent, and patient rights and responsibilities with respect to the use of telemedicine in their care. This applies regardless of whether the patient is at a healthcare institution or at home, school or work. This also includes a process for communicating complaints.

- i. Privacy, security and confidentiality when relying on electronic communication
- ii. Potential for technical failure and alternate procedures for completing the encounter
- iii. Emergency plans (particularly for patients in settings without clinical staff immediately available)
- iv. Conditions under which care services may be terminated and a referral for in-person care
- v. Timing of services (e.g., frequency, appointment times)
- vi. Record keeping and mandatory reporting
- vii. Scheduling arrangements
- viii. Credentials of the distant site provider
- ix. Billing arrangements
- x. Procedures for coordination of care with other professionals
- xi. Protocol for contact between sessions
- xii. Information specific to the nature of the interaction (e.g., store-forward transmission of data/images, videoconferencing)

6. Organizations **shall** apply integrate them into existing operational procedures for obtaining consent for treatment from patients. Additional informed consent for providing services via telemedicine is not required unless mandated by local, state, federal or other regulations.

7. Organizations **shall** have an established process to assure the implementation of standard operating procedures, including patient informed consent, and patient rights and responsibilities with respect to the use of telemedicine in their care. This applies regardless of whether the patient is at a healthcare institution or at home, school or work. This also includes a process for communicating complaints.
  - a. Telemedicine Agreement that includes credentialing requirements and conditions of participation for critical access hospitals and other hospitals
  - b. Individual clinical service agreement – denoting expectations and business arrangements
  - c. HIT (Health Information Technology) agreements for sharing electronic health information, including Business Associate Agreements;
  - d. All of the above can be incorporated into a single document.

## B. Healthcare Professionals

1. Healthcare professionals providing teleburn services (hereafter professionals) shall observe the jurisdictional regulatory/licensing laws pertaining to their professional practice in their own jurisdiction where they practice as well as the jurisdiction where the patient is located at the time of care. These include:
  - a. Telemedicine Agreement that includes credentialing requirements and conditions of participation for critical access hospitals and other hospitals
  - b. Individual clinical service agreement – denoting expectations and business arrangements
  - c. HIT (Health Information Technology) agreements for sharing electronic health information, including Business Associate Agreements;
  - d. All of the above can be incorporated into a single document.
2. Professionals **shall** be informed concerning credentialing/privileging requirements at the site where the patient is located Professionals **shall** meet Medicare's Conditions of Participation (COP) or similar local regulatory requirements for authentication and validation of provider's credentials prior to starting services.
3. Professionals **shall** be aware of their accountability and any/all requirements, including those for liability insurance, that apply when practicing telemedicine in any jurisdiction, including but not limited to:
  - a. Consulting with current malpractice carrier for any concerns or restrictions in coverage
  - b. Adding a rider or other additional coverage as needed
  - c. Reviewing state-based laws for coverage of accidental injuries and requirements for patient compensation or other liability coverage requirements, such as limits on payments.

4. Professionals **shall** be cognizant of the conditions necessary for establishing a provider-patient relationship in the context of a telemedicine encounter, whether real-time (live), store-and-forward or other mode of communication/interaction is used, and **shall** observe evidence-based, best possible standard of care.
5. Health Professionals **shall** have the necessary education, training/certification, and ongoing continuing education/professional development, in order to ensure the safe provision of quality health services to their patients.
6. Professionals **shall** be culturally competent to deliver services to the populations that they serve. Examples include awareness of the client's language, ethnicity, race, age, gender, sexual orientation, geographical location, socioeconomic, and sensitivity to cultural or religious practices.
7. Professionals **may** use online resources to learn about the cultural, ethnic, and religious affiliation of the patient and the community in which the patient resides.

