

September 26, 2012

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***Subject: Telemedicine Equipment Usage Review  
Audit & Management Advisory Services Project 2012-69***

The final audit report for Telemedicine Equipment Usage Review, Audit Report 2012-69, is attached. We would like to thank all members of the department for their cooperation and assistance during the audit.

We were able to reach agreement regarding corrective actions to be taken in response to the audit recommendations, and these actions are included in this final report. Consequently, a formal response is not requested.

The findings included in this report will be added to our follow-up system. We will contact you to schedule a review of the management corrective actions at the appropriate time.

UC wide policy requires that all draft audit reports, both printed (copied on tan paper for ease of identification) and electronic, be destroyed after the final report is issued. Because draft reports can contain sensitive information, please either return these documents to mail code 0919 or destroy them at this time.

Terri Buchanan  
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Attachment

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**AUDIT & MANAGEMENT ADVISORY SERVICES**



University of California  
**San Diego**

**Telemedicine Equipment Usage Review  
September 2012**

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Project Number: 2012-69

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**I. Background**

Audit & Management Advisory Services (AMAS) has completed a review of Telemedicine Equipment Usage requested by the School of Medicine Dean's Office. This report summarizes the results of our review.

Funding – Following California voter approval of the Kindergarten-University Public Education Facilities Bond Act of 2006 (Proposition ID), the University of California (UC) was slated to receive \$345M per year for facilities programs and an additional \$200M over a two-year period to expand UC medical schools and enhance its Telemedicine Programs throughout the state. The medical education portion of the funding was intended to provide facilities and state-of-the-art equipment for increased enrollments in UC's "PRograms in Medical Education" (PRIME), which are aimed at improving health care for currently underserved populations and communities in California.

Part of the funding provided by Proposition 1D has paid for a new UC San Diego Telemedicine Building. In addition, \$2M was allotted for Telemedicine equipment in order to enhance medical services for remote or underserved communities. The Telemedicine Department is an organizational unit within the Division of Medical Education in the UC San Diego School of Medicine (SOM) Dean's Office. The Telemedicine Department coordinates equipment, practitioners and facilities to make experienced faculty physicians available to serve remote communities.

Equipment - Telemedicine equipment permits practitioners to connect to remote clinics and evaluate patients with the aid of medical assistants or nurses at these sites. The telemedicine equipment in UC San Diego Health System (Health System) clinics consists of large monitors with cameras affixed such that a virtual face-to-face consultation is possible with the patient at a remote, or spoke location. Depending on the clinic, the cart may feature equipment such as a stethoscope, ophthalmoscope or otoscope. These are connected so that a physician may remotely listen to the patient's heart, lungs, or look into ears, nose and throat. The Telemedicine cart enables communication with various devices, so that the physician may remotely experience the same sensory experiences as if present with the patient.

The Telemedicine equipment is located in Health System patient exam rooms which are used to see outpatients in Tele-Psychiatry and Tele-Neurology clinics. The monitors are connected to the EPIC Electronic Health Record (EHR) system which allows the physician to face the patient, while typing clinic notes per observations in another window.

All Telemedicine equipment, both at hub and spoke locations, features a codec unit that encrypts and decrypts communications to Advanced Encryption Standard (AES) 128.

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The AES algorithm uses cryptographic keys of 128 to encrypt and decrypt data such that the resulting images are without time lag. The AES 128 encryption standard is maintained by Department of Commerce, National Institute of Standards and Technology, Information Technology Laboratory (ITL), and is considered sufficient for secure communications.

Communications are typically initiated by the spoke units and occur in a peer-to-peer environment; there is no central network management server. Once the communication link is established, the codecs recognize each other's encryption certificates, and a lock icon appears at the bottom of the screen. Each codec recognizes when the corresponding unit is not encrypting the transmission for some reason, and immediately signals the user to stop.

Agreements - The Department of Telemedicine has executed Memorandums of Understanding (MOU) with the SOM departments of Medicine (for Hepatology), Psychiatry and Neurosciences for the use of Telemedicine equipment. The departments provide physicians for three or four hour clinic sessions twice per month. The physician documents clinic evaluations using appropriate Current Procedural Terminology<sup>1</sup> (CPT) and ICD9<sup>2</sup> codes in the EHR. The codes are not used to generate clinical income, but are collected for UCSD Telemedicine reporting initiatives. Quarterly, each department invoices the Department of Telemedicine at a specific hourly rate for each physician's time.

The Department of Telemedicine has contracts with various remote medical centers and hospitals to facilitate the telemedicine clinics. If the clinic operates in California, serves an underserved population, and federally qualifies for Proposition 1D funding, UCSD provides appropriate telemedicine equipment at the clinic for purposes of performing telemedicine evaluations. If these provisions are not applicable, then the clinic is responsible for supplying telemedicine equipment, connection fees, incidental supplies as well all required non-telemedicine equipment. The clinics are also responsible for billing and collections; maintenance of health records relating to physician services provided; and compliance with Health System technical requirements and standards regarding security features.

