

Enterprise Imaging & Radiology Assessment & Planning



MCKENZIE STEPHENSON, INC.

Assessment

Background

This portion of our report focuses on each of the operational elements of the medical imaging service line within the California Department of Corrections and Rehabilitation (Corrections).

The efficient operation of a clinical department relies heavily on processes that are consistently standardized to ensure that desired outcomes fall within an acceptable level of fault tolerance. The processes used in clinical practice promote a standard of care attainable by replicating those work activities that are found to yield the best result in any given environment.

The MSI consulting team was briefed on the operational hurdles that obstruct a custody-assisted health care environment. We discovered very early that standard processes that are incorporated and utilized within the private sector do not always translate to the custody environment. In order to fully comprehend the unique challenges within a Correctional environment, MSI evaluated the continuum of care at 18 institutions--from the point an inmate seeks care to the point of treatment release. We focused on various "areas of process," such as:

1. On-site assessments of each inmate housing unit to study initial inmate-patient medical evaluations.
2. The referral line of care to each housing clinic.
3. We visualized the Central Health Services building to understand the settings for the Triage/Treatment Areas (TTA) and Correctional Treatment Centers (CTC) where medical evaluations and care are provided and decisions for routine or specialty care are determined.
4. Spoke with Plata and general custody staff to understand the challenges related to inmate-patient escort.

In addition, each site was further evaluated for scope of services, staffing, equipment, policies and procedures, leadership and regulatory requirements--with special attention given to inmate-patient access, standard of care and operational cost structures. These site visits were followed up with a review of relevant contracts and imaging forms; participation in a Town Hall teleconference; numerous phone interviews to sites not visited and teleconference activities and interviews with contracted vendors.

A list of documents reviewed and staff interviewed are provided below:

Documents Reviewed

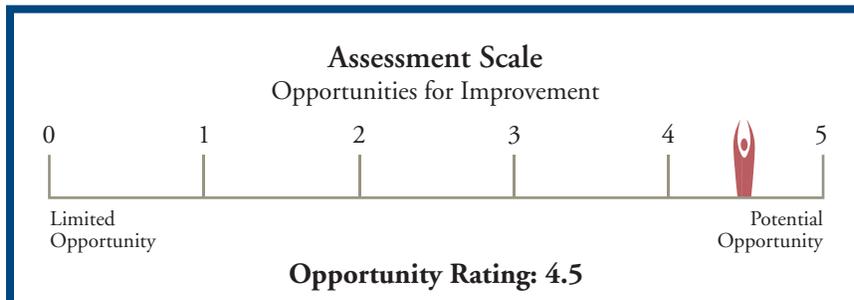
- ◆ Exam/patient logs
- ◆ Scheduling documents
- ◆ Report of exams completed and pending (backlog list)
- ◆ Utilization Management documents (medical imaging referral lists)
- ◆ Imaging departmental operations guidelines (where available)
- ◆ Radiological Services Policy and Procedures (where available)
- ◆ Inmate Medical and Scheduling Tracking System (IMSATS) volume reports
- ◆ California Department of Corrections and Rehabilitation Operations Manual
- ◆ Radiologic Technologist, Correctional Facility Series Specification (Job Descriptions)
- ◆ Service contracts (contracted on-site services and mobile services)
- ◆ CCR Title 17
- ◆ Physicist's Annual Survey Reports
- ◆ CFR Title 21

Staff Interviewed

- ◆ Correctional Health Services Administrators (CHSA)
- ◆ Chief Medical Officers
- ◆ Referring physicians
- ◆ Radiologic Technologists (RT, Sr. RT and RT Supervisor) and Office Technicians (OT)
- ◆ Radiologists (when available)
- ◆ Utilization Management Registered Nurses (RN)
- ◆ Nursing staff
- ◆ Financial Analysts
- ◆ Custody Officers (CO)
- ◆ Vendors

The following sections provide the reader specific information related to the operations section of this report.

Scope of Services



Providing a diverse and effective medical imaging service environment at each of Corrections thirty-three (33) facilities is a major challenge – one that requires deployment of properly selected functional equipment, trained staff and technology that ultimately yields an improved service line. Imaging modalities once thought to be ultra-specialty such as CAT scan and Ultrasound, are now considered as commonplace as general radiology. These particular modalities offer the clinician a variety of diagnostic options and are now considered the basic foundation from which to build a diagnostic opinion and treatment plan. Magnetic Resonance Imaging (MRI), Mammography (M), Positron Emission Tomography (PET), Nuclear Medicine (NM) and Interventional Radiology (IR) are important radiographic options, but each are considered specialty imaging services due to the cost considerations of full-time access. These specialty services, with the exception of mammography at the three (3) women’s facilities, are ideally provided on a part-time basis through mobile or fixed site agreements with outside providers.

Findings

At each visited site, the scope of imaging services varied widely from one institution to the next. MSI evaluated each institution’s full scope of services which included diagnostic activities performed in-house, contracted mobile services transported on-site, and services offered off-site by local or distant healthcare providers.

In-house services are limited to basic radiographic equipment and in some instances radiologic/fluoroscopic capabilities. Of those institutions housing the equipment capable of performing fluoroscopic examinations, very few offer a radiologist to perform these studies. The majority of facilities professionally contract for mobile CT, MRI and US services. These service contracts provide various service days, depending on the pattern of sched-

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uled needs of the institution and the availability of the contracted unit. There are eight (8) sites that do not utilize mobile CT services, four (4) sites that do not utilize mobile MRI services and three (3) sites that do not utilize mobile US services. Those particular sites are sending inmate-patients to local off-site providers at considerable cost to Corrections in the form of usual and customary professional exam charges, custody escort, transportation, and procedural billing.

The specialty imaging service of mammography is specific to the three (3) women's institutions. Each of these institutions provides some level of "Screening" mammography services. Two (2) sites (CIW and CCWF) have developed their own MQSA certified programs and provide mammography services by utilizing their own equipment and staff. The other site (VSPW) uses a contracted mobile service. Follow-up care, with regard to positive findings on screening mammography, is highly regulated and a critical component to the early detection and treatment of breast pathology. None of the sites visited provided follow-up diagnostic breast imaging. This practice is problematic in that it creates inherent delays, and interrupts the continuity of care by requiring the staff to manage the exchange of the screening study to the provider engaging in the follow-up. For instance, MSI spoke with the vendor that provides mammography services to VSPW. They are very concerned that when pathology is discovered on the screening mammography and a follow-up request for "diagnostic" breast imaging is recommended, the institution fails to deliver the follow up care in a reasonable amount of time. Although MSI does not have specific cases to provide in this report, the vendor expressed this to be an issue on many inmate-patients. When a screening mammography study is found to be abnormal and a follow-up diagnostic set of examinations is recommended, it is imperative that the institution acts immediately to ensure the follow-up is completed. The result of the follow-up must be reported back to the entity that initially requested the diagnostic examination to close the loop on the initial finding. This is a regulatory requirement; non-compliance can elicit inspection and possible litigious activity.

The hours of operation and subsequent coverage also varied from site to site. Coverage hours ranged from starting times of 0600 to 0800 and did not expand beyond 1600. The majority of sites visited operate on straight 8 or 10 hour shifts. Only three sites provide on-call coverage for after hours, nights and weekends.

Professional interpretation of imaging studies are attended to by a variety of contracted radiology groups and individual radiologists. Three (3) sites have contracted for on-site radiology coverage to interpret exams and complete fluoroscopic examinations when requested. The other sites use a variety of highly inefficient manual methods to send hardcopy exams to local or regional radiology groups for interpretation. A final report of findings is usually provided by the contracted reading groups utilizing their own dictation and transcription service with no interface or automated capability to provide the report back to the requesting site. In some cases, preliminary reports are faxed to Corrections facilities. Unfortunately, most imaging departments or the physicians do not have dedicated FAX machines to receive

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these reports directly; therefore the preliminary report is at risk of being lost among the numerous other faxed documents. In most cases, the final (official) reports are not transcribed by Corrections. Rather, they are completed using the transcription services of the contracted radiologist and only then sent to the ordering institution using a variety of manual processes, some so ridiculous by modern standards that MSI will not expand on the inherent problems and inconveniences that result from each adopted procedure.

Let us say that the methods for transporting the film to and from the interpreting provider back to the institution, with the corresponding final radiology report, can take from as little as 4-5 days to as long as 4-6 weeks. Furthermore, the delay in report turn around time (TAT) and the method used by Corrections for tracking inbound report data creates substantial risk related to both delays in inmate-patient care and multiple document control issues. The exchange of clinically relevant information is clearly deficient for this service line.

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TABLE 1

CDCR Medical Imaging Services (Number of Days Per Week Services Are Provided)						
CDCR Site	RAD Days	CT Days (Mobile)	MR Days (Mobile)	US Days (Mobile)	Mammo-gram Days	Comments
FSP	5	1	1	1		
SAC	5	None	1	1		
VSPW	5	1	1	1	1	Mobile mammography service used.
CCWF	6	1	1	2	5	
SQ	5	.5	1	.5		CT & US are performed 1 day every other week.
CTF	5	1	2	1		On-call staffing provided for after-hours
SVSP	5	1	2	1		
ISP	5	None	1 - 2	1		
CVSP	5	None	None	None		
CMF	5	1.5	1.75	2 - 3		CT – 6 days per month. MR – 7 days per month.
SOL	5	3	2	1		
COR	5	1	1	2		
CSATF	5	1	3	4		CT has a 46 patient back-log. MR has a 45 patient back-log. US currently being scheduled 4 days per week to catch up on US back-log.
PBSP	5	None	None	1		
HDSP	5	None	1	None		
CCC	5	None	None	None		
CIW	5	None	None	1 - 2	5	
CIM	5	None	1	1		On-call staffing provided for after-hours

The following bullets represent our most significant findings:

- ◆ Radiology interpretation turn-around times are not acceptable; the best TAT is 4-5 days and the worst is noted at 4-6 weeks.
- ◆ In-house medical imaging services represent a basic and minimized offering throughout Corrections. The only service consistently available throughout the system is basic radiology.
- ◆ Contracted mobile services offer inconsistent benefits. These services vary in scheduled availability, level of service and technological capabilities. Various sites do not utilize contracted mobile services and instead transfer all inmate-patients to off-site locations.
- ◆ Off-site imaging exams result in considerable custody and transportation expense, operational disruptions, and extended delays which negatively affect the quality of inmate-patient care.
- ◆ The scope of contracted mobile services is inconsistent. For example, various mobile CT and MRI units will perform studies requiring intravenous contrast injections while others do not. The absence of contrast studies can compromise the quality of exams.
- ◆ Fluoroscopic equipment is widely distributed throughout Corrections (10 sites visited), but only one site has a contracted radiology group that performs fluoroscopic procedures.
- ◆ There is limited quality control (QC) or quality assurance (QA) monitoring throughout each institution. This is a particularly relevant problem for mobile services, since Corrections imaging personnel are not directly responsible for providing knowledgeable oversight of these services.
- ◆ Two of the women's institutions have certified mammography programs. One women's facility has mammography equipment that sits idle; this particular site contracts this exam volume to a mobile mammography company.

Recommendations

1. **Expand in-house services to include CT and US at each Corrections facility. This can be accomplished by utilizing modular buildings and including CT and US in all plans for new medical facilities under consideration. In some cases a single CT unit could be shared between two facilities that are in close proximity, such as ISP and CVSP.**

RATIONALE

- a. CT, ultrasound and X-ray are considered basic diagnostic standards of care in any hospital or out-patient clinic.
- b. Radiology experts would agree that CT is fast approaching basic X-ray as the clinical "launch point" to process initial exam evaluations.
- c. Certified Radiological Technologists are permitted by licensure to operate both radiology and CT equipment. This creates an ideal opportunity to provide advanced cross-training for technologists which facilitates the addition of this technology with minimum staff overhead.

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- d. Corrections should invest in dedicated US equipment throughout each facility. US staff can be contracted for this service line. In addition, ultrasound equipment would be available to be operated by trained in-house physicians on an as-needed basis.
- e. The cost of ownership would be less than the cost of mobile services and off-site referrals (see proforma appendix) and would provide increased diagnostic oversight.