## CLINICAL GUIDELINES

Healthcare professionals providing teleburn services (hereafter professionals) shall observe the jurisdictional regulatory/licensing laws pertaining to their professional practice in their own jurisdiction where they practice as well as the jurisdiction where the patient is located at the time of care. These include:

1. Professionals **shall** determine the appropriateness of telemedicine on a case-by case basis, whether or not a telemedicine visit for burn care is indicated, and what portion of the examination **shall** be performed clinically and documented in conformance with appropriate standards in evaluating the patient. Wherever possible, diagnostic interventions **shall** be supported by high quality evidence.<sup>1-4, 24-39,44-48,50-62</sup> Where evidence is lacking, providers **shall exercise** their professional judgment, experience and expertise in making such decisions. Clinical guidelines pertaining to telemedicine are likely to change as indicated by new evidence from research and technological development.
2. Healthcare professionals **shall** be guided by professional discipline and national existing clinical practice guidelines<sup>50-56</sup> when practicing via telemedicine, and any modifications to existing clinical practice, the standards for telemedicine practice **shall** be consistent with standard clinical requirements.
3. Means for verification of provider and patient identity **shall** be implemented, as in standard practice.
  - a. Verification of both professional and patient identification may occur at the time of the consult through picture ID, through appropriate methods, including patient full name and birthdate. Professionals **may** ask patients to verify their identity more formally by providing a government issued photo ID.

- © American Telemedicine Association | Page 8

telephone.

10. In case of medication side effects, elevation in symptoms, and/or issues related to medication non-adherence, the professional **should** be familiar with the patient's prescription and medication dispensation options. Moreover, when prescribing, the clinician **should** be aware of the availability of specific medications in the geographic location of the patient. The professional **should** be familiar with available resources to render medical services for patients.
11. Patients with serious acute injuries require initial evaluation and stabilization prior to the telemedicine consultation with provider. Depending on the nature of the injury and patient status, the onsite practitioner **may** request emergent video (or phone if deemed appropriate) consultation while initial evaluation is in progress, provided that such communication can be arranged. Otherwise, consultation can be performed following initial evaluation. For small wounds, digital photographs **may** be transmitted to the consultant as store-and-forward images. Since visual assessment of burn wounds is a key component of evaluation, consultation **should** be performed following initial evaluation and debridement of wounds (by appropriately trained individuals), and before dressings are applied. This sequence is especially important if the consultation is done to determine the need for emergent transport, or for advice regarding appropriate wound care.
12. The following patient scenarios may require different approaches for initial care and subsequent involvement of the teleburn consultants:
  - a. **Acute Burns – Major Systems with a High Burn Percentage**
    - i. In acute burn situations, the on-site professional **shall** adhere to the principles of initial evaluation of the trauma patient as outlined by the American College of Surgeons<sup>63</sup> and American Burn Association,<sup>64</sup> including the criteria for referral of burn patients to regional burn centers.
    - ii. On-site practitioners **should** obtain and transmit basic medical history of the patient and on-site environmental assessment, including:
      1. patient identification, age, gender
      2. circumstances of injury (i.e., etiologic agent, duration of exposure, evidence of other trauma, possible exposure to hazardous substances and smoke)
      3. significant past medical history including illnesses, medications, surgeries, current medications
      4. allergies
      5. treatment provided up to the time of consultation, including volume and type of resuscitation, fluid, analgesics, and other medications administered
      6. evaluation of burn extent and depth
      7. vital signs and patient status

8. any laboratory values which have been obtained
9. any radiographs that have been obtained

**b. Acute Burns – Small Single Burn with Low Percentage Coverage**

- i. For burns that are not life-threatening and do not require transfer to a burn center, consultation can be performed following the initial evaluation or as a follow-up.
  1. On-site practitioners **should** obtain and transmit the same basic information to the burn consultant about the patient.
  2. For many small wounds, digital photographs **may** be transmitted in a store-and-forward mode. Since visual assessment of burn wounds is a key component of evaluation, consultation **should** be performed following initial evaluation and debridement of wounds and before dressings are applied. This sequence is especially important if the consultation is aimed at determining the need for emergent transport, or for advice regarding appropriate wound care.