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<sup>1</sup> CPT (Current Procedural Terminology) codes are numbers assigned to every task and service a medical practitioner may provide to a patient including medical, surgical and diagnostic services. They are used by insurers to determine the amount of reimbursement that a practitioner will receive by an insurer.

<sup>2</sup> ICD (International Classification of Diseases) codes are alphanumeric designations given to every diagnosis, description of symptoms and cause of death. These classifications are developed, monitored and copyrighted by the World Health Organization (WHO). In the United States, the National Center for Health Statistics (NCHS), part of CMS (Centers for Medicare and Medicaid Services) oversees all changes and modifications to the ICD codes, in cooperation with WHO.

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**II. Audit Objective, Scope, and Procedures**

The objective of our review was to evaluate, on a sample basis, whether Telemedicine equipment was acquired and implemented by SOM locations in accordance with state and University requirements. The scope of the site-visit portion of our review was limited to the Telemedicine hub locations for Hepatology, Neurology, and Psychiatry. Spoke locations may be visited in potential future phases of this review.

In order to achieve our objectives we completed the following:

- Met with Assistant Dean of Medical Education;
- Interviewed the Telemedicine Project Manager;
- Secured and reviewed Telemedicine equipment Purchase Orders (POs) and invoices for equipment purchases;
- Reviewed Telemedicine equipment inventory in the Campus Asset Management System (CAMS);
- Vouched Telemedicine equipment purchases from the PO, to invoice and to CAMS;
- Reviewed and compared Memoranda of Understanding (MOU's) between the Department of Telemedicine and Medicine (Hepatology), Psychiatry and Neurosciences;
- Visited three different Telemedicine clinics during clinic session;
- Interviewed the clinic Nurse Managers regarding equipment;
- Observed Telemedicine patient encounters;
- Interviewed physicians before or after the Telemedicine clinics regarding equipment;
- Reviewed Medical Center Policies (MCPs) related to Telemedicine;
- Attended a training session on the use of CAMS with the Telemedicine Project Manager;
- Reviewed and compared contracts between Department of Telemedicine and the following: Central Valley General Hospital (Hanford, CA); Desert Aids Project (Palm Springs); and K'ima:w Medical Center (Hoopa, CA);
- Evaluated Telemedicine clinic patient encounter reports; and
- Verified that installed equipment serial numbers were correctly recorded in CAMS.

**III. Conclusion**

We concluded that the deployment and use of Telemedicine equipment in the Health System was generally in compliance with Proposition 1D requirements, and University policy. Based on our interviews of physicians and Telemedicine Clinic observations, we concluded overall that patient encounters were performed in conformance with University and Health System policies.

However, we noted a few instances of non-compliance with University policies, as well as opportunities for improvement. Specifically, we noted that Clinical Engineering

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Services was not always notified when SOM funded Telemedicine equipment was placed in Health System clinic space; a centralized network management and support infrastructure for teleconferences had not been implemented; there were no provisions to continue Telemedicine equipment support after the implied support contracts expire; and Telemedicine equipment was not listed in the campus Capital Asset Management System (CAMS). These issues are addressed in detail in the balance of this report.

**IV. Observations and Management Corrective Actions**

**A. Clinical Engineering Role**

**Clinical Engineering Services was not always notified when SOM funded Telemedicine equipment was placed in Health System space.**

Some telemedicine carts contain various medical devices that interact directly with patients, and impact clinical decisions. Other Telemedicine carts are equipped strictly for remote telecommunications, and do not interact directly with the patient.

During our review, we noted that one Telemedicine cart that was about to be deployed in the hospital Emergency Room, and we inquired with Clinical Engineering Services as to the process for deploying the equipment. Clinical Engineering advised that they were not aware of the pending equipment placement.

Health System policy for the Medical Equipment Management Program provides that all medical equipment and electro-mechanical devices acquired for use in patient care areas are to be inspected by Clinical Engineering Services prior to being put into service (MCP 818.2). However, there were no specific provisions for review of Telemedicine equipment carts that interacted directly with patients.

**Management Corrective Actions:**

Telemedicine has notified Clinical Engineering Services of all Telemedicine equipment currently in UCSD hospital or clinical space.

Telemedicine will coordinate with Clinical Engineering Services in defining a formal process for notifying them of any plans for placing telemedicine equipment in any Health System location, and will incorporate the process into existing MCPs.

