

July 18, 2013

EHTISHAM MAHMUD, M.D.
Co-Director
Sulpizio Cardiovascular Center
7784

LISA C. MURPHY
Associate Administrator
7975

***Subject: Cardiac Electrophysiology and Non-Invasive Cardiovascular Lab
Audit & Management Advisory Services Project 2013-18***

The final audit report for Cardiac Electrophysiology and the Non-Invasive Cardiovascular Lab: Audit Report 2013-18, is attached. We would like to thank all members of those departments for their cooperation and assistance during the audit.

Because we were able to reach agreement regarding corrective actions to be taken in response to the audit recommendations, a formal response to the report is not requested.

The findings included in this report will be added to our follow-up system. We will contact you at the appropriate time to evaluate the status of the corrective actions. At that time, we may need to perform additional audit procedures to validate that actions have been taken prior to closing the audit findings.

UC wide policy requires that all draft audit reports, both printed and electronic, be destroyed after the final report is issued. Because draft reports can contain sensitive information, please either return these documents to AMAS personnel, or destroy them. AMAS also requests that draft reports not be photocopied or otherwise redistributed.

David Meier
Assistant Vice Chancellor
Audit & Management Advisory Services

Attachment

cc: D. Brenner
L. Donaldson
G. Matthews
R. Sivagnanam
B. Smith
M. Strachan
S. Vacca
P. Viviano

UC San Diego

AUDIT & MANAGEMENT ADVISORY SERVICES

Cardiac Electrophysiology and
Non-Invasive Cardiovascular Lab
July 2013

Performed By:

Gabor Herman, Auditor
Terri Buchanan, Manager

Approved By:

David Meier, Assistant Vice Chancellor

Project Number: 2013-18

*Cardiac Electrophysiology and Non-Invasive Cardiovascular Lab
Audit & Management Advisory Services Project 2013-18*

Table of Contents

- I. Background 1
- II. Audit Objective, Scope, and Procedures..... 2
- III. Conclusion 3
- IV. Observations and Management Corrective Actions 3
 - A. Separation of Duties..... 3
 - B. Equipment Inventory 4

Attachment A: Cardiac Electrophysiology – Audit Results by Business Process
Attachment B: Non-Invasive Cardiovascular Lab – Audit Results by Business Process

***Cardiac Electrophysiology and Non-Invasive Cardiovascular Lab
Audit & Management Advisory Services Project 2013-18***

I. Background

Audit & Management Advisory Services (AMAS) has completed a review of Cardiac Electrophysiology and the Non-Invasive Cardiovascular Lab as part of the approved audit plan for Fiscal Year 2012-13. This report summarizes the results of our review.

Cardiac Electrophysiology

The Cardiac Electrophysiology (EP) department is located at the Sulpizio Cardiovascular Center, which is adjacent to Thornton Hospital, and part of the University of California San Diego Health System (UCSDHS). EP facilities are comprised of two suites that have been newly remodeled, and include a robotic EP navigation system, a large control room, and live videoconferencing.

EP provides a wide range of electrophysiology, mapping and ablation procedures to treat various forms of cardiac arrhythmia (abnormal heart rhythm), including, but not limited to, atrial fibrillation, ventricular tachycardia, and Wolfe Parkinson White syndrome. In addition, EP physicians can implant pacemakers, cardioverter-defibrillator (ICD) devices and biventricular pacemakers. For patients whose device leads have become damaged or infected, the department offers laser lead extraction, and has one of the largest programs specializing in that procedure in the greater San Diego region. EP services are performed from 8 a.m. to 5 p.m., Monday through Friday. Procedures that do not require surgery are performed in an EP lab as scheduled procedures.

EP procedures are scheduled in the Operating Room Scheduling Office System (ORSOS). Clinical documentation is input into the Primanova application and interfaced to the patient's health record in the Epic electronic health record (Epic) system.