**c. Follow-up Visits**

- i. On-site healthcare practitioners **should** obtain and transmit basic information about the patient as noted above.
- ii. Patient sites **shall** ensure that enough time is allocated prior to and after the actual telemedicine visit to undress, clean, and redress wounds.
- iii. For follow-up visits, the patient site **shall** be prepared to facilitate all aspects of care delivery as an extension of the health professional site including:
  1. Ensure adequate supplies for burn dressings including the preferred type of dressing used by the burn center or health professional
  2. Having professionals trained in moderate sharps debridement (burn or wound therapist or RN tele-presenter trained by the health professional) at a minimum and possibly deeper debridement if available (typically a trained surgeon)
  3. Physical therapy services as ordered by the health professional (on-site or available as a referral service)
  4. Ability to transmit images of the burn if requested by the health professional and agreed upon as a part of the telehealth agreement
  5. Ability to refer the patient to community services as needed

13. The burn consultation **should** proceed in an orderly fashion and in sequential steps as follows. However, these steps can be altered as indicated by work flow, patient need and consultant preference.
- a. Complete set of vital signs on the patient and transmission to consultant
  - b. Preparation of the patient for the examination, including physical positioning and gowning. Dressing removal and photographs of the dressing to show the dressing during the live consult
  - c. Pictures with measuring tape showing the dimensions of the burn prior to cleaning to show during the consult
  - d. Pictures of the burn following cleansing of the wound.
  - e. Debridement may occur during the tele-consultation under the supervision of the tele-consultant at the request or direction of the consulting service
  - f. After the clinical consult is ended, the patient's wound is redressed and the patient discharged.
  - g. Consulting providers may want to observe the burn dressing
14. The patient site **should** ensure that enough time has been allocated for the tele-presenter or patient/family support to assist with removing dressings, cleaning wounds, and redressing wounds, in addition to the time the provider needs to meet with the patient, take a medical history, discuss the plan of care, and respond to any patient concerns.

## TECHNICAL GUIDELINES

### A. Communication Modes & Applications

All efforts **shall** be taken to use secure communication modes and applications that have appropriate identity verification, privacy and security protections in compliance with relevant federal, state and local laws and regulations. Telecommunications platforms **shall** have sufficient bandwidth to allow for accurate visualization, assessment and diagnosis of the burn. When feasible and appropriate, existing imaging guideline should be used (e.g., American Telemedicine Association's Teledermatology Guidelines<sup>65-66</sup>). Patients seen from home **may** transmit digital images that can then be imported in a common format (e.g., A DICOM wrapper) by the health professional into medical image storage systems and stored on the patient electronic record or another place.

### B. Devices & Equipment

1. Both the professional and patient site **should** use high quality digital cameras (minimum 3 megapixel), audio, and related data capture and transmission equipment now widely available for personal computers for both real-time (live) and asynchronous store-and-forward encounters. Image resolution should be sufficient to allow for an accurate assessment and diagnosis of the patient's condition.

2. When the Internet is used, health professionals and patients **shall** have up-to-date antivirus software and a firewall with the latest security patches and updates applied to the operating system and third party connections.
3. In the event of a technology breakdown the professional **shall** have a backup plan in place, which must be communicated to the patient or referring provider before the start of consult or treatment. This information **should** be incorporated into the general emergency management protocol, reviewed and updated as necessary on a periodic basis.
4. All equipment sufficient to support diagnostic needs and the patient visit **shall** be available and functioning properly at the time of clinical encounters; and organizational processes **shall** be in place to ensure operational readiness of equipment through on-going maintenance and testing, conducted at least annually.
5. Infection control policies and procedures **shall** be in place for the use of telemedicine equipment and patient peripherals in compliance with organizational, legal, and regulatory requirements.

### C. Image Acquisition

Image quality is essential teleburn consultation, including accurate diagnosis and treatment recommendations.<sup>1-2,24-39,47,57-62</sup> The professional **should** the following processes in image acquisition and display:

The following guidelines related to image resolution, storage, transfer and viewing are based on current industry standards. These are likely to be changed and updated commensurate with advances in technology. Hence, these standards must be reviewed on an annual basis to determine their compatibility with newer and more advanced systems that offer improved image resolution and image capture/transfer that are more clinically and economically appropriate.

