

## ESTABLISHING A LOW-COST TELECOMMUNICATIONS METHOD TO PROVIDE TELE-ENT CONSULTATIONS FROM A MILITARY MEDICAL CENTRE TO DEPLOYED LOCATIONS

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### Abstract

In many deployed locations, access to expert medical advice can be limited. The expansion of telemedicine has bridged this gap; however, the large and costly technology required to perform telemedical activities hinders its accessibility. This study aimed to develop a low cost telemedicine method in order to perform tele-ENT consultations for deployed military personnel. The results indicated an ability to transmit clear endoscopic images between deployed and garrison locations using low weight/volume/cost laptop based telemedicine technology.

**Keywords:** deployment medicine, telemedicine, military medicine, ENT.

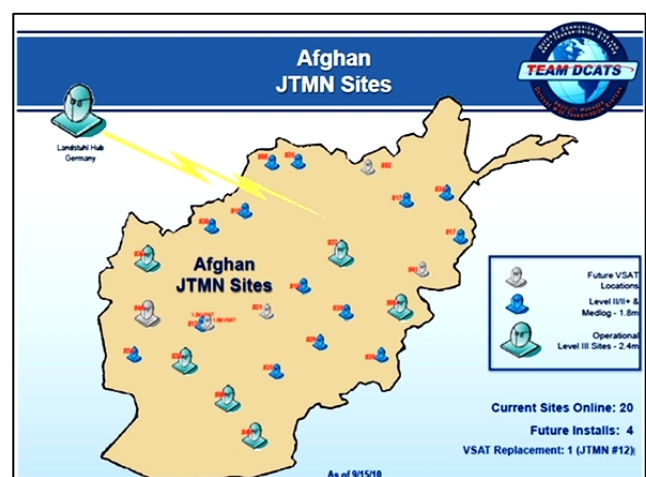
### Introduction

Facilitating telemedicine linkages from military medical centres to deployed locations would offer significant military medical advantages.<sup>1</sup> This effort is hampered by difficulties in transporting bulky, expensive telemedicine equipment to deployed locations and servicing it. The Army Knowledge Online (AKO) electronic e-mail system has been used as a teleconsultation service for remote teledermatology, but does not support real time ENT consultation.<sup>2</sup> This project compared the quality of surgical images transmitted from a standard endoscopic surgical imaging system to the C HUB, a low weight, low volume, low cost telemedical imaging system to provide linkage from a de-

ployed location to Landstuhl Regional Medical Center in Germany, which supports tele-ENT applications.

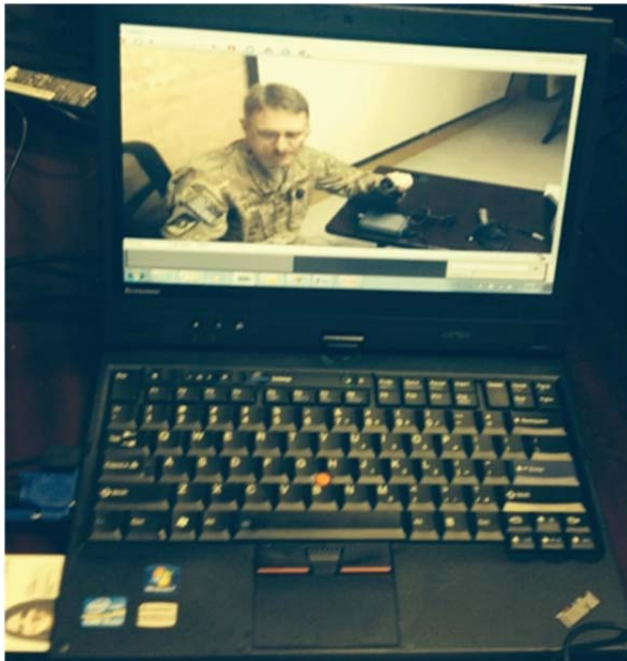
### Methods

A videoconferencing link was established between Landstuhl Regional Medical Center (LRMC), Landstuhl, Germany and Bagram Air Force Base (AFB), Afghanistan. The connection with Bagram was made using the Joint Telemedicine Network (JTMN) (Figure 1). JTMN connected to a local Document Object Model (DOM) network. LRMC Video Network Centers connected to the JTMN network.<sup>3</sup> The bandwidth used was 512 kbps.