2. Corrections should design and operate their own mobile MRI fleet for scheduled deployment to all thirty-three (33) prisons.

RATIONALE

- a. Owning mobile services allows for greater flexibility in scheduling.
- b. Equipment can be standardized throughout Corrections for integration to the RIS/PACS
- c. Technologists and drivers would be Corrections employees.
- d. Owning and managing mobile MRI services is considerably more cost effective versus contracting out for this service.

3. Re-draft Professional Service contracts that would require radiologists to provide scheduled on-site hours to perform fluoroscopic procedures within facilities where feasible.

RATIONALE

- a. Requiring radiologists to perform fluoroscopic exams on-site eliminates the necessity to refer inmate/patients to off-site facilities at additional expense and risk.

4. Develop purchasing guidelines that require appropriate subject matter expert (SME) review for all imaging equipment.

RATIONALE

- a. Subject matter expertise is essential to ensure that the correct radiology equipment is purchased for the indicated diagnostic need.
- b. Decision making processes would be improved. This would prevent poor decisions, such as the recent purchase of the multiple remote controlled radiographic/fluoroscopic units that were purchased for various facilities that have neither the space nor the functional requirements.

5. Implement an in-house mammography program at VSPW.

RATIONALE

- a. Mammography equipment should be replaced with a certified unit and Fuji CR units should be upgraded to provide for digital mammography for both portability of digital studies and inclusion into PACS
- b. Assistance in setting up a certified program can be obtained from CCWF or CIW.
- c. An in-house mammography program with tightly controlled standards and MQSA guidelines will be more efficient and cost effective.

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6. Expand imaging services hours of operation to cover late afternoons and evenings where applicable. Adding CT services will require additional staffing in some areas which will allow more scheduling flexibility. Staff could stagger shift times such that one technologist would start earlier and the other would arrive later to cover the evening hours of operation. This type of scheduling is very effective and will optimize the use of multi-modality technologists. Multi-modality technologists will be discussed in more detail under the staffing section.

RATIONALE

- a. Expanding upon the hours of operations will prevent off-site referrals of inmate-patients who become sick or injured during hours that are not currently covered.
 - b. Expanded hours will allow greater flexibility for scheduling inmates.
 - c. Once PACS is available, imaging exams can be read expeditiously so that clinicians can formulate improved clinical decisions.
 - d. Expanded hours, with the use of multi-modality technologists, will increase productivity and save money.
7. Implement a system-wide Radiology Information System (RIS) and Picture Archiving and Communication System (PACS) as soon as reasonably practical. Implementing this technology would be an important step toward achieving the goal of providing the proper medical care that compares favorably with industry standards. These particular systems would provide the most important components to improving quality, operational efficiency, productivity and TAT's across Corrections thirty-three (33) facilities.

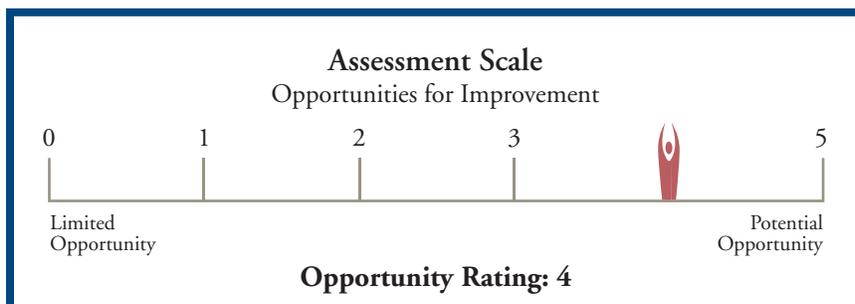
RATIONALE

- a. A RIS/PACS will link all thirty-three (33) CDCR imaging services.
- b. Transferring analog hard-copy imaging records from facility to facility will no longer be necessary. All medical and dental images will reside in a central database and be easily accessed anywhere throughout the CDCR system.
- c. A PACS provides the CDCR control and flexibility for contracting for professional radiologist services. The contracted radiologists can be physically located anywhere where they can log into the system, including a central reading location.
- d. Exams are available for reading and clinician review immediately after the exam is performed.

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Staffing



A well-trained and engaged imaging staff is critical to provide an appropriate level of service to Corrections healthcare delivery system. The range of diagnostic imaging options that are available to Corrections attending clinicians includes general radiography, fluoroscopy, CT, MRI, and US. Timely access to each of these diagnostic tools is essential to meet the required constitutional level of healthcare for all inmate-patients. Each of these technologies depend upon highly skilled, motivated and appropriately licensed personnel, either directly employed by the Corrections, or contracted to perform under a defined scope of work for prescribed duties.

Findings

Staffing levels and capabilities vary widely between facilities. We observed that staffing ratio's range from 1 to 5+ Full Time Equivalent (FTEs) with very little justification through the corresponding patient volume differences (see table 2). Many facilities have only one radiological technologist on staff with no codified back-up support plan to cover short-notice absences, vacations or sick leave. The sites with only one technologist simply cease to provide on-site imaging services if a technologist leaves or becomes ill. This practice is unacceptable in that it creates a break in operational continuity and presents a void in the care continuum which places the facility and inmate population at risk. Without some level of redundancy in operational staff, the brain trust resides with a single staff member. Should the staff member become unavailable to perform their required duty this would produce a fracture in available imaging service. All sites visited, regardless of the staffing ratio, revealed a high level of staff under-utilization. Even where the site only had one (1) technologist, the number of procedures performed places the staff in the 30th percentile for staff-to-procedure performance ratio. However, it must be noted that the staff are inundated with administrative and clerical responsibilities that require a majority of their attention because of the lack of any suitable information systems designed to address a majority of these administrative tasks.

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In addition to staffing levels, MSI closely observed and qualitatively analyzed the surrounding environment and the resultant culture of each institution for the purpose of anticipating the appropriate changes that might be required of that particular facility. Oftentimes, we found that the staff culture represented a silo environment with little collaboration for process improvement outside the walls of the individual institutions. In this type of work environment, staff tends to cover a dysfunctional system of shortcuts, work-around solutions and finger pointing. MSI believes this culture is not inherent. People do not generally wake up and consciously go to work to champion mediocrity. It is possible that the inability to generate positive changes in a highly stratified and bureaucratic environment has cultivated the belief among staff that any effort to improve the conditions or processes fail as a result of the time and energy it takes to move changes through the state process. Other cultural anomalies persist within the imaging services, many of which are a direct result of a lack of operational leadership, oversight and mentoring. One example we can provide is related to an interview we had with a staff member who refuses to report or assist the physician staff in identifying orthopedic pathology on an x-ray, because Corrections healthcare administration stopped paying him for taking evening and weekend call. He chose to use the issue of a management decision as the antecedent for disposing of his clinical obligation to inform or collaborate for the good of the patient. This is one example of a flat culture bred from the lack of good supportive leadership and regular performance feedback. Without effective leadership, there is little hope that the system of delivering quality imaging services will thrive.

There is little opportunity for the imaging staff within the Corrections to grow professionally. The system does not provide professional training or QA evaluation, nor does it cultivate the desire for continued education which can result in an upwardly mobile career ladder. The Corrections must adopt an organizational structure within the imaging department that allows technology staff to reach for advanced positions.

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TABLE 2

CDCR Site	Staffing Fte's				Volume		Hours Of Ops	Comments
	Rt	Sr. Rt	Supr. Rt	OT/ MA	X-Ray Exams 2007	Mammo-grams		
FSP		1			2,000 estimated		6 - 2	Exam volume estimated by tech.
SAC		1			3,500 estimated		6 - 2	Exam volume estimated by tech
VSPW	2	1		2.5	3,906	1663	7 - 3	1 registry RT covering for LOA; mammography services is contracted.
CCWF	1	1			3,057	1,517	7 - 3	RT's doing own mammography.
SQ	.4	1			5,764 estimated		6 - 4	No staff tech, 1.4 Registry RT's work 10-hr shifts; exam volume estimate based on Oct -Dec 2007 reports.
CTF	2	1		1	3,056		6 - 3:30	1 RT is a registry tech.
SVSP	1	1		1	3,838 estimated		8 - 6	Exam estimate based on Jul-Dec report.
ISP	1	1			3,180 estimated		6:30 4:30	Exam volume estimated by technologist.
CVSP		1			2,508 estimated		7 - 3:30	New staff tech hired as of 3/3/08-no back-up tech; volume estimated based on Oct-Dec 2007 reports.
CMF	3		1	1	7,100		8 - 4:30	1 RT vacancy and 2 inmate helpers; on-call coverage for nights and weekends.
SOL	.6	1		1	4,944 estimated		8 - 4	.6 registry tech & 1 registry OT; exam volume estimate by tech.
COR	1	1		1	3,342 - estimated		7:30 - 3:30	On-call coverage for nights and weekends; exam volume estimate based on Sep-Dec 2007 reports.
CSATF	1	1		.5	3,900 estimated		8 - 4	OT support for scheduling in Administration; exam volume estimated by technologist.
PBSP	1	1		.5	3,171		7:30 - 3:30	Random OT support from admin; exam volume includes 495 ultrasound exams performed by contract tech.
HDSP		1			2,072 estimated		8 - 4	No back-up tech; exam volumes estimate based on Oct-Dec 2007 reports.
CCC	2	1			3,120 estimated		6 - 8 M-F, 7:30 - 5:30 Sat	Exam volume estimated by technologist; imaging services are available 8:00 P.M. in the evening and 8 hours on Saturday.
CIW	1	1		1	3,796 estimated	1,788	6 - 2	MA on loan from Medical Records; exam volume estimate based on most recent month of activity.
CIM	2	1		1	7,623 estimated		8 - 4	1 RT, 1 LVN/OT on loan; on-call coverage for nights & weekends; volume estimate based on monthly reports (Jun, Aug, Oct & Dec 2007).

The following bullets represent our most significant findings:

- ◆ Staffing is inconsistent and does not correlate to workload, hours of coverage, operational efficiencies or depth of coverage requirements.
- ◆ Hours of operation are limited. No evening, weekend or holiday coverage is provided with the exception of CMF, COR, and CIM. These sites provide on-call coverage after hours. CCC also provides extended hours; it is the only facility that staffs imaging services into the evening and on Saturdays.
- ◆ Some facilities do not provide any coverage when the technologist position is vacant due to illness or vacation.
- ◆ Technologists are adversely impacted by the overwhelming administrative and clerical responsibilities required of a completely manual system of processes. Non-technical duties constitute as much as 80% of productive time.
- ◆ The sharing of ideas and suggestions is non-existent throughout Corrections. The imaging departments operate as silos with little centralized oversight by management or peer review.
- ◆ There is no shared support between facilities. This is true even among those facilities that are located adjacent to each other.
- ◆ MSI found no evidence of Corrections sponsored training or continuing education.
- ◆ Annual safety training is one area we found to be well established.
- ◆ Our general finding across the system is that there is inadequate space to efficiently operate within a department entirely reliant upon a film-based manual work process.
- ◆ Most staff interviewed felt they were busier than the volumes reviewed indicated.

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Recommendations

1. **Standardize staffing ratios across the Corrections system. Create a minimum staffing model so that all imaging services are represented by two (2) technologists and one (1) OT. This model is necessary to meet clinical requirements for expanded imaging hours of operation, the addition of CT and the appropriate clerical support. This staffing ratio also provides coverage for short notice absences and vacations.**

RATIONALE

- a. Standardizing staffing ratios will ensure adequate staffing meets the requirements of each Corrections facility. Staffing will be based on volume of inmate/patient exams, hours of required coverage and other duties as defined by P&P's.
- b. Two (2) technologists' hours can be flexed to cover both early and late hours of operation. This type of coverage increases the availability of imaging services throughout the day and reduces the need to refer inmate/patients off-site.

Create a minimum staffing model so that all imaging services are represented by two (2) technologists and one (1) OT.