#### 1. Real-time videoconferencing

- a. A minimum of 640 X 360 resolution at 30 frames per second **shall** be used regardless of technology (e.g., Internet, mobile phone)
- b. Audio compression rates sufficient to allow for uninterrupted two-way audio during live video consultations **shall** be used support good communication between the health professional, the patient, and the tele-presenter
- c. Exam room lighting **should** be a minimum (?)750 - 1500 lumens for good visualization of the skin. Additional indoor lighting using fluorescent daylight or full spectrum bulbs may be needed to augment illumination. Too much unfiltered lighting can blanch skin color or whiten the entire image.
  - i. When the patient is in the home, ask the patient to move into direct day light if possible.
  - ii. Room lighting **should** be sufficient to light the participants' faces during conversations. Light **should not** be directly over them. Shadows **should** be considered when positioning the patient as shadows will hide important clinical indications on the burn. Additional room lighting can



be accomplished by turning on an examination light or additional lighting sources in the room positioned in front of the patient and away from the video camera lens, but avoid blinding the patient.

- d. The tele-presenter **should** hold the camera at a distance initially to show the general distribution of the burn injury before obtaining close-up images. When moving the camera to show the general distribution of the injury, the tele-presenter **should** inquire whether the speed of camera movement impedes image quality.
  - i. Capturing and storing images prior to the visit can be a more efficient way of providing images.
- e. If the camera does not contain an image viewer, the tele-presenter will need to be able to see the image via PIP (Picture in Picture) or SEND image on the video conference screen and **should** position oneself to ensure the quality of images for an assessment of the burn in terms of location, size, color, depth, etc.
- f. As the tele-presenter moves the camera over the burn area, he/she **should** continuously verbalize the part of the body that is being captured, noting important characteristics such as size, color, appearance of tissues and fluids. This will orient the burn specialist to the location of the injuries.
- g. For capturing close-up images, position the camera 8-10' from the burn surface and allow the camera to focus in and out for closer views.
  - i. Autofocus cameras are the best option for patient hand-held cameras.
- h. Most video-format general examination cameras are equipped with a freeze-frame feature to produce still images that are very useful for diagnosis, allowing the burn specialist to appreciate detailed features of injuries. Freeze-frame capture **should** be used when connection speed is low, as slow connections can result in degradation of image quality.
- i. Viewing devices **should** be color calibrated. Although there is no accepted calibration standard for color medical displays, it is important to select one that can readily be implemented and maintained on the display of choice.<sup>67</sup>
- j. Remove distracting jewelry and clothing from injury site.
- k. Use measurement tools to ascertain size of burn as appropriate.
- l. Use solid neutral color for background.

## 2. Store-forward

- a. Digital cameras **should** be used for image capture (avoid PDAs; high quality image cell phone cameras can be used if this is the only option available). Minimum resolution **should** be 2000 x 1500 pixels or 3 megapixels.
- b. Macro mode capability is ideal ("flower" image).
- c. Use solid, neutral color for background.
- d. Use diffuse, indirect light, avoid shadows. For indoors fluorescent day-light or full spectrum bulbs are best (avoid incandescent). For outdoors, use well-lit but evenly shaded area if it is sunny.
- e. Flash **may** be used as necessary to help eliminate shadows. Test to see if needed. It should be located about 18 to 24 inches (45 to 60 cm) away to avoid blanching or whiteout.

- f. JPEG or other compression algorithms commonly used in medical imaging **may** be used at levels not to exceed 20:1 (e.g., medium or low settings).
- g. Camera angle **should** be perpendicular to the skin lesions.
- h. Autofocus **should** be used with area of interest in center of frame.
- i. Image views **should** show location and arrangement of lesions. Take several views:
  - i. *Far* - larger segment of the body to show the exact region
  - ii. *Medium* - area involved central in image but include close-by anatomical landmark such as the navel or hand
  - iii. *Close-Up* - use macro capacity or the optical zoom (i.e., “flower” image) to acquire images less than 18 inches (45 cm) from the skin. Use straight and oblique views for close-ups
  - iv. Remove distracting jewelry and clothing from the burn site
  - v. For face shots, eyes should be open if possible
  - vi. Use measurement tools as appropriate to indicate lesion size, indicate whether inch or centimeter.
  - vii. Review images for clarity, resolution and coverage before sending
  - viii. Do not alter images in any way after taken
  - ix. Label images, transmitted text and consultant response to become part of a secure, retrievable medical record.
- a. Display screen resolution **should** be 1280 x 1024 pixels to allow adequate viewing of 3 megapixel images and magnification without noticeable loss in image quality. Viewing devices should be color calibrated (see 1j above)