Medical supplies are ordered based on par levels established by Supply Chain Services. Implantable devices are ordered from vendors as needed for scheduled procedures. Medications maintained in the department are stocked by the Pharmacy and stored in a Pyxis automated dispensing machine (ADM).

The Fiscal Year 2012-13 department budget totaled \$8,622,066. The two largest cost components were prosthesis, or implantable devices (\$3,623,462) and surgical supplies (\$2,899,913), which were 42% and 33% of the budget, respectively.

Non-Invasive Cardiovascular Lab

The Non-Invasive Cardiovascular Lab (NICL) completes comprehensive cardiovascular diagnostic procedures to support the detection, diagnosis and treatment of all illnesses and injuries.

***Cardiac Electrophysiology and Non-Invasive Cardiovascular Lab
Audit & Management Advisory Services Project 2013-18***

All tests and procedures are performed under the direction of the NICL Medical Director and other Cardiologists or Surgeons. NICL Sonographers and Vascular Technologists are Registered Diagnostic Cardiac Sonographers or Registered Vascular Technologists. Nursing care is provided by Registered Nurses (RNs) and/or Nurse Practitioners (NPs).

NICL services include ECG, Transesophageal Echocardiogram (TEE), Stress Echocardiogram with Treadmill or Dobutamine, Peripheral Vascular Ultrasound, Ankle Brachial Index (ABI), Exercise Testing with Treadmill (ETT), Ambulatory ECG (Holter) Monitor and Event Monitor, Enhanced External Counter Pulsation (EECP). Services are performed from 8:00 a.m. to 5 p.m., Monday through Friday at the Hillcrest Medical Center, the Thornton Hospital, the Sulpizio Cardiovascular Center (SCVC), 3rd & Lewis Street Echo Lab and at the Encinitas Cardiology Clinic.

All NICL procedures are scheduled in GE-IDX. Because Cardiac Sonographers assist physicians with TEEs, those procedures are also scheduled in ORSOS. All outpatient procedures are scheduled and performed in the NICL. Inpatient procedures are performed either in the NICL or at the bedside, based on whether the patient may be transported safely from the patient unit to the NICL. Throughout the Hillcrest Medical Center and Thornton Hospital, there are 30 ECG machines that interface to the MUSE application, a system that permits Cardiologists to read and interpret ECG tracings. The ECG test results are uploaded to Epic as text files. The related graphic images are made available in Epic via a hyper link that allows the provider to view the image in MUSE.

The Fiscal Year 2012-13 NICL budget totaled \$3,072,882 when Hillcrest and Thornton cost centers are combined. The two largest cost components were payroll costs (\$2,237,610) and depreciation (\$531,036), which were 72% and 17% of the budget, respectively.

II. Audit Objective, Scope, and Procedures

The objective of our review was to determine whether EP and NICL business process controls were adequate to ensure that operations were effective, financial information was accurate, and that business transactions complied with University policy. The review was conducted using a Hospital Cost Center audit approach designed to evaluate the effectiveness of hospital department business practices.

We completed the following audit procedures to achieve the project objective:

- Reviewed UCSDHS Policies (MCP) 428.3: *Equipment Control*, and MCP 818.2: *Medical Equipment Management*; and University of California Business and Finance Bulletin (BUS) 29: *Management and Control of University Equipment*;
- Interviewed EP and NICL Managers;

***Cardiac Electrophysiology and Non-Invasive Cardiovascular Lab
Audit & Management Advisory Services Project 2013-18***

- Contacted representatives from the following UCSDHS departments to discuss operational issues in their areas of expertise:
 - Biomedical Equipment Services
 - Medical Center Finance (Finance)
 - Supply Chain Services
- Reviewed each department's asset records in the following systems:
 - Campus Asset Management System (CAMS)
 - Medical Center Asset Depreciation System (Lawson)
 - Biomedical Equipment Services database (XPro3)
- Traced the cost of a judgmental sample of EP implantable devices (from January to April 2013) to patient accounts;
- Performed an analytical review of NICL charge description master (CDM) service codes to evaluate the consistency of CDM content between locations; and
- Analyzed significant revenue and expense variances for each department by completing a month to month comparison of actual financial activity.