- c. OT support assists the technologists in focusing on their primary role of imaging. They will have more time and flexibility to provide better service and complete more exams. This will become especially important if CT is deployed as a standard modality.
 - d. Technologists will be able to better assist in oversight of in-house services as well as general oversight of contracted resources to help them comply with the objectives of the department.
 - e. Technologists will be able to participate in Quality Assurance and Quality Control activities.
2. **Create new job descriptions for multi-modality Radiology/CT technologist positions.**

RATIONALE

- a. CRT licensed technologists are licensed to operate both radiology and CT equipment.
 - b. These positions will provide greater flexibility and eliminate the need for contracted mobile CT services once CT scanners are deployed.
 - c. Multi-modality positions create a higher degree of job satisfaction and will help with staff recruitment and retention.
3. **Standardize hours of operation across Corrections to cover both early morning and late afternoon/early evening hours whenever and wherever possible.**

RATIONALE

- a. Standardizing hours will increase availability of imaging services to better coincide with clinical operations.
 - b. Improved coverage will provide more flexibility for scheduling and improve overall productivity.
4. **Create OT positions to cover clerical duties that are currently being performed by technologists.**

RATIONALE

- a. Technologists are spending an inordinate amount of their time, as much as 80%, performing clerical tasks that can be achieved by a subordinate employee.
 - b. Providing OT support will free up technologists to perform their primary role.
5. **It is critical that Corrections creates an Imaging Services organizational structure incorporating key imaging specific leadership. This structure would aid in developing a unified, standardized, and dynamic imaging service line. Good proactive leadership can assist in breaking down the silo operating model that currently exists.**

RATIONALE

- a. There is currently little correspondence or council available to the site operating level from the Corrections Headquarters in Sacramento.

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- b. Staff is independently making decisions without direction related to any operational standards, strategic direction, system goals or input for the best aggregate system-wide outcome.
 - c. The staffing models currently in place in Corrections imaging service line was clearly designed without any subject matter expertise in imaging operations.
 - d. Imaging personnel are poorly utilized. Staff does not cross-cover between adjacent facilities, share related services, collaborate on purchase agreements, or contract for relevant goods and services.
- 6. Develop a Corrections system-wide program that supports staff training and continuing education.**

RATIONALE

- a. An annual conference for imaging staff or, as a minimum, a webinar would create opportunities for imaging personnel to network with their peers throughout Corrections.
 - b. Annual participation in training will help to maintain standard processes as well as to serve as a vehicle for updates and feedback from operational and supervisory personnel.
 - c. Training is a critical component for implementing and maintaining new technology such as RIS and PACS.
- 7. Evaluate all work space as new technology and equipment are introduced. Identify space that will become available.**

RATIONALE

- a. PACS digital technology will eliminate hard copy film files. Existing film files could be moved off-site or to a centralized facility. Prior relevant films could be digitized and sent to the PACS where they become part of the permanent digital imaging file.
- b. Space that is currently being used for darkroom processing will become available with PACS and can be utilized for storage or other functions.

Findings

The general radiographic and fluoroscopic imaging equipment currently utilized throughout Corrections ranges from antediluvian to virtually brand new. At many of the sites, new radiographic equipment has been installed with digital Computed Radiography (CR) processing technology to support these units. The decision to install digital CR technology was a good first step, since this technology will integrate with the system-wide Picture Archiving and Communications System (PACS) when it is implemented.

The recent selection and subsequent installation of the new radiology equipment at many institution sites can only be categorized as incompetent and borderline dangerous. For the most part, the recently installed radiographic/fluoroscopic units pose several risk factors to both patient and radiological professionals. MSI has submitted a letter from the Office of Inspector General (OIG) dated, August 30, 2007 (see attached letter). This letter was issued to Corrections pertaining to the numerous issues related to these units. MSI concurs with many of the issues raised in this letter. Although the OIG's letter was generated from a formal complaint from a losing bidder for this book of business, it must be noted that MSI believes that the issues raised in the bid complaint constitute a much greater issue; whereas, safety for both staff and inmate-patient elevate the concern about the decision to deploy this type of equipment.

For example:

- ◆ The collimator on the tube head does not provide a visible readout of the exposure area.
- ◆ The x-ray emitting fluoroscopy unit is designed with the "Tube", or x-ray producing device above the table. This poses concerns about primary and secondary (Characteristic and Bremsstrahlung) radiation exposure to the physician or technologist assisting the patient at the table side.
- ◆ The system was built with remote controls operating tube and table movement from the control area to minimize staff exposure to radiation. This configuration and practice increase the hazard of a patient fall from the x-ray table.
- ◆ The new systems being deployed do not provide any edge barriers or concaved table structure to keep the patient from falling off of the table during procedures.
- ◆ Working remotely requires the staff to issue verbal commands for patient movement which are often misunderstood, ultimately hindering the quality and efficiency of the study.
- ◆ The structure of the x-ray table and fluoroscopic tower assembly is unstable, poorly designed and subject to rocking and tilting when a 200 pound body is placed on the table.
- ◆ The installation at CMF was poorly performed. The support for the unistrut infrastructure was found to be missing several wall anchor bolts. Some of the installed anchors are loose and beginning to tear away from the walls.

The recent selection and subsequent installation of the new radiology equipment at many institution sites can only be categorized as incompetent and borderline dangerous.

...equipment selection was completed with very little imaging professional involvement...

This purchase decision is a glaring example of the flawed procurement processes we noted in the summary section above. MSI discovered that this equipment selection was completed with very little imaging professional involvement and as such, does not meet the functional needs of the imaging staff. MSI is aware of instances at CMF and SVSP where the sites are experiencing extended downtime and service delays (up to 30+ days) related to this equipment. The service delays are so dire that CMF has been unable to use the device consistently since the original installation date.

The x-ray equipment at many of the sites visited is complemented and supported by FUJI™ Computed Radiography (CR) readers and cassettes. CR technology is used to produce digital images generated from an analog acquisition device. The decision to use digital CR technology at these sites is very good, as this technology is a fundamental stepping stone to the state-wide digital strategy and eventual implementation of a Radiology Information System (RIS) and Picture Archiving and Communications System (PACS). We must note here that the CR systems were installed with an inadequate version of software image manipulation tools required for quality control of image data. The software enabled on the CR devices falls below market standard for this technology. It is also important to note that the CR units deployed will not support digital mammography as stated in the original bid.

The following bullets represent our most significant findings:

- ◆ Initial progress has been made toward digital imaging with the purchase and deployment of CR equipment at several sites; however, the CR equipment deployed is not capable of supporting digital mammography (this requirement was part of the bid process).
- ◆ Decisions for imaging equipment purchases are not being made by knowledgeable staff.
- ◆ New radiographic/fluoroscopic equipment recently purchased does not meet industry standards for safety and efficiency.
- ◆ Equipment does not meet CFR Title 21 standard 1030.31-(2) (the system does not provide a read-out of radiation field size on the table/fluoroscopic tube).
- ◆ Equipment does not allow technologist access to the back side of the table for patient care.
- ◆ Table unit is unstable and may not support large patients.
- ◆ Poorly installed anchoring brackets with missing bolts could collapse during a seismic event.
- ◆ Overhead tube and ceiling support rails are from a different manufacturer. MSI discovered that the original tube support unit was pulled off the market for safety reasons.
- ◆ Remote fluoroscopic features are dated and not a standard feature used today.
- ◆ Remote controlled fluoroscopic equipment is not the preference of the majority of radiologists.

It is also important to note that the CR units deployed will not support digital mammography as stated in the original bid.

Equipment does not meet CFR Title 21 standard 1030.31-(2)

- ◆ Unit is much too large for the small imaging rooms that are typical throughout Corrections. The physical configuration of the various tube components could cause collisions and equipment damage.
- ◆ The CR units have been installed with minimal image manipulation features.
- ◆ Higher capacity units should have been installed in multi-room departments.
- ◆ Units are dropping most recent exams from hard drive rather than oldest exams.
- ◆ Units become slow when hard drive is full.
- ◆ The vendor has been slow to respond to service requests and has not addressed the above mentioned technical problems.
- ◆ The Picker equipment is obsolete, no longer supported by the original equipment manufacturer (OEM), and parts are no longer available.

Recommendations

1. **Immediately establish SME oversight of all pending and future imaging equipment purchases.**

RATIONALE

- a. A SME will apply industry standards, personal experience and medical imaging expertise to realistically assess the requirements based on functional expectations for each Corrections medical facility to ensure that the right equipment is purchased for the mission.
2. **Complete assessment of imaging equipment at all Corrections sites; determine what upgrades or replacements are necessary to achieve acceptable levels of performance, reliability and safety.**

RATIONALE

- a. A complete inventory and evaluation of age, condition and functionality of imaging equipment is essential for developing a useable capital equipment plan and digital strategy.
 - b. During the assessment, imaging personnel can be engaged in the decision process for selection of new equipment. This factor will begin to break down barriers and produce ownership.
 - c. Most sites have only one (1) radiographic unit which makes it imperative that the equipment is reliable.
3. **Upgrade or replace existing imaging equipment. (This includes the recently installed equipment.)**

RATIONALE

- a. Replacing old and obsolete equipment will improve reliability and up-time of imaging services.
- b. A project to replace out-dated imaging equipment has already begun, but has been put on hold until the MSI Enterprise Imaging Project is completed. Once this project is completed, the replacement project should move forward with SME oversight and guidance.
- c. The new equipment purchased for Corrections is substandard and does not meet the required bid specifications.

4. Purchase and deploy CT and Ultrasound equipment for system-wide deployment.

RATIONALE

- a. CT, Ultrasound and general radiology modalities are considered standard equipment for use in day to day imaging operations. These modalities are used regularly as part of basic diagnostics of routine and emergent medical conditions.
- b. Owning this equipment in-lieu of contracting for mobile services or transportation of the inmate patient off-site is far less expensive and greatly improves timely access.

5. Establish and apply equipment standards to existing equipment and to future purchases.

RATIONALE

- a. Standardized equipment provides many advantages and cost savings.

6. Corrections will need to explore whether the recently installed radiographic/fluoroscopic equipment can be returned as per OIG recommendation.

RATIONALE

- a. Safety and functional issues identified in the OIG and MSI reports need to be resolved. The ideal solution would be to return equipment and replace with equipment meeting standards of safety, functionality and serviceability.

7. Immediately upgrade and reconfigure recently installed FUJI™ CR units.

RATIONALE

- a. These systems are lacking various basic image manipulation software features that are required for technologists to produce quality radiographic images.
- b. CR units are generally configured to retain images for a limited amount of time. The units should follow the purge schema of “First on, First off”. The CR units currently deployed are configured to release the latest studies when the archive is full. This configuration must be reversed immediately until the CR unit is integrated to a PACS archive. The newest images need to be readily available in case reprints are required.

8. Replace low capacity single-plate CR readers with high capacity multi-plate readers at sites with multiple radiographic rooms.

RATIONALE

- a. Single-plate readers can only process one (1) imaging plate at a time. Sites with multiple rooms are experiencing workflow bottlenecks, because the CR reader cannot keep up with the volume.

Purchase and deploy CT and Ultrasound equipment for system-wide deployment.

9. Upgrade CR readers at the three (3) women's facilities to support mammography programs.

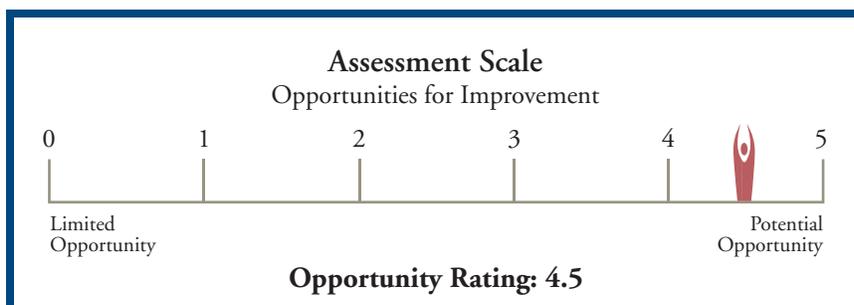
RATIONALE

- a. Upgrading CR readers will convert analog film based mammogram programs to digital format.
 - b. Analog acquisition mammogram x-ray equipment can be used with CR.
 - c. Films can still be printed using the existing digital printer until a PACS is implemented.
 - d. Darkrooms will be replaced with CR; this will eliminate the use of processing chemicals and processor maintenance.
 - e. General radiology can continue to use the upgraded CR units.
- 10. Negotiate and implement a system-wide service agreement for CR readers and digital printers.**

RATIONALE

- a. In order to ensure quality imaging exams, CR readers and digital printers must be maintained by competent service professionals.