#### D. Connectivity

1. Adequate video bandwidth (minimum of 512 kbps) **shall** be used to enable the remote clinician to make an accurate diagnosis and to interact with the patient and the presenting provider at the bedside or scene of injury. Lower bandwidth **may not** be sufficient, a bandwidth of 512 kbps **shall** be used when feasible.
2. Where practical, providers **may** recommend preferred video conferencing software and/or video and audio devices to the patient.
3. The provider and/or patient **may** use link test tools (e.g., bandwidth test) to verify bandwidth connectivity before the start the session to ensure sufficient quality of service.
4. Wired connections **should** be used when available (e.g., Ethernet).
5. The videoconference software **should** be able to adapt to changing bandwidth environments without losing the connection.
6. Organizations **shall** have appropriate redundant (appropriate backup) systems in place that ensure availability of the data transmission infrastructure for critical connectivity.

## E. Privacy

1. All modes of communication, data acquisition, storage and retrieval involving **shall** comply with federal, state, and local laws and regulations for assuring security and confidentiality of personal health information.
2. Organizations **should** be familiar with changes in computing and mobile communication devices and their potential for assisting patients and improving their performance.
3. Organizations **should** implement a standard policy for secure patient and provider authentication, including the use of passwords and firewalls to protect their electronic systems.
  - a. Two-layer authentication **should** be used.
4. Computers and other devices **should** be designed to have a “sleep” function when not used for more than a specified timeframe, with re-authentication to resume access.
5. Organizations **should** have remote access capability to disable electronic devices when lost or stolen and to wipe out stored PHI or PII.
6. Organizations **shall** have a secure data back-up and recovery plan. This includes data warehouse or cloud storage that comply with local, state, and federal regulations.
7. PHI and other confidential data **shall** be backed up or stored on secure data storage locations.
  - a. If PHI is stored on a mobile device such as a laptop or cellphone, the data **shall** be secured according to local, state, and federal requirements for the storage of PHI. Examples of security measures include whole disk encryption (FIPS 140-2, known as the Federal Information Processing Standard, and encryption such as AES (Advanced Encryption Standard)
8. Informed consent **shall** be secured from the patient before video recording consultation sessions or parts of sessions for educational or research purposes. When the recording is intended as part of the patient record, the patient shall be informed of the fact and how the recording will be secured.
  - a. Access to recordings **shall** only be granted to authorized users and **should** be shared in a manner that protects the data from accidental or unauthorized file sharing and/or transfer.
  - b. Recording a session or part of a session for purposes of rendering care **shall** comply with relevant privacy and security requirements.