The scope of this review focused on general business processes and did not include evaluation of compliance with federal and state regulations that are typically assessed by the California Department of Public Health (CDPH) or The Joint Commission (TJC).

III. Conclusion

Based on the procedures performed, we concluded that EP and NICL business process controls were adequate to ensure that operations were effective, financial information was accurate, and that business transactions complied with University policy. ***Attachments A and B*** provide the audit results by business process for each department.

While conducting our review, we also identified opportunities to improve controls with respect to separation of duties and equipment management practices. These issues are discussed in more detail in the remainder of this report.

IV. Observations and Management Corrective Actions

A. Separation of Duties

The NICL Manager performed incompatible duties, and did not have an alternate.

Separation of duties is a key internal control for ensuring that individual employees do not complete transactions in their entirety. This provides some assurance that activities are bona fide University transactions. To help evaluate separation of duties issues the NICL Manager completed a matrix as part of the audit process. Through subsequent discussion about the completed matrix, we

***Cardiac Electrophysiology and Non-Invasive Cardiovascular Lab
Audit & Management Advisory Services Project 2013-18***

determined that at times, the Manager completed incompatible duties. For example, the Manager could prepare and authorize purchase requisitions and check requests. In addition, the Manager did not have a designated alternate for selected business tasks including approving invoices for payment and approving recharges from campus services units.

In a small and distributed department such as NICL adequate segregation of duties and the designation of alternates for selected processes may be difficult to achieve. However, because both EP and NICL report to the same Associate Administrator, NICL could potentially achieve separation of duties through cross-delegation of responsibilities between the two departments.

Management Corrective Actions:

Cardiology Program management will require that NICL staff duties be further evaluated to improve separation for duties; and identify alternates for core business processes. Consideration will be given to coordinating shared oversight between EP and NICL Managers.

B. Equipment Inventory

Our review of EP and NICL equipment depreciation schedules and inventory lists identified various errors.

Due to overlapping maintenance and custodial requirements, UCSDHS equipment is tracked in three separate systems. Per BUS-29, *Management and Control of University Equipment*, all equipment exceeding \$5,000 in acquisition cost must be entered into the Campus Asset Management System (CAMS). Health System Policies (MCP) 428.3 *Equipment Control* and MCP 818.2 *Medical Equipment Management* also apply in the clinical environment. The MCPs state that medical equipment is subject to review, maintenance and calibration by Biomedical Equipment Services (BES). MCP 818.2 also requires that departments complete an annual equipment inventory be performed. BES uses the XPro-3, a database designed to track equipment maintenance schedules and requirements. The Lawson asset management system also contains equipment data for the purpose of calculating equipment depreciation that is uploaded to the Medical Center general ledger system.

EP and NICL do not complete an annual equipment inventory. However, some equipment verification processes are performed. BES staff provide department Managers with an equipment list to verify on an annual basis. The list is developed using XPro-3 content, and selecting equipment items that do not have a

***Cardiac Electrophysiology and Non-Invasive Cardiovascular Lab
Audit & Management Advisory Services Project 2013-18***

corresponding entry in CAMS. Finance also completes a monthly comparison of equipment entries in Lawson and CAMS.

AMAS traced EP and NICL equipment entries to each of the three systems. We determined that NICL was charged depreciation for one item with an acquisition cost \$1,172,000, that belongs to Radiology. The item was placed into service in 1980, but was marked inactive in CAMS on April 15, 2013.

Although BES and Finance personnel take active measures to reconcile their systems, those processes are not conducted at a departmental level, and do not ensure that the departments are charged depreciation for only their equipment or that a complete annual inventory is performed as required by policy.

Management Corrective Actions:

EP and NICL Managers will create an annual equipment inventory procedure to comply with UCSDHS policy. The annual process will include a reconciliation of the verified equipment list with the depreciation schedule, to confirm that the depreciation charges for each department are accurate.