Policies and Procedures



Medical imaging is a highly regulated and specialized service due to the inherent dangers of ionizing radiation. Both the Federal government and the California State government publish and enforce strict guidelines governing many of the operational activities of medical imaging. Corrections Policies and Procedures (P&P) should be drafted in a way that incorporates all relevant federal and state mandates as well as provide a level of governance to standardize operations directives not specifically delegated to regulatory controls. Departmental policies and procedures are drafted to uniquely address specific issues or requirements for each individual site to ensure safe and effective services. The guiding principles of a well written policy and procedure manual instruct employees on the requirements for patient care delivery and medical records management. It is desirable to standardize policies and procedures as much as possible when applying them across an enterprise environment.

Policies and procedure manuals act as a quick reference for staff and management should questions arise pertaining to regulatory requirements. Non-compliance with Federal and State regulations may not only place patients and operators at risk, but can also lead to fines and forced closure of services.

Findings

Radiological Services Policy and Procedure manuals varied widely among the eighteen (18) sites visited. Seven (7) facilities have a Policy and Procedure manual based mostly on Corrections Operations Manual, (Article 6 – Radiology Services dated June 16, 1995). Various modifications to Corrections Operations Manual incorporate very rudimentary documents prescribing directives pertaining to local operational conditions. Four (4) facilities have locally developed Policies and Procedures. Four (4) do not operate under any

Radiological Services Policy and Procedure manuals varied widely among the eighteen (18) sites visited.

codified Policy and Procedures and three (3) sites stated they have policies and procedures but were unable to locate them during our site visit.

The facilities where MSI was successful in securing even a basic rendition of a policy and procedure manual could not produce a guidebook that was remotely comprehensive enough for a newly hired staff member to understand either the scope of work or operational requirements of their required position. Well drafted policies and procedures are critical to Corrections because of the tremendous amount of manual steps and clerical duties. Technologists spend 50% to 80% of their time performing non-imaging tasks. These tasks more closely resemble a jumble of work around activities thrown together to mitigate the impact of the absence of codified guidelines for clerical operational duties such as: exam scheduling, registration, film file management, procedure tracking, results reporting or volume and productivity monitoring.

The following bullets represent our most significant findings:

- ◆ Job descriptions are not available at all sites and should be updated [scope of work documents found on-line are dated and do not accurately reflect the duties required of the positions].
- ◆ There are very few policies or guidelines covering day-to-day operations.
- ◆ Film files are not being maintained adequately. Some sites do not have 7 years of files, and most sites do not have a workable tracking system for file transfers for loans or tacking of prior exams. None of the sites have a Radiology Information System (RIS).
- ◆ Patient registration systems are developed at individual sites and are not standardized. Most facilities do not have a system other than IMSATS.
- ◆ Original exams, instead of copies, are being sent out for referrals and subpoenas. The department is ultimately responsible for the stewardship of original studies and must account for location of all loaned studies. A system of check-out and check-in must be in place and up-to-date at all times.
- ◆ Volume and patient exam tracking mechanisms are rudimentary and unreliable.
- ◆ Both scheduled and emergent referrals are tracked by departments other than imaging.
- ◆ There is an extensive amount of paperwork that the technology staff must complete because of a lack of information systems technology
- ◆ Less than half of the imaging departments have any policies and procedures. A few facilities have procedure guidelines that were developed by local staff, but they are far from comprehensive and/or standardized.
- ◆ There is no evidence of budget accountability at the operational level.

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Film files are not being maintained adequately.

There is no evidence of budget accountability at the operational level.

Recommendations

1. Update job descriptions to include appropriate Federal and State regulatory requirements as well as Corrections Policies and Procedures.

RATIONALE

- a. Job Descriptions must be comprehensive enough to cover specific required job elements as well as position roles and responsibilities.
- b. SOW should be updated to incorporate workflow changes brought about by the introduction of new technology.
- c. Every employee should have a copy of a job description that accurately outlines departmental expectations for performance and the tasks associated with day to day operations. They should also provide specific work guidelines and general orientation to governing policies and procedures.

2. Develop specific guidelines for accomplishing operational workflow.

RATIONALE

- a. Guidelines and step-by-step workflow documents will provide a reference resource for imaging personnel.
- b. Workflow guidelines will ensure consistent adherence to standardized processes across the Corrections system.
- c. Comprehensive workflow guidelines will assist with the orientation and training of new and contract personnel.

3. Develop and implement a standardized policy for maintaining imaging file archives prior to the introduction of RIS and PACS. The content of this policy must include a workable tracking system for current and previous exam files, a process for exam transfers/loans and a functional exam location methodology to find previous exam folders.

RATIONALE

- a. Standardized clerical and operational processes must be in place prior to installing a RIS and PACS. The RIS will not fix poor work processes. In most cases, adding technology will exacerbate an already bad situation. Consider the old adage of garbage-in, garbage-out. The current processes must be addressed before introducing changes utilizing new technology.

Workflow guidelines will ensure consistent adherence to standardized processes across the Corrections system.

Standardized clerical and operational processes must be in place prior to installing a RIS and PACS.

4. **The practice of loaning original film must stop. Each facility must have a mechanism to produce copies of films for loaning to entities other than Corrections facilities. Films that are loaned or transferred within Corrections must be accounted for at both the sending and receiving facilities.**

RATIONALE

- a. The organization that performs an imaging exam has custodial responsibility for the original exam for seven (7) years. This responsibility includes maintaining an original record, ensuring that the exams are protected and in original condition and being able to retrieve the exam when required.
 - b. The best way to prevent losing imaging records is to have a good system for archiving and to send copies, not originals, to requesting providers or facilities.
5. **Develop workflow processes to log and report all in-house, mobile or referred imaging exams. Imaging services should own this process.**

RATIONALE

- a. Imaging personnel should be considered the decisive reference point to determine the referring clinician's orders.
 - b. Institution schedulers, utilization managers, and contract analysts that oversee contracted mobile services fail to appropriately utilize the proper imaging personnel.
6. **Deploy a RIS as early as possible to reduce the large volume of clerical functions that are being performed by technologists and OTs.**

RATIONALE

- a. A RIS is designed to electronically track all steps of the imaging workflow process, thereby improving staff efficiency by eliminating manual tasks.
- b. A RIS will eliminate lost requests that are caused by the multiple hand-offs with the current manual process.
- c. The scheduling component will eliminate the current inefficient practice of scheduling all exams for a single time slot, then calling Custody Officers for transfers throughout the day. This practice requires additional coordination with custody staff and can leave large gaps between exams.
- d. A RIS will eliminate the current practice of redundant entries into IMSATS.
- e. A RIS is a prerequisite to installing a PACS.



Rewrite new standardized policies and procedures to incorporate all elements of Corrections directives and imaging operations.

7. Rewrite new standardized policies and procedures to incorporate all elements of Corrections directives and imaging operations.

RATIONALE

- a. Standardized policies and procedures will provide guidelines for unifying all imaging services across Corrections.
- b. Having a system-wide unified imaging service will make it much easier to manage change that comes with the implementation of new processes and systems.
- c. Standardized P&P's, operational guidelines and workflow processes are all critical to successful implementation of RIS and PACS.

8. Each lead technologist should have budget input and should be accountable for meeting budget expectations.

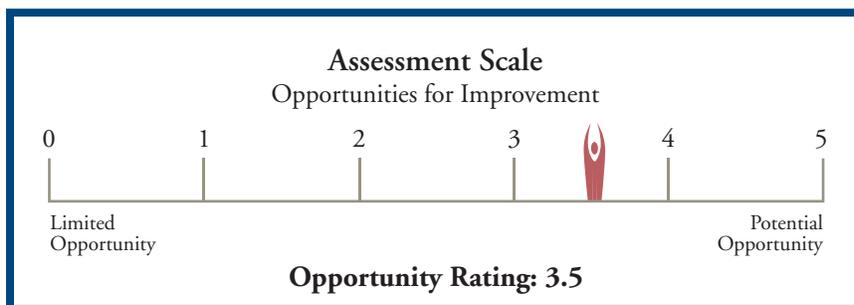
RATIONALE

- a. Not having input and ownership of an operating budget creates an environment without accountability for salaries, supplies and other costs.

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Leadership



Effectively managing several imaging sites is always challenging. Managing thirty-three (33) sites broadly dispersed across California is a monumental challenge. To effect change and compliance, leadership must be able to foster a culture of collaboration related to all functions within the imaging service line and extend their efforts in an intradepartmental effort to break down barriers and overcome obstacles between departments that ultimately share in the delivery of patient care. Leadership must be able to understand and articulate the advantages of new applications in imaging and embrace new technology in order to lead any necessary change efforts. Leadership must also possess extensive industry knowledge in order to develop and support standardization of processes across the system. Without effective leadership to ensure processes are standardized and operating efficiently, there is little hope for the long term survival of any technological solutions designed to limit the number of manual processes and create a truly integrated practice throughout Corrections.

Findings

Diagnostic Imaging Services is without specified leadership or expertise to understand the barriers to recovery, create strategic decisions, develop standards, unify the points of contact or provide performance feedback to enhance the imaging service line. Leadership of medical imaging is confined almost exclusively to the local level. Each facility operates as an independent entity with no guidance or coordination other than that provided by local medical and administrative managers who admit to not understanding the operations of diagnostic imaging. There is no organizational structure that provides technical, operational and professional oversight of medical imaging services across the thirty-three (33) Corrections' facilities. In addition, contracted radiologists who should be providing professional oversight and leadership of imaging services as part of the professional service contract, do

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The radiology services division within Corrections is myopic and dysfunctional to the point of paralysis.

not engage in this effort. The radiology services division within Corrections is myopic and dysfunctional to the point of paralysis.

It is apparent that there is no central leadership providing guidance and support to imaging services at the eighteen (18) sites visited. MSI could not find any established standards for operational processes, staffing ratios, performance expectations, equipment selection and budget management. In a multi-site system such as Corrections, the ability to measure performance outcomes or developing metrics for baseline valuation is impossible. MSI inquired on multiple occasions if staff clearly understood how, where and whom to address issues and/or ideas. The overwhelming response was one of uncertainty. Staff has nowhere to go with suggestions for improving processes. During our visits, various staff articulated constructive ideas for improvement as though they saw our team as the window to change. The staff is hungry for improvement and need only a path to follow and a leadership team to help guide their efforts

Leadership has also failed to negotiate favorable purchasing agreements for supplies and services. Corrections is paying extremely high prices for imaging supplies by purchasing through local distributors rather than negotiating system-wide contracts as a consortium or through a Group Purchasing Organization (GPO). As an example, one site buys CT contrast from a local distributor for \$140.00 per 150 ml bottle. In comparison a large healthcare system in northern California pays \$26.70 and another medium size system in central California pays \$28.81 for the same 150 ml bottle of contrast. Corrections should be utilizing the size of its purchasing power to negotiate similar buying agreements.

The following bullets represent our most significant findings:

- ◆ Subject matter expertise and industry knowledgeable oversight and leadership of imaging services do not exist.
- ◆ Contracted radiologists do not provide local professional oversight or leadership.
- ◆ Imaging staff do not feel they have input into equipment and supply contracting decisions.
- ◆ Staff has no one in an operational leadership position to consult with regarding problems that effect operations.
- ◆ Staff is unfamiliar with the organizational structure outside of their facility.
- ◆ There is no Corrections sponsored annual Medical Imaging Conference for staff to update, network, discuss common issues, collaborate, earn CEU's and collaborate directly with leadership.
- ◆ There is little standardization of processes, supplies, operations and staffing.
- ◆ There are no group purchasing agreements for imaging supplies.
 - ✦ Corrections is paying \$140.00 for a bottle of CT contrast that costs two (2) other healthcare systems \$28.81 and \$26.80.