## APPENDIX

### REFERENCES

1. Wallace DL, Hussain A, Khan N, Wilson YT. A systematic review of the evidence for telemedicine in burn care: with a UK perspective. *Burns*. 2012;38:465-480.
2. Ajami S, Arzani-Birgani A. Fast resuscitation and care of the burn patient by telemedicine: a review. *J Res Med Sci* 2014;19:562-566.
3. Kelly J, Nikkah D, Wek C, Dheansa B. Changing management models in burn care. *Br J Healthcare Mngt* 2013;19:225-229.
4. Lewis ER, Thomas CA, Wilson ML, Mbarika VWA. Telemedicine in acute-phase injury management: a review of practice and advancements. *Telemed e-Health* 2012;18:434-445.
5. Butler DP. The 21<sup>st</sup> century burn care team. *Burns* 2013;39:375-379.
6. Brigham PA, McLoughlin E. Burn incidence and medical care use in the United States: estimates, trends, and data sources. *J Burn Care Rehabil*. Mar-Apr 1996;17:95-107.
7. Saffle JR. The 2002 Presidential Address: N.P.D.G.B. and other surgical sayings. *J Burn Care Rehabil*. Nov-Dec 2002;23:375-384.
8. Klein MB, Kramer CB, Nelson J, Rivara FP, Gibran NS, Concannon T. Geographic access to burn center hospitals. *JAMA*. Oct 28 2009;302:1774-1781.
9. Burn Incidence and Treatment in the United States-- Fact Sheet, 2015. American Burn Association, Chicago, IL. [http://www.ameriburn.org/resources\\_factsheet.php](http://www.ameriburn.org/resources_factsheet.php). Last accessed January 6, 2015.
10. Istre GR, McCoy MA, Osborn L, Barnard JJ, Bolton A. Deaths and injuries from house fires. *N Engl J Med*. Jun 21 2001;344:1911-1916.
11. Berkebile BL, Goldfarb IW, Slater H. Comparison of burn size estimates between prehospital reports and burn center evaluations. *J Burn Care Rehabil*. Sep-Oct 1986;7:411-412.
12. Freiburg C, Igneri P, Sartorelli K, Rogers F. Effects of differences in percent total body surface area estimation on fluid resuscitation of transferred burn patients. *J Burn Care Res*. Jan-Feb 2007;28:42-48.
13. Eastman A, Arnoldo B, Hunt J, Purdue G. Pre-burn center management of the burned airway: do we know enough? *J Trauma*. 2010;31:701-705.
14. Saffle JR, Edelman L, Morris SE. Regional air transport of burn patients: a case for telemedicine? *J Trauma*. Jul 2004;57:57-64; discussion 64.

15. Baack BR, Smoot EC, 3rd, Kucan JO, Riseman L, Noak JF. Helicopter transport of the patient with acute burns. *J Burn Care Rehabil.* May-Jun 1991;12:229-233.
16. Hop MJ, Polinder S, van der Vlies C, Middlekoop E, van Baar ME. Costs of burn care: a systematic review. *Wound Rep Reg.* 2014;22:436-450.
17. Saffle JR, Davis B, Williams P. Recent outcomes in the treatment of burn injury in the United States: a report from the American Burn Association Patient Registry. *J Burn Care Rehabil.* 1995;16:219-232; discussion 288-219.
18. Salisbury R. Burn rehabilitation: our unanswered challenge. The 1992 presidential address to the American Burn Association. *J Burn Care Rehabil.* 1992;13:495-505.
19. Mock C, Peck M, Krug E, Haberal M. Confronting the global burden of burns: a WHO plan and a challenge. *Burns.* Aug 2009;35:615-617.
20. Fact Sheet about Burns. World Health Organization. 2010.  
<http://www.who.int/topics/burns>. Last accessed January 6, 2015.
21. Russell KW, Saffle JR, Theurer L, Cochran AL. Transition from grant funding to self-supporting burn telemedicine program in the western United States. *Am J Surg.* 2015;210:1037-1044.
22. Fuzaylov G, Anderson R, Knittel J, Driscoll DN. Global health: burn outreach program. *J Burn Care Res.* 2015;36:306-309.
23. AbdelFattah KR, Wolf SE. Advances in burn care. In Latifi R, Rhee P, Gruessner RWG (eds). *Tech Adv Surg, Trauma, Crit Care.* 2015; Springer, New York; pp. 163-172.
24. Saffle JR, Edelman L, Theurer L, Morris SE, Cochran A. Telemedicine evaluation of acute burns is accurate and cost-effective. *J Trauma.* 2009;67(2):358-365.
25. Jones OC, Wilson DI, Andrews S. The reliability of digital images when used to assess burn wounds. *J Telemed Telecare.* 2003;9:S22-24.
26. Smith AC, Kimble R, Mill J, Bailey D, O'Rourke P, Wootton R. Diagnostic accuracy of and patient satisfaction with telemedicine for the follow-up of paediatric burns patients. *J Telemed Telecare.* 2004;10:193-198.
27. Poropatich R, Lai E, McVeigh F, Bashshur R. The US Army Telemedicine and m-health program: Making a difference at home and abroad. *Telemed e-health.* 2013;19:1-7.
28. Sagraves SG, Phade SV, Spain T, et al. A collaborative systems approach to rural burn care. *J Burn Care Res.* Jan-Feb 2007;28:111-114.
29. Massman NJ, Dodge JD, Fortman KK, Schwartz KJ, Solem LD. Burns follow-up: an innovative application of telemedicine. *J Telemed Telecare.* 1999;5:S52-54.