**Cardiac Electrophysiology (EP)
Audit Results by Business Process
Audit & Management Advisory Services Project #2013-18**

Business Process	AMAS Audit Review Procedure				Risk & Controls Balance Reasonable (Yes or No)	Audit Conclusion	Comments
	Analytical Review of Financial Data	Internal Control Questionnaire/ Separation of Duties Matrix	Process Walk-through (Ltd Document Review)	Transaction Testing (Sample Basis)			
Staff and/or Patient Safety Management		√		Discussed safety measures with the EP Manager.	Yes	Satisfactory	EP has a Safety Officer that keeps management and staff informed about safety related issues. All staff required to complete annual safety training.
Patient Scheduling		√		Discussed scheduling scenarios with the EP Manager.	Yes	Satisfactory	EP procedures are scheduled in three separate systems. Procedures are scheduled in the EP Primanova system and in ORSOS. Physicians use MS Outlook to schedule patient procedures.
Supply Inventory Management	√	√	√	Reviewed supply expenditures and completed a variance trend analysis for the period July 1, 2012 through April 30, 2013.	Yes	Satisfactory	Expense account transactions appeared reasonable.
Timekeeping & Payroll	√	√	√	Reviewed the payroll report for March 2013.	Yes	Satisfactory	Time reporting and payroll management controls were adequate. No exceptions were noted.

**Cardiac Electrophysiology (EP)
Audit Results by Business Process
Audit & Management Advisory Services Project #2013-18**

Business Process	AMAS Audit Review Procedure				Risk & Controls Balance Reasonable (Yes or No)	Audit Conclusion	Comments
	Analytical Review of Financial Data	Internal Control Questionnaire/ Separation of Duties Matrix	Process Walk-through (Ltd Document Review)	Transaction Testing (Sample Basis)			
Patient Billing		√		Traced a sample of implantable devices patient accounts. Discussed charge monitoring with the EP Billing Analyst and the EP Manager.	Yes	Satisfactory	Charge capture processes were adequate. No exceptions were noted.
Charge Description Master (CDM) Maintenance		√		Reviewed the EP CDM.	Yes	Satisfactory	The EP CDM was comprehensive.
Clinical Research Activity	√	√		Discuss clinical research support with the EP Manager.	Yes	Satisfactory	EP did not support clinical research projects at the time of our review.
Medication Management	√	√	√	Discussed medication management processes with the EP Manager.	Yes	Satisfactory	Medication is managed by Pharmacy staff and stored in automated dispensing machines (ADMs) in the procedure rooms.
Information Systems Environment		√		Discussed information systems and related support	Yes	Satisfactory	EP personnel manage the Primavera system with assistance from Medical Center Information Services and the

**Cardiac Electrophysiology (EP)
Audit Results by Business Process
Audit & Management Advisory Services Project #2013-18**

Business Process	AMAS Audit Review Procedure				Risk & Controls Balance Reasonable (Yes or No)	Audit Conclusion	Comments
	Analytical Review of Financial Data	Internal Control Questionnaire/ Separation of Duties Matrix	Process Walk-through (Ltd Document Review)	Transaction Testing (Sample Basis)			
				with the EP Manager.			vendor.
Travel		√		EP did not have travel expenses during the audit scope period.	Yes	Satisfactory	Travel costs are typically insignificant.
Cash and Recharge	√	√	√	Reviewed selected recharge activity reports, recharge analysis worksheets, and supporting documents.	Yes	Satisfactory	EP does not handle cash. Recharge variances are monitored and corrected.
Transaction Processing - Non-Payroll Expenditures	√	√	√	Reviewed and discussed the EP separation of duties matrix with the Manager.	Yes	Satisfactory	Separation of duties appeared adequate. No exceptions were noted.
Medical Record Management		√		Discussed medical record creation, transfer and storage processes with the EP Manager.	Yes	Satisfactory/ Improvement Needed	Procedure mapping information is downloaded to encrypted compact discs that remain in EP. The EP Manager spent a considerable amount of time attempting to implement a process to upload the mapping