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...one site buys CT contrast from a local distributor for \$140.00 per 150 ml bottle. In comparison a large healthcare system in northern California pays \$26.70 and another medium size system in central California pays \$28.81 for the same 150 ml bottle of contrast.

Recommendations

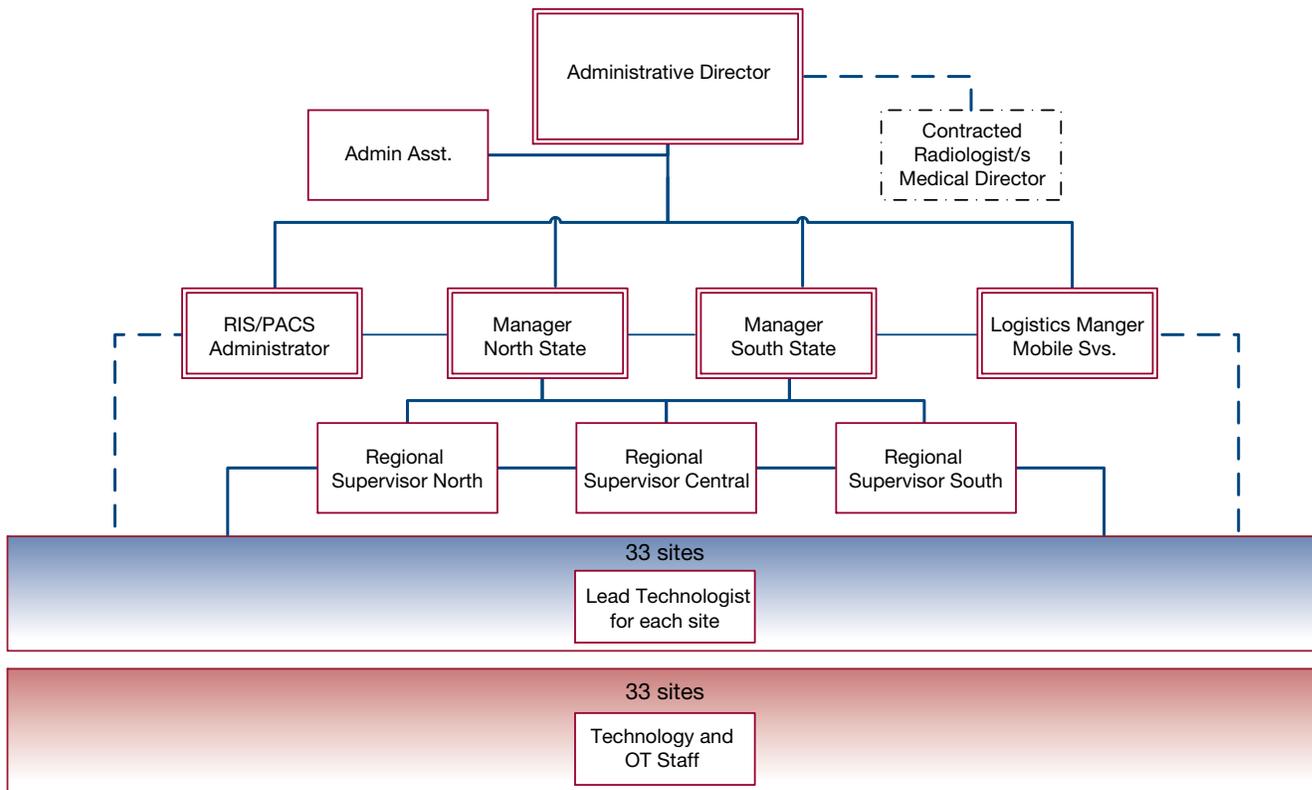
1. Create an organizational structure that provides effective leadership, direction and oversight of all imaging services within Corrections. At the top of this structure there must be a knowledgeable and skilled medical imaging professional with experience and capabilities to lead and direct all Corrections imaging services. There should also be additional support personnel to provide administrative assistance, oversight/support of RIS and PACS and oversight/support of mobile services and professional contracting. In addition to a centralized leadership structure, it is highly desirable to provide positions at a regional level for assisting with coordination and training associated with the introductions of new technology and workflow processes. To accomplish this, a working lead position in the south, central and northern regions could be expanded to include regional coordination duties.

RATIONALE

- a. Effective leadership is critical to fixing the chronic problems that currently exist throughout Corrections imaging services.
- b. A professional imaging service Administrative Director will have the knowledge and experience to unite personnel and standardize operations across Corrections.
- c. A Director with subject matter expertise will be able to correctly assess operational requirements and take appropriate action.
- d. It is necessary to provide leadership of RIS/PACS, mobile services and professional contracting to effectively manage these complex functions.
 - ❖ A RIS/PACS Administrator would provide specific expertise to correctly implement and maintain this technology.
 - ❖ Establishing and operate a Corrections owned mobile service will require an experienced, knowledgeable manager to ensure seamless cost effective operations.
 - ❖ Negotiating and monitoring imaging professional contacts will be an important function to ensure appropriate service levels and cost savings.
- e. An organization chart designed to meet Corrections and State requirements should be developed. The positions for this chart (Corrections titles to be determined) are as follows:

At the top of this structure there must be a knowledgeable and skilled medical imaging professional with experience and capabilities to lead and direct all Corrections imaging services.

Proposed Corrections DCHS Imaging Organizational Chart 6/29/2008



2. Revise contracts for Radiologists to include a requirement to provide medical professional leadership to Corrections imaging services. These professional services should include Radiation Safety Officer (RSO) duties, providing protocols for all imaging exams, monitoring appropriateness and quality of imaging exams, evaluating technical competencies of imaging technologists and overseeing all QA and QC programs.

RATIONALE

- a. Radiologists are the imaging experts who provide professional leadership to ensure quality, safety and appropriateness of imaging services that operate under their oversight.
- b. A radiologist is the most qualified person to evaluate technical competencies of technologists.

3. Create a process to obtain staff input into equipment selection prior to new purchasing decisions

RATIONALE

- a. Staff input is beneficial to the equipment selection process. Operational level staff members are most familiar with their local environment and can point out problems or limitations. Staff input can prevent purchasing equipment that does not meet the requirements of each facility.
 - b. When staff members feel they have a say in the decision making process, they are more likely to support the final decision, even if it is not exactly what they wanted.
 - c. Obtaining input from staff on a project creates an opportunity to seek commitment and support. It is easier to achieve success with projects when staff is engaged from the beginning, rather than having to drive compliance after the project is completed.
- 4. Educate staff on new organization structure and how everyone fits into it. Imaging personnel will need to understand their responsibilities along with the benefits to them and the organization. We recommend that Corrections sponsor the first annual Corrections Imaging Services Conference prior to implementing the new organization structure. This will offer imaging personnel an opportunity to be briefed on the strategic plan and hear directly from senior leadership.**

RATIONALE

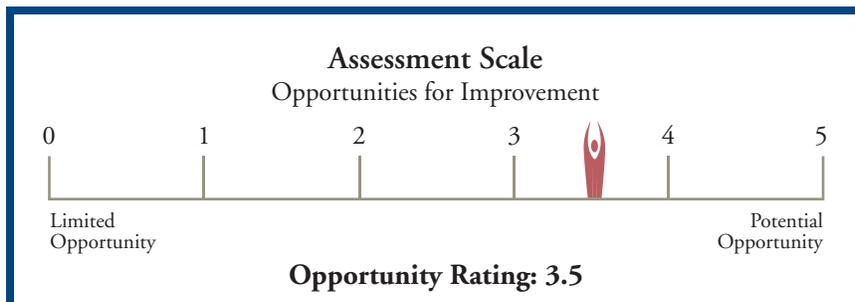
- a. Corrections leadership must engage imaging personnel to let them know who they will be working for and what is expected of them.
 - b. Bringing staff together and keeping them informed will help engage personnel in the change process.
 - c. Participating in an annual imaging conference will go a long way in elevating the professionalism of Corrections imaging services.
 - d. Education and training is essential to maintaining continuity of services and adherence to standards across the system.
- 5. Corrections leadership must standardize all systems, operational processes, staffing models, supplies, contracts and scope of services throughout the system.**

RATIONALE

- a. Standardization is the key to developing and maintaining an efficient and effective imaging service that supports thirty-three (33) prisons.
- b. Standardizing processes is a prerequisite to implementing system-wide RIS/PACS.
- c. Standardization will break down the silo culture that is endemic to Corrections.

It is easier to achieve success with projects when staff is engaged from the beginning, rather than having to drive compliance after the project is completed.

Regulatory Requirements



Compliance with Federal, State and Corrections regulations is fundamental to providing safe and effective medical imaging services to inmate-patients. Corrections medical facilities utilize CCR Title 17, CFR Title 21, and California Department of Corrections and Rehabilitation Operations Manual as the principle directives for managing medical imaging operations. Complying with these directives ensures operations that meet safety, quality and operational standards for staff and inmates/patients. These directives also provide requirements for retention of imaging exams and exam results.

Corrections Diagnostic Imaging Services is not meeting many of the Federal and State regulatory requirements.

Findings

Corrections Diagnostic Imaging Services is not meeting many of the Federal and State regulatory requirements. We found several sites that did not have current annual radiation safety inspections. Contracted radiology groups are not performing Radiation Safety Officer (RSO) duties as stated in the contracts. A primary responsibility of the RSO is to ensure that annual radiation safety inspections are completed. Not having regular radiation safety inspections puts patients and operators at risk for higher radiation exposure.

In addition, there are no consistent processes for regularly monitoring radiation safety at each facility – another responsibility of the RSO. At many of the sites visited, radiation exposure badge programs were not managed correctly. Very few of the sites were providing current and lifetime exposure readings to the staff being monitored. There was also confusion as to who should manage the badge program; at some sites it was dental and other sites it was radiology. Radiologists are the experts and should be involved in all radiation safety programs.

For each institution, the RSO should perform the following duties:

- ◆ Ensure that all authorized users wear film badges or Thermo Luminescent Dosimetry (TLD's)
- ◆ Review all personnel monitoring reports.

- ✧ Alert the radiation worker if there is a high or unusual exposure.
- ✧ Notify the Radiation Control Agency personnel as required if there is a high or unusual exposure.
- ✧ Investigate all unusual exposures.
- ✧ Take corrective action to prevent other high or unusual exposures.
- ◆ Serve as a point of contact between the radiation worker and management.
- ◆ Ensure that the terms and conditions of the license are met.

Another area of concern is the total lack of quality assurance (QA) programs. Though QA programs are not required by regulation other than for mammography programs, they are recommended by the Joint Commission and the Department of Health Services. Currently there is no program that involves radiologists and imaging staff in monitoring and ensuring quality and appropriateness of Corrections imaging services. Utilizing subject matter specialists for oversight of in-house, mobile and referred imaging services is essential to a quality imaging program. Other entities, such as scheduling and utilization management, are not qualified to judge the quality of imaging services.

Medical imaging records (film, reports and digital images) are not being retained for the required seven (7) years. Individual exams are not being consolidated in a master jacket along with exam reports. There is no standard process for registering patients or methodology for locating prior exams. Some sites have developed Excel programs for registration and film tracking. Other sites use log books which are very ineffective unless staff know the dates of prior exams. At several sites, we found films being stacked and not filed, film files in disarray and at one site films stored in a Conex box where high heat totally destroyed them. Another problem we found with accountability for imaging records is the practice of loaning out original films. Imaging personnel stated that getting films back was a problem. Not being able to locate and provide appropriate diagnostic imaging exams is a serious problem throughout Corrections. Lost records cause exams to be repeated, exams not being available for comparison, delays in diagnosis and treatment, and increased risk of litigation.