**Figure 1.** Joint Telemedicine Network (JTMN) sites in Afghanistan.

The videoconferencing system at LRMC consisted of a standard laptop computer with Polycom M 100<sup>®</sup> desktop videoconferencing software loaded (Figure 2).



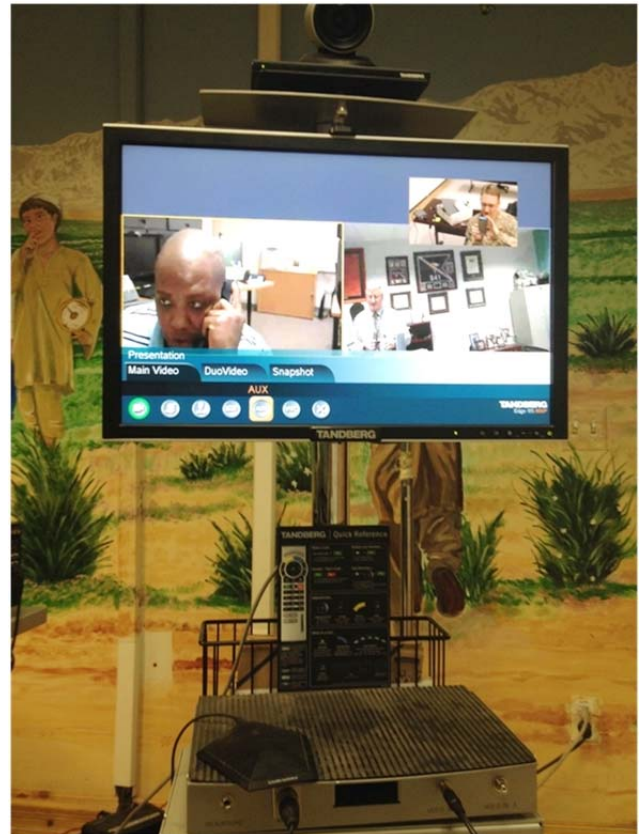
**Figure 2.** Polycom desktop software on standard laptop computer at LRMC.

The videoconferencing system at Bagram consisted of a Tandberg MXP 95<sup>®</sup> videoconferencing cart, which was owned by JTMN (Figure 3). Because the Tandberg and Polycom videoconferencing systems use a standard base system, they were able to connect using any network connection. The Tandberg MXP 95<sup>®</sup> was connected to a Karl Storz C-HUB<sup>®</sup> using an S video port as shown in Figure 4. The C-HUB creates a portal to plug in various endoscopic devices.

The Karl Storz CMOS Otoscope<sup>®</sup> was plugged into a USB port on the Tandberg as shown in Figure 5. This completed a connection to allow medical images to be transmitted from the Tandberg unit at Bagram AFB Afghanistan to LRMC, Germany. Otoscopic images of the tympanic membrane were transmitted from Bagram to LRMC using this system (Figure 6).

In addition to medical images being sent from Bagram (a deployed location), to LRMC, we tested transmission of images from the support area (LRMC) to the deployed location (Bagram). By connecting a C-HUB to a standard laptop computer and transmitting

the images using desktop M 100 Polycom<sup>®</sup> software to the LRMC Tandberg unit, the researchers were able to perform the connection (Figure 7).