**Cardiac Electrophysiology (EP)
Audit Results by Business Process
Audit & Management Advisory Services Project #2013-18**

Business Process	AMAS Audit Review Procedure				Risk & Controls Balance Reasonable (Yes or No)	Audit Conclusion	Comments
	Analytical Review of Financial Data	Internal Control Questionnaire/ Separation of Duties Matrix	Process Walk-through (Ltd Document Review)	Transaction Testing (Sample Basis)			
							data to a secure file server, but he was not able to complete that project. Because this information is on separate physical media, there is a chance that may be misplaced. The EP Manager is aware of this risk and will continue to identify an alternative way to store this information, preferably as an upload to the Epic EHR when possible.
Equipment Management	√	√	√	Reviewed EP equipment lists in the Campus Asset Management System (CAMS), the Biomedical Equipment Services (BES) database, and the Medical Center Lawson asset management system; reviewed depreciation expenses; and	No	Improvement Needed	EP verifies the equipment included on a list provided by BES annually, but an annual equipment inventory is not completed. <i>(Audit Report Finding B)</i>

**Cardiac Electrophysiology (EP)
 Audit Results by Business Process
 Audit & Management Advisory Services Project #2013-18**

Business Process	AMAS Audit Review Procedure				Risk & Controls Balance Reasonable (Yes or No)	Audit Conclusion	Comments
	Analytical Review of Financial Data	Internal Control Questionnaire/ Separation of Duties Matrix	Process Walk-through (Ltd Document Review)	Transaction Testing (Sample Basis)			
				evaluated selected equipment maintenance records.			

**Non-Invasive Cardiovascular Lab (NICL)
Audit Results by Business Process
Audit & Management Advisory Services Project #2013-18**

Business Process	AMAS Audit Review Procedure				Risk & Controls Balance Reasonable (Yes or No)	Audit Conclusion	Comments
	Analytical Review of Financial Data	Internal Control Questionnaire/ Separation of Duties Matrix	Process Walk-through (Ltd Document Review)	Transaction Testing (Sample Basis)			
Staff and/or Patient Safety Management		√	√	Discussed safety measures with the NICL Manager	Yes	Satisfactory	NICL has a Safety Officer that keeps management and staff informed about safety related issues. All staff required to complete annual safety training.
Patient Scheduling		√		Discussed scheduling scenarios with the NICL Manager.	Yes	Satisfactory	Patient scheduling for non-invasive imaging involves three separate systems. Patient clinic visits are scheduled in GE-IDX; vascular procedures are scheduled in the Radiology Information System (RIS); and ORSOS because Cardiac Sonographers assist physicians with procedures. Beginning in July 2013, vascular procedures will no longer be performed in the NICL.
Supply Inventory Management	√	√	√	Reviewed supply expenditures and completed a variance trend analysis for the period July 1, 2012 through April 30, 2013.	Yes	Satisfactory	Supply expense transactions appeared reasonable.

**Non-Invasive Cardiovascular Lab (NICL)
Audit Results by Business Process
Audit & Management Advisory Services Project #2013-18**

Business Process	AMAS Audit Review Procedure				Risk & Controls Balance Reasonable (Yes or No)	Audit Conclusion	Comments
	Analytical Review of Financial Data	Internal Control Questionnaire/ Separation of Duties Matrix	Process Walk-through (Ltd Document Review)	Transaction Testing (Sample Basis)			
Timekeeping & Payroll	√	√	√	Reviewed the payroll report for March 2013.	Yes	Satisfactory	Time reporting and payroll management controls were adequate. No exceptions were noted.
Patient Billing		√		Discussed charge capture processes with the NICL Manager.	Yes	Satisfactory	Patient charges are entered into the Patient Care Information System (PCIS) Charge Capture module by the personnel that performed the procedure.
Charge Description Master (CDM) Maintenance	√	√	√	Performed an analytical review of CDM service codes to evaluate consistency of content for the Hillcrest and La Jolla locations.	Yes	Satisfactory	AMAS confirmed with the Revenue Cycle Administration CDM Manager that the differences noted in our review would not affect the billing process.
Clinical Research Activity		√		Discussed the process for completing procedures performed for patients involved in clinical research studies.	Yes	Satisfactory	NICL provides its services to clinical research projects at research rates upon request.