The following bullets represent our most significant findings:

- ◆ All technologists are licensed and CPR certified.
- ◆ Several sites are not complying with annual radiation safety inspections.
- ◆ Contracted radiologists are not performing radiation safety officer (RSO) duties.
- ◆ There is good compliance with custodial safety training.
- ◆ There is no evidence of quality assurance or quality control programs other than at the two (2) certified mammography programs and one other facility.
- ◆ Not all facilities are retaining record/film files for seven years following an inmate's death, discharge, parole or interstate transfer.

Another area of concern is the total lack of quality assurance (QA) programs.

At several sites, we found films being stacked and not filed, film files in disarray and at one site films stored in a Conex box where high heat totally destroyed them.

- ◆ Many sites are not able to locate all medical imaging films to be forwarded to the receiving facility when an inmate is transferred.
- ◆ There are no card files for accessing prior exams, no master jackets and no effective information systems for tracking prior exams.
- ◆ There is frequent use of log books which are ineffective for referencing prior visits.
- ◆ Many sites are loaning original films and are not following up when the films are not returned.

Recommendations

1. **Enforce contract requirements for Radiologists to perform as Radiation Safety Officers for Corrections medical facilities. As RSO they must ensure that annual safety inspections are completed on all imaging equipment.**

RATIONALE

- a. Radiologists are the imaging experts who provide professional oversight of radiation safety programs.
 - b. Radiologists are in the best position to monitor radiation dose to patients and safe practices of imaging staff.
2. **Develop standardized Quality Assurance (QA) and Quality Control (QC) programs and implement system-wide. These programs should encompass all in-house imaging, mobile imaging and contracted imaging services. Professional oversight of QA processes should be included in all professional service contracts for radiologists. Ultimate oversight and accountability should come from a knowledgeable medical imaging professional that is accountable to Corrections.**

RATIONALE

- a. Radiologists and imaging staff should be directly involved in oversight of all medical imaging services.
 - b. Radiologists are an essential part of any medical imaging QA program.
 - c. Technical imaging staff should be responsible for maintaining an effective QA program for all in-house imaging services, and they should ensure that all mobile services are regularly providing QA process results.
3. **Implement immediate corrective action requiring all sites to retain imaging exams for a minimum of seven (7) years.**

RATIONALE

- a. Medical imaging exams are required by regulations to be maintained in original condition for a minimum of seven (7) years.

4. **Implement a standardized process for registering patients/exams, for the use of “Master” jackets and for documentation of file locations, so that records can be located and retrieved when needed.**

RATIONALE

- a. The current common practice of filing each exam separately, rather than in a master jacket, creates more likelihood of misfiled exams.
 - b. There is no standardized record keeping guidelines for staff to follow.
 - c. Imaging personnel work in a silo environment without standards and guidelines. Few sites have set up effective processes for managing imaging records; most have taken short cuts and are not doing an acceptable job of records management.
 - d. Correct documentation and file management is fundamental to meeting the medical and legal requirements of providing imaging services.
5. **Manual log books should be replaced by a more efficient system as soon as possible.**

RATIONALE

- a. Log books are virtually worthless for locating prior exams that were done weeks, months or years ago. Personnel will not take the time to go back through log books.
6. **Implement a system for loaning copies of imaging exams, rather than sending original studies.**

RATIONALE

- a. All imaging services are required to furnish prior original exams when needed for medical or legal reasons. Loaning original films increases the risk of losing original exams.
- b. The failure to retrieve referred and loaned films was a common theme throughout the sites visited.
- c. There is little motivation or means to enforce the return of films from outside facilities.

Background

This section focuses on the existing dental and medical imaging technology that is currently utilized within the California Department of Corrections and Rehabilitation (Corrections). MSI toured 18 institutions to analyze the numerous radiology components that frame the structure of delivery and utilization for the referring physicians, technologists, institution personnel and Corrections inmate-patients. These components are either physically located within a facility structure or are delivered on-site through a professional service agreement. During this tour, we discovered that each institution revealed their own unique challenges with regard to the delivery of health care services. Many of the challenges were the product of factors such as: geographic location, access to outside health care services, space constraints within existing medical areas, gender-based nuances for care, and inmate classification. A majority of these challenges are fixed and offer limited opportunity for conversion without reclassifying existing operations. The application of a well planned and efficiently executed deployment strategy of market available technology would work very effectively to mitigate the stranglehold that these challenges have on the delivery of timely healthcare.

MSI conducted our technology assessment with knowledge of the Receiver's current activities toward improving Correction's network infrastructure. It must be noted that many of the technological deficiencies suffered by Corrections result from a combination of insufficient clinical and information systems applications. In order for Corrections to achieve the benefit of any advanced clinical application, a network infrastructure that is capable of handling the applications overhead (dataset traffic) is of critical importance. Therefore, MSI will report on the current status of technology without prejudice toward the ongoing efforts. Our report will be pure in respect to the current operational structure and the existing technology which is devoid of a proper network infrastructure.

Our data collection and assessment focused on key technological components which include the status of Corrections current network infrastructure, information systems, contracted mobile technologies, DICOM readiness, and dental technologies.

The application of a well planned and efficiently executed deployment strategy of market available technology would work very effectively to mitigate the stranglehold that these challenges have on the delivery of timely healthcare.

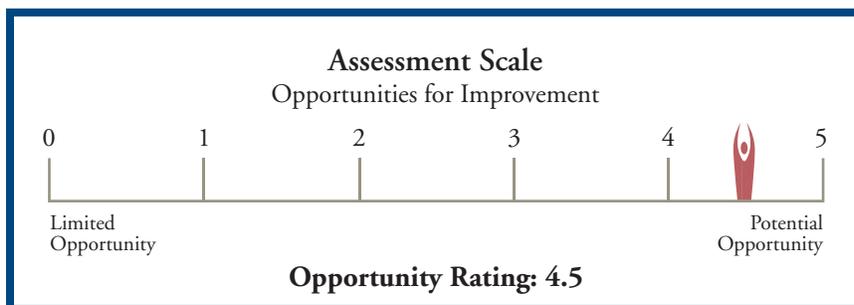
Documents Reviewed

- ◆ Equipment manuals
- ◆ Manufacturer specifications
- ◆ DICOM conformance statements
- ◆ Vendor equipment specifications
- ◆ Physicists' reports
- ◆ Service personnel reports
- ◆ Vendor contracts
- ◆ Corrections staff/administration communication documents
- ◆ IMSATS schedules and tracking print-outs
- ◆ OBIS transfer lists
- ◆ MPIMS schedules, orders, and tracking print-outs
- ◆ Procedure log books
- ◆ Film check-out log books
- ◆ Standard corrections medical forms
- ◆ Facility-specific medical forms
- ◆ Perez design build documents
- ◆ Plan Meca System Configuration Documents
- ◆ Corrections Plan Meca purchase order
- ◆ Dental vendor equipment specifications

Staff Interviewed

- ◆ Chief Medical Officers
- ◆ Correctional Health Services Administrators (CHSA)
- ◆ Senior Technologists
- ◆ Office Technicians (OT)
- ◆ Nursing Directors
- ◆ Custody Officers (CO)
- ◆ Information Technology (IT) Staff (where available)
- ◆ Contracted Technologists
- ◆ Administrators of contracted services
- ◆ Utilization Nurses
- ◆ Contract Analysts
- ◆ Michael Barks, DDS
- ◆ Alex Puig, DDS
- ◆ Multiple site Dentists and CDO's
- ◆ Michelle Bottino (Plan Meca)

Network Infrastructure



A substantial network infrastructure which is capable of handling large imaging data sets is a vital component to a successful diagnostic imaging department that is outfitted with digital technology. Speed is important, in that it is common for an imaging department to transfer file packets that range up to 50 Gigabits (GB) of clinical data per hour and image latency caused by collisions of data packets because of an insufficient network can interrupt transfer of clinically important data. The fact that imaging utilizes significant network availability impacts the available bandwidth for the remainder of the enterprise network and can create such overhead that general business and added clinical applications required by other departments can be significantly impacted. Any disruption or limitation to such a network fundamentally impacts the final delivery of diagnostic services.

Corrections has begun the implementation of rudimentary digital imaging technology by purchasing and installing Computed Radiography (CR) in half of the facilities. CR technology allows the departments to continue use of existing analog x-ray devices and converts the analog acquisition to a digital output. The purchase and deployment of this type of equipment is typically a precursor to the implementation of a Picture Archiving and Communications System (PACS) and adds to the eventual establishment of a Digital Imaging and Communication in Medicine (DICOM) standard language format for archiving and presentation of medical imaging data. Successful implementation of the described CR and other digital devices is dependent upon a functional network infrastructure with a Local Area Network (LAN) as well as a Wide Area Network (WAN) configured to a distributed or centralized set of databases and archive servers enabling enterprise-wide communications. Without a well designed network, the newly purchased CR equipment becomes nothing more than a stand alone device lacking interoperability and ultimately diminishes the operational efficiency gains requisite of this type of technology. There must be a logical and

There must be a logical and phased approach for successfully implementing digital imaging devices onto a robust network infrastructure if the inherent value of this type of technology is to be fully realized.

phased approach for successfully implementing digital imaging devices onto a robust network infrastructure if the inherent value of this type of technology is to be fully realized.

MSI is aware of the ongoing efforts of the Receiver's office to implement a WAN and LAN capable of handling both the clinical and custody needs of Corrections.

Findings

The network infrastructure within Corrections is simply not capable of handling a digital imaging environment. The new CR equipment that typically functions on established networks was installed with a point-to-point hard-wired configuration, therefore diminishing any of the advantages of performing in concert with a switched Ethernet. The current CR configuration does not provide for any level of interoperability of peripheral networked devices such as archives, printers or PC's used to provide the exchange of imaging data to other service areas. An incidentally finding is that the data cables used to link the CR units to the laser film printers were exposed and found to be a tripping hazard for staff and inmates.

It is possible to provide some interoperability for imaging studies by using low bandwidth public transfer capabilities such as Digital Subscriber Line (DSL); however, the majority of facilities can not even provide a simple DSL connection. Imaging staff that are assigned a Corrections email account oftentimes do not have available internet access due to a limited number of computers within the facility. This factor leads us to believe that any effort to evolve into a digital environment will need to include the purchase and liberal distribution of PC's that can be used for multiple applications including the imaging software application. We found that internet access points were mainly centralized around the administrative departments and created a congested point for access to a business application as simple as email. It is a sad commentary that many of the departments offered limited phone access for the technology staff. Existing phone lines were very limited and did not provide adequate phone access within the inmate care areas in the event of an emergency. Almost all imaging departments functioned without a dedicated FAX machine.

In our discovery, we visualized equipment at one site that was utilizing a T1 connection to digitize and transmit imaged film for off-site interpretation. A T1 link is digital and is capable of transmitting voice and data with 1.544 Mega bytes per second (Mbps) of available bandwidth. Although this bandwidth configuration is not optimal for the future implementation of PACS, it is currently adequate for the requirements of transmitting small data sets of images for off-site interpretations. The manifestation of multiple ad-hoc network configurations found throughout Corrections illustrates a variety of discrepancies and little or no standardization. Each facility functions independently and demonstrates a complete lack of uniformity or network design strategy to support the healthcare mission. A Corrections implementation of WAN and LAN would standardize such environments and eliminate this complexity and unnecessary expenses that are currently incurred by each facility that are attempting to establish customized network links for their interim needs.

The network infrastructure within Corrections is simply not capable of handling a digital imaging environment.

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Existing phone lines were very limited and did not provide adequate phone access within the inmate care areas in the event of an emergency.

Of the Corrections facilities that MSI toured, a majority had updated architecture. However, as mentioned in the earlier sections, standardization is lacking in regards to existing building structures. Older institutions pose considerable challenges in the future installation of Unshielded Twisted Pair (UTP) CAT 6 cable, which is the industry standard for any LAN. The age and difficulty of the building architecture essentially limits access points for future LAN drops to the specific network devices. Additional planning is necessary to ensure that the planned network infrastructure utilizing UTP Ethernet cables are brought into the departments and made available by location to the proper imaging equipment.