**Figure 3.** Tandberg MXP 95 videoconferencing cart, Bagram AFB, Afghanistan connected to LRMC.



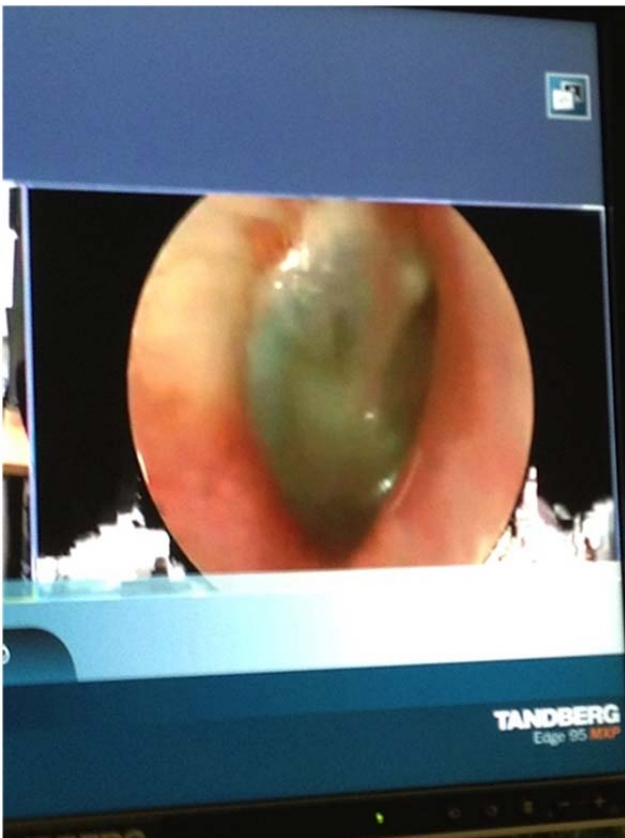
**Figure 4.** C-HUB plugged into the Tandberg unit via an S video port.



**Figure 5.** Karl Storz CMOS Otoscope plugged into the Tandberg USB port.



**Figure 7.** CMOS Otoscope and C-HUB which links via USB port into standard computer.



**Figure 6.** Image of the tympanic membrane being transmitted from the CMOS Video Otoscope from Bagram to LRMC.

## Results

Endoscopic images could be transmitted from a deployed location to a military medical centre in order to provide sub-specialty telemedical support to far forward areas. Endoscopic images from a military medical centre were also transmitted to a deployed site in support of a deployed specialist providing teleconsultation from the deployed location to rear echelon locations. The quality of the ENT images from the C-HUB-C-CAM linked by Polycom Desktop was high.

## Discussion

This project demonstrates the ability of low weight, low volume, and low-cost telemedicine instruments to support teleconsultation in far forward areas. The demonstration is novel use of new technology which allows linking surgical endoscopic instruments to a standard computer to support telemedicine applications at lower cost than with standard telemedicine platforms. During this demonstration, difficulties were encountered in scheduling time in the teleconsultation area at Bagram AFB, which housed the Tandberg videoconferencing unit. By downloading Polycom M100 software on the deployed clinician's computer and adding a standard webcam to the computer, access can be improved. This effectively converts the clinician's workspace computer into a full telemedicine system. Endoscopic images can be transmitted by linking the C-HUB to the laptop. This

methodology allows incorporation of telemedicine into the provider's standard workflow process. Demonstration of the ability to transmit endoscopic images from a rear area to the deployed specialist illustrates a method of utilizing deployed specialists to provide telemedicine consultation to rear areas if excess capacity exists. This communication methodology can also be used for low-cost education to deployed areas.

[http://www.tatrc.org/conferences/ata\\_midyear\\_10/ppt/Brittain\\_ATA\\_MidYear\\_Sept10.pdf](http://www.tatrc.org/conferences/ata_midyear_10/ppt/Brittain_ATA_MidYear_Sept10.pdf)

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**Conflict of Interest.** The authors declare no conflict of interest.

### **Acknowledgements**

The authors would like to thank Gail Kuper, Chief Operating Officer for the Center for Advanced Technology and Telemedicine, UNMC for assistance with this project.

The views expressed in this manuscript are those of the author(s) and do not reflect the official policy or position of the Department of the Army, Department of Defense, or the U.S. Government.

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