30. Nguyen LT, Massman NJ, Franzen BJ, et al. Telemedicine follow-up of burns: lessons learned from the first thousand visits. *J Burn Care Rehabil.* 2004;25:485-490.
31. Wallace DL, Jones SM, Milroy C, Pickford MA. Telemedicine for acute plastic surgical trauma and burns. *J Plast Reconstr Aesthet Surg.* 2008;61:31-36.
32. Redlick F, Roston B, Gomez M, Fish JS. An initial experience with telemedicine in follow-up burn care. *J Burn Care Rehabil.* 2002;23:110-115.
33. Johansen MA, Wootton R, Kimble R, Mill J, Smith A, Hockey A. A feasibility study of email communication between the patient's family and the specialist burns team. *J Telemed Telecare.* 2004;10:S53-56.
34. Smith AC, Kairl JA, Kimble R. Post-acute care for a paediatric burns patient in regional Queensland. *J Telemed Telecare.* 2002;8:302-304.
35. Syed-Abdul S, Scholl J, Chen C, et al. Telemedicine utilization to support the management of the burns treatment involving patient pathways in both developed and developing countries: a case study. *J Burn Care Rehabil.* 2012;33:e207-212.
36. Houtchens BA, Clemmer TP, Holloway HC, et al. Telemedicine and international disaster response. Medical consultation to Armenia and Russia via a Telemedicine Spacebridge. *Prehosp Disaster Med.* 1993;8:57-66.
37. Thomas C, Prasanna M. The role of a 'satellite-service' in the national organisation of burn care in the Sultanate of Oman. *Burns.* 2000;26:181-185.
38. Fuzaylov G, Knittel J, Driscoll DN. Use of telemedicine to improve burn care in Ukraine. *J Burn Care Res* 2013;34:e232-236.
39. Holt B, Faraklas I, Theurer L, Cochran A, Saffle JR. Telemedicine use among burn centers in the United States: a survey. *J Burn Care Res.* 2012;33:157-162.
40. Mahoney E, Harrington D, Biffl W, Metzger J, Oka T, Cioffi W. Lessons learned from a nightclub fire: institutional disaster preparedness. *J Trauma.* 2005;58:487-491.
41. Jeng J, Gibran N, Peck M. Burn care in disaster and other austere settings. *Surg Clin N Am.* 2014;94:893-907.
42. Yurt RW, Bessey PQ, Bauer GJ, et al. A regional burn center's response to a disaster: September 11, 2001, and the days beyond. *J Burn Care Rehabil.* 2005;26:117-124.
43. Barillo DJ, Jordan MH, Jocz RJ, Nye D, Cancio LC, Holcomb JB. Tracking the daily availability of burn beds for national emergencies. *J Burn Care Rehabil.* 2005;26:174-182.
44. Benner T, Schachinger U, Nerlich M. Telemedicine in trauma and disasters--from war to earthquake: are we ready? *Stud Health Technol Inform.* 2004;104:106-115.