Whatever infrastructure is deployed, it became evident in our discovery, that dedicated IT support staff will be necessary once the CDCR transitions to an advanced network configuration. During our visits, we experienced numerous complaints on the lack of services that are provided by the local IT department. The following bullets represent our most significant findings:

- ◆ No existing network infrastructure, WAN, LAN, WWAN, or WLAN.
- ◆ No immediate phone access in the inmate care areas posing multiple risks to staff and inmates in case of emergencies.
- ◆ Newly installed CR equipment was installed with a hard-wired configuration, therefore providing for no interoperability by linking other devices within the imaging department.
- ◆ CR data cables were found to be tripping hazards for staff and inmates.
- ◆ The majority of imaging departments did not have basic internet access for educational research purposes. Imaging staff with assigned Corrections' emails had to access the internet in specific administrative buildings.
- ◆ Majority of imaging departments did not have a dedicated FAX machine.
- ◆ Older building architecture poses multiple challenges around future implementations of UTP CAT 6 cabling, essential for LAN distribution to imaging devices.
- ◆ Imaging staff and administration expressed multiple complaints toward existing Corrections IT staff regarding requests for services and relative response times.

Recommendations

1. **Implement a statewide WAN capable of handling uncompressed, native DICOM data, required for diagnostic interpretive review. This network should be composed of a fiber-optic connection capable of transmitting 1.2 gigabits per second (Gig man).**

RATIONALE

- a. A WAN is the foundation for future implementations of enterprise information systems, PACS and further integration with digital applications.
- b. It is critical to the future design of imaging dataflow to allow for a centralized reading vault for radiologists.

Older institutions pose considerable challenges in the future installation of Unshielded Twisted Pair (UTP) CAT 6 cable, which is the industry standard for any LAN.

- c. A WAN will streamline imaging data transfer among the thirty-three (33) facilities, enabling communication and simultaneous review of inmates' images by a variety of clinicians and radiologists.
- d. It will allow for the appropriate design of a centralized data repository with secondary disaster recovery.

2. Implement a LAN within every Corrections facility connecting to the statewide WAN via an Ethernet switch. Each acquisition device should be connected to LAN via a minimum UTP CAT 5E cabling capable of transmitting up to 100 Mbps of imaging data from the device to the Ethernet switch.

RATIONALE

- a. A LAN will allow for interoperability of digital imaging equipment with information systems and peripheral devices within the local Corrections' facilities.
- b. Each acquisition device acquires and transmits native DICOM images typically ranging anywhere from 6Mb to 60Mb of space per image. Furthermore, imaging procedures range anywhere from 1 image (1 view CXR) to 1000/2000 images (CT angiogram) per study. It is vital that LAN permits frequent large data set transfers in order to transmit imaging data to the statewide WAN.
- c. A LAN is the bridge that connects local acquisition devices and supporting technology with the statewide WAN.

3. Implement a Virtual LAN (VLAN) for all diagnostic imaging devices.

RATIONALE

- a. A VLAN separates all imaging devices capable of transferring large data sets and isolates them from other devices, technologies and software applications sitting on the same LAN. The VLAN architecture maintains an efficient dataflow from the acquisition devices and doesn't disrupt the operations of other departments utilizing low-frequency devices and less intrusive software applications.

4. Install additional voice lines and FAX machines in the imaging departments for interim and on-going requirements.

RATIONALE

- a. The aggregate imaging workflow is dependent on the receipt and delivery of documentation. Most of these common documents are dictated reports that are faxed to the Corrections medical record departments or medical administration. Imaging staff spend a great percentage of their day hand receiving and delivering reports.

patient visits and procedure information. These systems do not support the electronic archival of procedural outcome report information and act solely as a rudimentary tracking system. Unfortunately, the systems used are an unreliable source of PHI data. Within the imaging services, prior records were misplaced or entered into incorrect areas within the application. Inmates' relevant prior studies, that are required for correlation during medical diagnosis, were discovered to be irretrievable from such systems.

Corrections' utilizes a state-wide scheduling and tracking system to coordinate the transfer of inmates throughout the patient care continuum. Other systems within Corrections, namely the Inmate Medical Scheduling and Tracking System (IMSATS), Offender Base Information System (OBIS), and Madrid Patient Information Management System (MPIMS) have also been adopted by imaging services as a fall back position for tracking inmate-patients. None of the above systems were found to be HL7-compliant and therefore would not be capable of simple integration and interface with any imaging specific information system and PACS.

The most common system utilized by the imaging staff for scheduling was IMSATS. The IMSATS system is of little benefit to the imaging departments because of its redundant data entry, lack of standardization from facility to facility, and complete lack of integration with other technology. In fact, this system drastically increased the technologist's clerical duties--limiting their available time for clinical tasks. Of the systems listed in the preceding paragraph, OBIS was the one system that offered a single point of access to the entire Corrections inmate population. This particular function has multiple benefits to the imaging staff during the course of their duties. Imaging staff can access the OBIS database to crosscheck on whether the inmates' demographic information is correct. However, the OBIS system is not available as a standard application to each imaging department and had minimal clinical benefits, as it mainly designed for custodial needs. Corrections imaging staff consistently found duplicate inmate identification numbers in addition to incorrect inmate information. After reviewing the frequency of such discrepancies, the referencing process for inmate CDC identification numbers and demographic information via OBIS was determined to be unreliable.

The Madrid system implemented and utilized at PBSP offered few automated functions to the imaging staff for scheduling and tracking. This system was capable of scheduling and delivering a request for imaging services from one department to another. The system was also capable of tracking and retaining procedural information entered by the staff. At first glance, this system resembled a very rudimentary Radiology Information System giving hope that perhaps it could be developed to incorporate other features required by imaging services; however, as result of additional exposure to the application, MSI concluded that this system resembled nothing more than an alternative version of the above mentioned IMSATS. MPIMS also revealed multiple HIPAA risk factors such as: general staff full access to the inmate-patient orders and medical record with full read/write/delete capabilities. In addition, MPIMS lacked a reliable order entry process. Imaging requests are consistently misplaced adding to extended delays for imaging

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services and required additional follow-up to meet the *access to care* timelines prescribed by *Plata*.

Corrections are beginning to implement basic digital imaging technologies such as Computed Radiology (CR) and digital dental acquisition devices. The problem resides with the continued use of non-clinical software applications for patient scheduling, tracking, and reporting. The information systems that feed a digital department are the single most important element in the digital chain and handoff of critical PHI data. These systems provide the data necessary for the database to remain synchronized with the image management system. It provides the indexing data for all inmate-patients and procedures. Without a designated RIS or dental PMS capable of interfacing to an imaging management system, Corrections will experience a multitude of issues when attempting to maintain the efficacy of PHI and will ultimately be subject to potential risk. It is unacceptable in the industry today to rely on analog processes for scheduling, tracking, film management and reporting. The following bullets represent our most significant findings:

- ◆ The majority of Corrections' facilities had locally-designed tracking systems utilizing MS Access, Excel, and Word. These systems were found to be unreliable, inefficient for retrieval of information and posed multiple HIPAA violations.
- ◆ Not one of the Corrections digital scheduling and tracking systems is HL7-compliant, eliminating the option for systems' interface with an enterprise information system and PACS.
- ◆ IMSATS contributed no functional benefit to the imaging departments due to its redundant data entry, lack of standards from facility to facility, and lack of integration with the remainder of Corrections technology.
- ◆ OBIS generated duplicate CDC numbers, rendering the system unreliable for prior record retrieval and correlation.
- ◆ MPIMS at PBSP allowed non-medical staff full access to inmates' medical records, orders, and history. Anyone with access to the system had the ability to alter imaging orders and inmates' records.
- ◆ Requests for imaging services were consistently misplaced within MPIMS due to the mislabeled entry fields and incorrectly configured interfaces. Requests for services were delayed adding to the risk of falling outside the Plata access to care timelines.
- ◆ Corrections staff used an analog tracking process of recording all imaging records in log books or Microsoft Excel worksheets. Existing information systems acted as secondary and redundant points of data entry which increased clerical duties and added unreliable and unnecessary processes within the imaging department.

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Recommendations

1. **Implement an enterprise-wide Radiology Information System (RIS) and Dental Practice Management System (PMS) capable of interfacing with the enterprise health information system (HIS) to provide accurate MPI and managing ADT records for inmates.**

RATIONALE

- a. All Corrections medical records would be managed by one enterprise-wide standard system to create an appropriate foundation for downstream departments' information systems.
 - b. Maintenance and operations around one system will consolidate support staff and create standard Policies and Procedures.
 - c. Such systems will provide an automated HL7 feed of inmates medical information into the PMS and RIS/PACS for use by clinicians.
2. **Implement an enterprise-wide dental PMS and RIS/PACS for order entry, tracking, and reporting of inmates' dental and medical imaging procedures and report records.**

RATIONALE

- a. PMS and RIS/PACS would standardize departments across the state with consistent workflow and related imaging processes.
- b. This architecture would consolidate all listed analog imaging processes into one digital system capable of interfacing all records with Corrections future medical systems.
- c. Enterprise-wide medical and dental PACS would allow central archival of digital images and would also enable image transfer and review anywhere within the Corrections WAN. PACS would also provide for remote access to image and report data for offsite contracted professional services.
- d. PMS and RIS/PACS would create a stable and efficient management system, allowing more business with contracted vendors at lower prices.
- e. PMS and RIS/PACS would drive imaging workflow and provide automated ADT feeds to imaging modalities using a standard DICOM service class (DMWL), eliminating the need for manual entry of demographic information into the imaging devices.
- f. The implementation of the enterprise-wide PMS and RIC/PACS would assist in recruiting and establish a better environment for hiring and retaining technologists.

tion unit technology and were capable of providing images within imaging standards. These units were fully DICOM and are capable of future integration with PACS. They were also equipped with on-board laser film printing hardware used in producing diagnostic quality films for review and archival. Some of the MRI units provided CD burners to produce digital archive media of scanned procedures. At two (2) facilities one vendor provided above adequate services with American College of Radiology (ACR) and Joint Commission on Accreditation of Healthcare Organizations (JCAHO) accredited scanners and programs, optimal operations, and overall satisfactory imaging delivery.

Following our interviews with contracted radiologists and Corrections administration, MSI discovered that the majority of mobile MRI service issues were a direct result of operational deficiencies and the lack of oversight by the contracted mobile services technologists. While the imaging device technology utilized on the mobile MRI coaches met bid standards, many processes related to the service line were suboptimal. Issues related to the workflow were; missing imaging sequences demanded by standard scanning protocols, extremities being scanned utilizing large body coils, and inconsistent filming standards. These deficiencies created numerous challenges for the radiologists interpreting the procedures. If the reporting radiologist chose not to complete the dictation because of a sub-optimal study, the follow-up process for obtaining additional or improved images seriously impacted the delivery of the final report. Many of the delays fell outside of the required *Plata* guidelines which call for timely access to care. Delays for MRI services due to poor quality imaging and a delay in reporting were recorded to take as long as 4 weeks from the initial request for services.

Computed Tomography (CT) - CT mobile services were delivered by two (2) vendors utilizing scanners that are capable of axial and marginal helical scanning with a single-slice detection system. The bid for CT services defined the basic unit's specifications as fully helical with continuous 60 cm scanning at .75 mm slice thickness. The systems evaluated are capable of 60cm continuous helical coverage, at minimum of 1mm slice-thickness, and scan speeds of 1 second, which met the their contract terms. However, after closely reviewing the types and the volumes of the scans performed for Corrections, MSI concluded that the scanners provided by the mobile CT vendors delivered optimal scanning only 30% of the time with the residual 70% not meeting the quality standards because of the unit specifications. Under perfect conditions, these scanners can only deliver a 60cm helical scan with a 7mm to 10mm slice-thickness using a gantry pitch of 3:1 or 5:1 with sub-adequate mili-amperage (mA) which leads to an artifact on the image called "Mottle". The issue of attempting to adjust the scanner to comply with the bid specifications renders the image data sub-optimal and many times non-diagnostic for even the most rudimentary CT studies. Commonly requested imaging procedures from the referring physicians called for at least a 5mm slice-thickness for general body scans and 2mm slice-thickness for orthopedic and extremity scans. Such requests required the CT technologists to adjust their scanning parameters and induce unnecessary and disruptive artifact in the image data. An additional problem with the

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technology currently in use by the mobile CT vendors is related to the speed of the scanner. When technologists attempted to image confused and/or uncooperative inmates, the CT equipment limitations made it extremely difficult to expedite the scan sequence resulting in patient motion due to extended breath holds, inter-scan delays (ISD), misalignment of reformatted images due to the step-off effect, and increased Mottle due to the lack of adequate MA on continuous helical scans. These conditions also presented multiple limitations on contrast-enhanced studies which require fast and dynamic scanning times with continuous anatomical coverage. Continuous coverage is necessary to scan anatomical areas of interest following an intravenously-injected contrast within a certain time frame. If the technologist fails to capture contrast-enhanced anatomical images in the prescribed time frame, procedures would be considered useless, and a rescan would be necessary at a later time. In short, the technology in use for mobile CT falls short of bid specifications and greatly impacts the ability to provide optimal image data.

