Tech Topic #27: Teleconsultation

I. Introduction and definitions

Telemedicine is "the use of electronic information and communication technologies to provide and support health care when distance separates the participants."[1] It encompasses a great variety of techniques that are meant to allow patients to benefit from clinical expertise despite distances or isolation. Telemedicine techniques allow doctors and experts to be involved in more clinical decisions and gives patients more treatment options. This document will focus on one area of telemedicine called teleconsultation. This is the exchange of images, text, or data between clinicians for the purpose of collaboration or consultation on a case. Teleconsultation can be further divided into real-time consultation and store-and-forward consultation. Real-time consultation is the contemporaneous collaboration between clinicians with technologies such as videoconferencing, which allows simultaneous interaction. This Tech Topic will focus on store-and-forward consultation, which is the sharing of static images or audio/video clips that can be for viewing on a time-independent basis. This method is more efficient from a clinical time-efficiency standpoint, especially when the participants are in different time zones. Store-and-forward is also more practical in low-bandwidth situations.

[1] *Field, M.J. Telemedicine: A Guide to Assessing Telecommunications in Health Care*

II. How to compose a consultation request

A. Teleconsultation through email

When the determination is made that a teleconsultation is necessary, there are several factors to be considered in composing the request, such as the urgency of the situation, how much is known about the case and what data is available, and what bandwidth or hardware constraints you are working under. Teleconsultation through email has the advantage of reaching a wide audience and the capability of working with low bandwidth, but does not provide the immediate feedback that real-time consultation can achieve.

B. Components of the teleconsultation request

The consultation request will be composed of text portions including case histories and descriptions of the condition, and a multimedia portion including static images and audio and video clips (if available). Although it is important to give complete information about the case and the patient involved, other considerations such as the size of the file and the means of transmission need to be weighed when compiling this information electronically.

1. Text Portion

The text portion should include an introduction and a case history.

a. The introduction

The introduction should be a brief summary of the situation containing the most important information. If one is soliciting consultation from outside experts, response to the request will be better if one can quickly grasp the substance of the situation and decide whether collaboration is possible. The introduction should include:

- Name and institution for the person sending the request

- Brief (one or two sentences) description of the condition

- Degree of urgency of the situation

- Brief itemization of the data or information available to work with

- Name of contact person for collaboration

b. The case history

The case history should be as informative as possible. Text does not require a large amount of bandwidth to transmit, so it is a good idea to be very descriptive in your case history.

Here are a couple of things to remember when developing the case history:

- Do NOT include the patient's name. This does not give the consulting clinician any useful information and violates the patient's confidentiality.

- Provide as much pertinent information as possible.

2. Binary files

Multimedia files can be an important and sometimes essential part of the consultation request. There are many types of files that can be attached, including static images, video clips, and audio clips. For these kinds of files, bandwidth can be a major obstacle. It is imperative to maintain a small file size when sending consultation requests through email. If the binary file is not essential to the case, or if the request is being sent to a large group, it is better to simply state in the text that the files are available to those interested, and give a text description. The binary files can then be sent directly to individual respondents.

The type of file that this Tech Topic focuses on is static images.

Static images can be acquired in several ways:

- As automatic output from image-generating machines. (e.g. MRIs)

- Scanned images from hard-copy or film using optical scanners

- Video-capture devices

- Digital cameras

This Tech Topic focuses on scanned images. When discussing concepts of scanning, one uses the expected output device as context. In teleconsultation, graphic images will be sent electronically, and presumably will be only be viewed on a computer display, rather than printed. Scanning for computer display is the most relevant for teleconsultation. This means that image sizes are referred to in pixels rather than inches. Another difference is that in computer displayed images, resolution effects the size of the image, while in print it does not.

The main concerns when sending clinical images is the size (in bytes) of the file and the image resolution. Images of higher resolution are higher quality, and result in larger file sizes. How these two factors are weighed relatively will depend on the case.