**Non-Invasive Cardiovascular Lab (NICL)
Audit Results by Business Process
Audit & Management Advisory Services Project #2013-18**

Business Process	AMAS Audit Review Procedure				Risk & Controls Balance Reasonable (Yes or No)	Audit Conclusion	Comments
	Analytical Review of Financial Data	Internal Control Questionnaire/ Separation of Duties Matrix	Process Walk-through (Ltd Document Review)	Transaction Testing (Sample Basis)			
Medication Management	√	√	√	Discussed medication management processes and the medication expense variance with the NICL manager.	Yes	Satisfactory	NICL does not administer controlled substances. Medication control is maintained through an Automated Dispensing Machine (ADM). Nurse practitioner prepares and administers all medications and contrast agents used in procedures.
Medical Record Management		√		Discussed medical record creation, transfer and storage processes with the NICL manager.	Yes	Satisfactory	Electrocardiogram test results are stored in the MUSE Cardiology Information System, and are hyper-linked within the Epic electronic health record system. Diagnostic test results are uploaded into Epic from the Cardiology Logbook system in an HL7 file format.
Information Systems Environment		√		Discussed information systems and related support with the NICL Manager.	Yes	Satisfactory	NICL personnel manage the MUSE Cardiology Information System with assistance from Medical Center Information Services.

**Non-Invasive Cardiovascular Lab (NICL)
Audit Results by Business Process
Audit & Management Advisory Services Project #2013-18**

Business Process	AMAS Audit Review Procedure				Risk & Controls Balance Reasonable (Yes or No)	Audit Conclusion	Comments
	Analytical Review of Financial Data	Internal Control Questionnaire/ Separation of Duties Matrix	Process Walk-through (Ltd Document Review)	Transaction Testing (Sample Basis)			
Travel		√		NICL did not have travel expenses during the audit scope period.	Yes	Satisfactory	Travel costs are typically insignificant.
Cash and Recharge	√	√	√	Reviewed selected recharge activity reports, recharge analysis worksheets, and supporting documents.	Yes	Satisfactory	NICL does not handle cash. Recharges are reviewed by the Manager. Recharge variances were due to initial billing errors and corrections.
Transaction Processing - Non-Payroll Expenditures	√	√	√	Reviewed and discussed the NICL separation of duties matrix with the Manager.	No	Improvement Needed	The NICL Manager has sole responsibility for selected business transactions. An alternate has not been designated and trained in some cases. <i>(Audit Report Finding A)</i>
Equipment Management	√	√	√	Reviewed NICL equipment list in the Campus Asset Management System (CAMS), the Biomedical Equipment Services database and the	No	Improvement Needed	NICL verifies the equipment included on a list provided by Biomedical Equipment Services annually, but does not conduct an annual equipment inventory. Analysis of the CAMS asset list and equipment depreciation

**Non-Invasive Cardiovascular Lab (NICL)
 Audit Results by Business Process
 Audit & Management Advisory Services Project #2013-18**

Business Process	AMAS Audit Review Procedure				Risk & Controls Balance Reasonable (Yes or No)	Audit Conclusion	Comments
	Analytical Review of Financial Data	Internal Control Questionnaire/ Separation of Duties Matrix	Process Walk-through (Ltd Document Review)	Transaction Testing (Sample Basis)			
				Medical Center Lawson asset management system; reviewed depreciation expenses; and evaluated selected equipment maintenance records.			identified that NICL was charged depreciation for equipment that it did not own. <i>(Audit Report Finding B)</i>