45. Simmons SC, Murphy TA, Blanarovich A, Workman FT, Rosenthal DA, Carbone M. Telehealth technologies and applications for terrorism response: a report of the 2002 coastal North Carolina domestic preparedness training exercise. *J Am Med Inform Assoc.* 2003;10:166-176.
46. Light TD, Jeng JC, Gunzel CS, Jordan MH. Digital photography: a technique to optimize reimbursement. *J Burn Care Res.* 2008;29:147-150.
47. Woolf S. Practice guidelines: a new reality in medicine. *Arch Int Med.* 1993;153:1545-2655.
48. Ahn CS, Oneill SP, Maitz PK. Improving accuracy of burn referrals through use of an internet-based burns chart. *Eur J Plas Surg* 2011;34:331-335.
49. American Telemedicine Association's Core Operational Guidelines for Telehealth Services Involving Provider-Patient Interactions. <http://www.americantelemed.org/docs/default-source/standards/core-operational-guidelines-for-telehealth-services.pdf?sfvrsn=6> Last accessed January 6, 2015.
50. Childs C. Is there an evidence-based practice for burns? *Burns.* 1998;24:29-33.
51. Arenholz DH, Cope N, Dimick AR, Gamelli RL, et al. Practice Guidelines for burn Care. *J Burn Care Rehabil.* 2001;22:S1-69.
52. Brychta P. European practice guidelines for burn care: minimum level of burn care provision in Europe. Springer; Vienna, Austria; 2012.
53. Alharbi Z, Piatkowski A, Dembinski R, Reckort S, et al. Treatment of burns in the first 24 hours: simple and practical guide by answering 10 questions in a step-by-step form. *World J Emerg Surg.* 2012;7:13.
54. Clinical Practice Guidelines: Burn Patient Management. ACI Statewide Burn Injury Service. August 2011.  
[http://www.aci.health.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0019/162631/Clinical\\_Practice\\_Guidelines\\_2012.pdf](http://www.aci.health.nsw.gov.au/__data/assets/pdf_file/0019/162631/Clinical_Practice_Guidelines_2012.pdf). Last accessed January 6, 2015.
55. Toussaint J, Singer AJ. The evaluation and management of thermal injuries: 2014 update. *Clin Exp Emerg Med.* 2014;1:8-18.
56. Warner PM, Coffee TL, Yowler CJ. Outpatient burn management. *Surg Clin N Am.* 2014;94:879-892.
57. Brusselaers N, Pirayesh A, Hoeksema H, Verbelen J, Blot S, Monstrey S. Burn scar assessment: a systematic review of different scar scales. *J Surg Res.* 2010;164:e115-e123.
58. Hop MJ, Moues CM, Bogomolova K, Nieuwenhuis MK, Oen IMM, Middelkoop E, Breederveld RS, van Baar ME. Photographic assessment of burn size and depth: reliability and validity. *J Wound Care.* 2014;23:144-152.

59. Yoder LH, McFall DC, Cancio LC. Use of the videophone to collect quality of life data from burn patients. *Int J Burn Trauma*. 2012;2:135-144.
60. Reiband HK, Lundin K, Alsbjorn B, Sorenson AM, Rasmussen LS. Optimzation of burn referrals. *Burns*. 2014;40:397-401.
61. Turk E, Karagulle E, Aydogan C, Oguz H, Tarim A, Karakayali H, Haberal M. Use of telemedicine and telephone consultation in decision-making and follow-up burn patients: initial experience from two burn units. *Burns*. 2011;37:415-419.
62. Baartmans MGA, van Baar ME, Boxma H, Dokter J, Tibboel D, Nieuwenhuis MK. Accuracy of burn size assessment prior to arrival in Dutch Burn centres and its consequences in children: a nationwide evaluation. *Injury*. 2012;43:1451-1456.
63. *Advanced Trauma Life Support for Doctors*. 8th ed. Chicago, IL: American College of Surgeons.
64. *Advanced Burn Life Support Course*. Chicago, IL: American Burn Association; 2001.
65. American Telemedicine Association's Quick Guide to Store-Forward and Live-Interactive Telermatology for Referring Providers.  
<http://www.americantelemed.org/resources/telemedicine-practice-guidelines/telemedicine-practice-guidelines/quick-guide-to-store-forward-live-interactive-teledermatology#.Vo1Y6FL08XY>. Last accessed January 6, 2015.
66. American Telemedicine Association's Practicve Guidelines for Telermatology.  
<http://www.americantelemed.org/resources/telemedicine-practice-guidelines/telemedicine-practice-guidelines/practice-guidelines-for-teledermatology#.Vo1ZVFL08XY>. Last accessed January 6, 2015.
67. Badano A, Revie C, Casertano A, Cheng WC, Green P, Kimpe T, Krupinski E, Sisson C, Skrovseth S, Treanor D, Boynton P, Clunie D, Flynn MJ, Heki T, Hewitt S, Homma H, Masia A, Matsui T, Nagy B, Nishibori M, Penczek J, Schopf T, Yagi Y, Yokio H. Consistency and standardization of color in medical imaging: a consensus report. *J Digit Imaging* 2015;28:41-52.