Higher resolution images can be difficult to transmit through low-bandwidth connections. Although the higher resolution images are of better quality, lower resolution images of smaller file sizes can often be sufficient for the purposes of the consultation.

In many cases, a digital image of 640 x 480 resolution will be adequate. Black and white images, rather than color, are of a significantly smaller file size and can often provide sufficient diagnostic information.

The following methods can be used to decrease image file size, but each to some degree result in decreased resolution or image quality. It is best to use as many file size reducing techniques as possible while still maintaining enough of the essential data.

- Convert the image from color to black and white (this method works well when the image has essentially no color, or when the essential information is simply relative brightness

- Reduce the file size. Crop the image to only include the area of interest

- Reduce the image resolution. 640 x 480 is often sufficient (see imaging FAQ)

- Use image compression. Jpeg is a good file format that compresses the image while maintaining much of the image integrity.

Optical scanners

Optical scanners can be used to generate digital versions of flat, static images from hard copy or film. Following are some techniques to remember to ensure a quality image:

- Scan films such as x-rays in black and white mode

- Adjust the brightness level until contrast between the image elements is seen

- Perform image manipulation in a graphics program such as Adobe PhotoShop or Paint Shop Pro, rather than with scanning software.

- Sharpen the image using a retouching program

Additional Resources

Scanning tips:

- Scanning Tips
  http://www.scantips.com

Examples of digital images:

A number of Web sites post clinical images, usually for educational purposes or as case studies:

- [WebPath Internet Pathology Laboratory](http://www-medlib.med.utah.edu/WebPath/webpath.html)
  http://www-medlib.med.utah.edu/WebPath/webpath.html
  A sample of more than 1500 archived images demonstrating gross and microscopic pathologic findings associated with human disease states arranged by system. *Description from MedMatrix*

- HONmedia

  http://www.hon.ch/cgi-bin/HONmedia
  A repository of over 6800 medical images and videos on 2,000 topics.   HON also encourages users to add their own image links via the "Submit an image" service.

IV. Sending a consultation request

A. Assembling the email

Consultation requests can be sent to individuals or to groups. Email distribution is a very efficient means of distributing requests to a wide audience.

The email consultation will consist of an introduction and summary, a text case history, and multimedia attachments. It is important to consider your audience when composing the request – make the request succinct so that it can be reviewed quickly, yet provide enough detail about the case. Remember to keep the file size to a minimum. If you have a number of binary files that can be used, it may be preferable to state in the text that they are available, and then send the binaries to the respondents. Remember to use Mime or UUENCODE when sending binary attachments.

A good strategy for making binary attachments available is to post them on your Web site. This way, respondents to your request can go to the URL you specify and view the files at their convenience, without requesting them from you. This also obviates the need to encode the image as is done with email attachments.

B. Where to send it

A good way to do teleconsultation on a regular basis is to develop a relationship with one or several experts. AIHA's partnership program is an excellent example of an existing network of potential teleconsultation partners. Mailing lists are an efficient means of sending your request to a large number of experts. Before sending any request to a mailing lists, consider the rules and standard posting guidelines of the group.

1. AIHA mailing lists and discussion forums

AIHA maintains a number of mailing lists that are setup to facilitate communication between partnership program participants and other health professionals. These lists can be used to request help with a medical information question.

aiha-partners@googlegroups.com

EurasiaHealth@googlegroups.com

EurasiaTeleconsult is a forum for the exchange of ideas about interesting or difficult clinical cases or questions. Teleconsultation requests can be uploaded to the EurasiaHealth Knowledge Network using the Teleconsultation Forum page at
http://www.eurasiahealth.org/eng/forum/viewforum.php?f=3&sid=b5a4d135673926ebcc8720fabba5f86b
 This forum allows users to upload case histories and clinical images, and offers a threaded discussion forum for each request. Upload images or other data files along with case histories, and present your question to a broad audience of professionals; or browse through consultation requests and offer your opinions.