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**B. Centralized Network Management and Support**

**As of the time of our review, the Telemedicine Department had not implemented a centralized network management and support infrastructure for teleconferences.**

Based on a review of the teleconferencing system and interviews with the Telemedicine Analyst, we noted that teleconferences took place without centralized network management or support. Instead, connections were made in a peer-to-peer environment. Upon each connection, a separate path was made through the Health System firewall. Teleconference installations are distributed and growing in number; and support and maintenance is becoming more challenging. As more teleconference clinics are established, support tasks will become more time consuming.

Completing support tasks, such as installing system updates, for the peer-to-peer network are carried out by physically visiting each Telemedicine location. Due to the lack of a centralized network management and support infrastructure, server updates cannot be pushed out remotely to each node via a central node.

The installation of a Unified Communications Manager (UCM) and/or Video Conferencing System (VCS), a device that can centralize and manage all aspects of video teleconferencing, could provide an efficient method for updating systems. This installation would provide a single place of entry and exit with respect to the firewall, and make updates more systematic. Centralization would make communications more secure in that UCM/VCS would assist in verifying credentials, and permit authentication certificates to pass from/between units.

**Management Corrective Actions:**

The Department of Telemedicine and Health Systems Information Services (IS) have agreed to jointly fund a Cisco Unified Communications Manager/Cisco Video Communications Server which will:

- Allow for the creation, distribution and management of certificates that allow secure communication between the endpoints and servers.
- Provide focus on the security of the end devices, i.e., phones and codecs.
- Enable easier and more secure firewall transversal.



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- Provide endpoint management which will mean less physical access needed to devices except by only a small number of IT personnel.
- Permit verification of users and devices making a Session Initiation Protocol (SIP) call.
- Assist in restricting certain categories of messages from reaching SIP clients.
- Allow for the use of encrypted device configuration files.

**C. Continuation of Equipment Support**

**There were no provisions to continue telemedicine equipment support after the implied SOM support contracts expire.**

Contracts to provide Telemedicine services to the remote clinics are executed in twelve month increments. In two of the three contracts reviewed, SOM provided the Telemedicine equipment to be used at the remote clinic site. In the third instance, the remote clinic purchased the equipment needed to connect with the Health System.

For SOM equipment purchases, UC had negotiated a contract with the equipment vendor which included a three-year support agreement. So while maintenance and support were not specifically addressed in the SOM contracts with the clinics, it appears implied that SOM would also provide support for the first three years. Per the contract: "If clinic operates in California, serves underserved population, and federally qualifies for Proposition 1D funding, UCSD will provide (during period of each yearly contract) appropriate Telemedicine equipment at clinic for purposes of performing Telemedicine evaluations."

The Telemedicine Project Manager advised that Telemedicine equipment is expected to have a much longer service life than the three year support contract. Because the initial equipment purchases were made in 2010, some maintenance contracts will likely expire during the life of a SOM agreement with the remote clinics. It is essential that medical equipment perform as expected over the life of the equipment to ensure patient safety and prevent unnecessary downtime.

Health System policy entitled Medical Equipment Management Program, provides that requests for maintenance contracts are to be reviewed by Equipment Management Services (MCP 818.2). For each request, Clinical Engineering Services ascertains whether the support can be performed in-house or if a contract with an outside vendor is more appropriate. If the equipment cannot be

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maintained in-house, Equipment Management Services will work with the department to ensure the vendor contract proposal meets all specifications.

**Management Corrective Actions:**

Health Systems IS will determine how to fund maintenance service costs.

The Department of Telemedicine will modify the current contract language for spoke site locations to clarify responsibilities for equipment maintenance at the conclusion of original contract periods.

**D. Campus Asset Management System**

**Telemedicine equipment was not listed in CAMS.**

At the inception of our review, we noted that there was not any Telemedicine equipment listed in CAMS. Telemedicine equipment is unique in that it was located in the Health System hospital or clinical space, but was funded by the campus. Consequently, it should be managed in CAMS. Health System equipment custodians generally lacked knowledge of the CAMS system because it is a campus system which is outside the scope of their responsibilities. Because Telemedicine was a relatively new SOM Department, they had not formally designated any SOM personnel to document the equipment in CAMS, and fulfill other equipment related responsibilities such as periodically conducting a physical inventory of Telemedicine equipment as required by University policy. The physical inventory needs to be completed by personnel that do not have authority to purchase equipment, in order to provide adequate separation of duties between the purchasing and accounting functions. Consequently, the physical inventory cannot be completed by the current Telemedicine Project Manager.

**Management Corrective Actions:**

The Telemedicine Project Manager attended CAMS training, has entered all Telemedicine equipment into CAMS, and will continue to enter data for new equipment into CAMS.

The Department of Telemedicine will formally assign equipment inventorying responsibilities to a designated Business Analyst (who does not have equipment purchasing authority), and will ensure that all equipment is tracked in conformance with University policy.