2. Other professional mailing lists and Web-based consultation services

In addition to the AIHA mailing lists, there are many professional mailing lists for most specializations that can be used for teleconsultation. These lists have rules and protocols that should be followed when posting. Some are private and selective about their membership. Others are reserved for discussion in a certain area and do not allow consultation requests. Most do not allow

binary attachments to be sent to the list. Before sending a consultation request to a list, it is important to ensure it is consistent with the rules and protocols of the list.

There are two places that compile mailing list information that can be used to find a list relevant to your request. A searchable database of listservs is available at http://lists.topica.com/. A good tool for joining and managing subscriptions to medical listservs can be found at Lawguru: http://www.lawguru.com/subscribe/listtoolmed.html

Swinfen Charitable Trust
http://www.swinfencharitabletrust.com/

The Trust establishes telemedicine links between hospitals in the developing world and specialists, who generously give free advice by email. Digital cameras are used to send clinical photographs by email. They run telemedical links through an automated server using digital cameras for clinical images and email to put remote hospitals in touch with a team of some 130 Volunteer Medical Specialists from many countries [covering 70 Specialties and Sub-specialties] who give their advice to the remote hospital free of charge. The consultant gives advice to the doctor—not to the patient. It is up to the doctor to accept or refuse that advice.

Donetsk R&D Institute of Traumatology and Orthopedics
http://www.dniito.org.ua
The Institute provides teleconsultations in trauma surgery, orthopedics, neurosugery, microsurgery, pediatrics trauma (http://www.telemed.org.ua/wwwtm_eng/TM/tkmain.html). There is also a second-opinion service for patients.

3. Usenet newsgroups

Two Usenet newsgroups, sci.med and sci.med.telemedicine can be used to post consultation requests. There are also clinical specialty newsgroups in the sci.med hierarchy that can be used.

IV. Appendices

A. URLs for additional information

There are a number of organizations and publications with information on the Web related to telemedicine. Many of these resources focus on more advanced applications of telemedicine, but some valuable information relevant to email teleconsultation can be also found:

- Telemedicine and Telehealth Networks Magazine
  http://www.telemedmag.com/
- Telemedicine Today Online
  http://www.telemedtoday.com/
- The American Telemedicine Association
  http://www.atmeda.org/
- TIE home page
  http://tie.telemed.org/
  The Telemedicine Information Exchange contains a bibliographic database of telemedicine articles.

B. Bibliography:

For additional information on this topic, see the citations listed below.

eRisk Working Group for Healthcare: Guidelines for Online Communication
http://www.medem.com/phy/phy_eriskguidelines.cfm
These Guidelines are meant to provide information to health care providers related to online communication.

A review of the first year's experience with an automatic message-routing system for low-cost telemedicine.
J Telemed Telecare. 2003;9 Suppl 2:63-5
http://www.uq.edu.au/swinfen/pdf/Swinfen_p63_s2.pdf

Telemedicine and developing countries--successful implementation will require a shared approach

J Telemed Telecare. 2001;7 Suppl 1:1-6
http://www.uq.edu.au/swinfen/pdf/Swinfen_1-6.pdf

Design and implementation of an automatic message-routing system for low-cost telemedicine.
J Telemed Telecare. 2003;9 Suppl 1:44-7
http://www.uq.edu.au/swinfen/pdf/Swinfen_p44_s.pdf

Email consultations in health care: 1--scope and effectiveness
BMJ. 2004 Aug 21;329(7463):435-8
http://www.pubmedcentral.nih.gov/articlerender.fcgi?tool=pubmed&pubmedid=15321902

Email consultations in health care: 2--acceptability and safe application.
BMJ. 2004 Aug 21;329(7463):439-42.
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Systematic review of cost effectiveness studies of telemedicine interventions
BMJ. 2002 Jun 15;324(7351):1434-7
http://www.pubmedcentral.nih.gov/articlerender.fcgi?tool=pubmed&pubmedid=12065269

Legal issues in teleradiology-distant thoughts
Br J Radiol. 2002 Mar;75(891):201-6
http://bjr.birjournals.org/cgi/content/full/75/891/201

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