Ultrasound (US) - During our assessment we found two (2) vendors that provided the majority of US services to Corrections' facilities. For the most part, the ultrasound units met Corrections contractual language as well as functional needs. Most of the studies required by the sites visited were general procedures such as abdominal and pelvic procedures. Vascular and cardiac procedures that require "Doppler" and "Echocardiology" capabilities were seldom performed onsite although this level of service should be available provided the equipment is capable and the technologist trained in performing vascular studies.

The processes for delivering the ultrasound procedures to the radiologist for interpretation and the long term archiving processes are entirely unacceptable. Every US vendor contracted with Corrections delivered final images in the form of a paper print-out. Paper images are not an acceptable media for radiologist review and interpretation. MSI interviewed various radiologists that were contractually responsible for interpreting the ultrasound studies. Each voiced their disapproval of this media.

General ultrasound studies can be reviewed as "snapshots" or static images gathered and printed by the technologist during the study. Vascular studies using Doppler and echo technology are dynamic "like a movie." The dynamic quality is compromised using static film or paper based media. Vascular studies should be reviewed using a media capable of providing the original dynamic image set such as CD or DVD. The vascular studies performed during our visits were printed on paper, therefore forcing MSI to question the sensitivity and specificity of the interpretations for these types of studies.

Mammography (M) - With the exception of analog film processing, MSI did not find major issues with the mobile service providing mammography at Valley State Prison for Women (VSPW). The challenge with analog mammography units is the film processing dependency upon a conventional dark room using chemical film processing. In a mobile environment, the vendor providing services to Corrections utilized a film processing workflow

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of exposing film on-site and then developing the film upon their return to the vendor's headquarters. Without the ability to visualize the films and perform immediate quality control of the images following the study, there is a risk that the study quality is sub-optimal in either exposure technique or anatomical positioning. The delay in processing and QC of the film caused by off-site development invites inherent delays in reporting. As such, MSI questions the frequency of follow-up on studies that fall below quality standards and where a repeat is required. The following bullets represent our most significant findings:

- ◆ Most of the on-site mobile CT and MRI coaches had no phone line connections, posing multiple high level risks should a medical emergency occur during procedures. This is particularly troubling for studies requiring intravenous contrast injections.
- ◆ Some MRI scanners did not have small body part coils for hi-resolution procedures.
- ◆ MRI vendors delivered suboptimal images to the reviewing radiologists due to the lack of operational oversight, lack of scan protocols and missing procedure sequences.
- ◆ All mobile CT units were found to be suboptimal in helical and reformatting capabilities posing issues around dynamic contrast studies and final image quality for radiologist review.
- ◆ US vendors did not have access to laser printers. All US units printed paper images, greatly impacting the diagnostic quality of the final radiologist review.
- ◆ US vendors printed dynamic studies (Doppler & echo) utilizing paper versus archiving media such as CD or DVD.
- ◆ The mammography mobile unit at VSPW develops exposed film at the vendor's headquarters. This practice raises issues with the film quality and general QA process.

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Recommendations:

1. **Expand in-house Corrections' services to include CT and US.** Such an implementation would resolve current mobile issues with these modalities (see the "Recommendations" section under "Scope of Services" in the "Operations" document).

RATIONALE

- a. CT and US services are considered to be as standard as general radiology in the level of care for imaging services. Providing onsite access to such diagnostic services, clinicians can accurately triage and prescribe an appropriate level of care to the inmate population in a much more efficient manner.
 - b. Corrections would limit digital-archiving concerns in the future by owning and operating CT, MR and US modalities. These modalities perform better in a fixed environment linked to a central database rather than a mobile environment that moves from one location to another.
2. **Purchase and operate fully DICOM ready CT units with a minimum of a 4-slice detection system and robust reconstruction software. In addition, purchase and own fully DICOM ready US units with Doppler and echo capabilities (please see the "Recommendations" section under "Scope of Services" in the "Operations" document).**

RATIONALE

- a. All Corrections' facilities had an adequate number of CT and US service requests to justify owning and operating such equipment across the enterprise.
- b. CT units with a minimum 4-slice detection system and robust reconstruction software are commonly utilized in the private sector and are capable of handling 99% of CT procedures in the most challenging scanning environments.
- c. Ensure that all newly purchased CT and US equipment contain a native DICOM operating system to meet the future diagnostic standards within Corrections and enable future integration with PACS.

3. Purchase and operate Corrections MRI mobile units. Plan and implement mobile MRI docking locations to include level slabs, power, network and telecom connectivity to the mobile coaches at each Corrections facility to ensure adequate equipment performance.

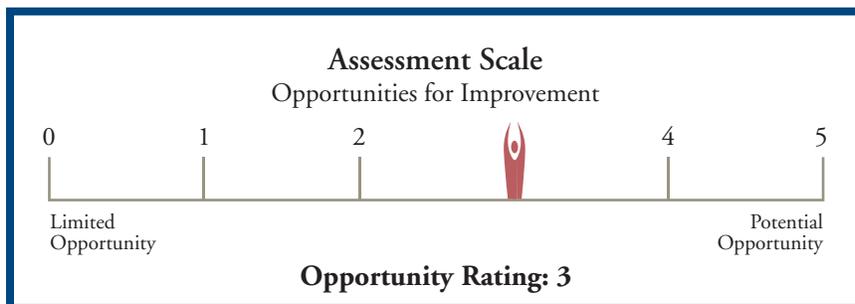
RATIONALE

- a. Corrections owned and operated mobile MRI will provide a focused service line with more flexibility to meet the needs of the inmate-patient population. This action would create a standard of MRI equipment, protocols and policies and procedures.
 - b. MRI requests were the second highest volume recorded within Corrections and these requests for services are projected to increase with the current culture of Corrections' inmates' injuries.
4. Inspect and install the mammography unit currently warehoused at VSPW to accommodate a new onsite mammography program. Furthermore, purchase and install digital mammography capable CR readers to be utilized simultaneously with diagnostic radiology exams (see the "Recommendations" section under "Scope of Services" in the "Operations" document).

RATIONALE

- a. By bringing mammography services in-house, similar to Central California Women's Facility (CCWF) and California Institution for Women (CIW), VSPW will eliminate associated issues inherent to mobile services.
- b. Standardizing Corrections mammography services and equipment will provide a foundation for transition to PACS.

DICOM Readiness



Digital diagnostic imaging equipment utilizes a standard language format -- Digital Imaging & Communication in Medicine (DICOM). This language format provides for interoperability between devices and systems designed for archival and presentation of image data. The DICOM backbone of an imaging department affects the readiness to proceed with the deployment and implementation of RIS/PACS for complete system interoperability. Corrections is currently considered to be working in a “hybrid” environment with their inventory consisting of both analog and digital equipment. Departments working in a hybrid environment typically work to evolve their DICOM conformance by including very specific DICOM requirements in any RFP’s for imaging equipment. If the digital equipment is not standardized and the DICOM backbone is not achieved, any attempt to implement PACS induces unnecessary workflow complications as the staff is required to function in two distinctly different environments. Hybrid environments tend to have an extremely low success rate.

Findings

During our tour assessments, MSI developed and organized a complete imaging equipment inventory matrix listing DICOM capabilities and other device functionalities (see “Sites Visited” section for each Corrections facility). At least 50% of the facilities we visited were found to have no DICOM capabilities. In fact, equipment lacking DICOM functions were also configured without network outlets (NIC) for basic network integration. Such equipment would have to be replaced or upgraded if possible to integrate within any future network environment. Devices not capable of digital output through an Ethernet networking port can be configured onto the network and integrated to PACS by utilizing DICOM conversion boxes. This is not a recommended alternative to native network and DICOM capabilities, but will suffice if necessary. Of the equipment lacking network

At least 50% of the facilities we visited were found to have no DICOM capabilities. In fact, equipment lacking DICOM functions were also configured without network outlets (NIC) for basic network integration.

functions, most had access to a Digital Video Interface (DVI) outlet located on the device allowing for DICOM conversion to occur. For example, a C-Arm fluoroscopic unit, located at California Medical Facility (CMF), is relatively new and functions to meet the current surgery requirements in an analog workflow. However, this device is incapable of integrating to a RIS/PACS without some sort of DICOM conversion capabilities.

None of the radiographic equipment has Direct Radiography (DR) capabilities; they require the use of CR digital plates to convert analog acquired images to digital display. This is a common approach in the diagnostic imaging line to avoid the very expensive purchase of new DR equipment in order to integrate with PACS. However, it would be necessary to ensure that Corrections has deployed an adequate number of CR readers to accommodate the volumes, system redundancy and the variations in workflow from site to site. Corrections must consider purchasing dual-function CR readers capable of reading mammography CR plates as well as diagnostic radiography plates at the few facilities performing mammography. The bid for the recently purchased CR readers specified the ability to process digital mammography images. The CR readers being deployed do not fulfill this requirement, therefore, for those sites performing mammography and using the recently added CR technology for general radiology will require a system change out.

All the recently implemented CR equipment was found to have native DICOM functions. However, due to the lack of administrative access to the configuration areas of the software, MSI could not verify that this equipment was fully DICOM such that it would allow for future RIS integration with Modality Work Lists (DMWL). DMWL is a DICOM service class that allows the imaging staff to query the central database or information system to retrieve necessary demographic information about all scheduled imaging procedures. This function has minimal room for error and merely requires technologists to select the correct procedure off of the scheduled list. Therefore, additional software purchases may be necessary for Corrections in the future. MSI also found that the CR units installed are not standard with regard to the user software. In fact, a few sites were missing vital software modules such as “free text entry” and a “pan/zoom function”. These omissions reveal a poor procurement process as well as a lack of knowledgeable supervision and oversight during the installation.

A CR unit is typically configured to transfer acquired images to a central database for further display and archiving. Because Corrections does not yet make use of a “system architecture”, the CR was configured to store acquired images on the local hard drive. When the hard drive on the CR device reaches its maximum archive capacity, the oldest files begin to be replaced by the newly-acquired image files--a concept known as “first-on-first-off”. However, MSI discovered that facilities have begun experiencing issues with hard drives filled to capacity on the CR units. It appears that some systems have been configured incorrectly and are dropping off the most recent image files. This is a major configuration problem and poses multiple risks with film records should the laser printer become inoperable or fail completely. This issue is exacerbated by the fact that some Corrections im-

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aging staff are utilizing the CR as their only source for copies. Sites without a film duplicator are relying on the CR unit's minimal storage capability to produce copies of examinations when requested by outside agencies or clinicians. This factor creates additional film records management issues.

The majority of contracted vendors providing MRI and US services had native DICOM equipment. One ultrasound vendor provided equipment limited to wireless DICOM functions. If kept, this equipment may require additional implementation of wireless routers within Corrections to allow for the transfer of images. MSI is not an advocate of wireless transfers from the acquisition devices to the archive database due to the limitations of wireless bandwidth around large datasets and the risks associated with common network failures.

The mobile CT services do not have devices capable of native DICOM functionality. These units would need a considerable hardware upgrade and be required to utilize DICOM conversion boxes. Again, the use of DICOM conversion boxes is not recommended. The following bullets represent our most significant findings:

- ◆ More than half of the Corrections imaging equipment are not capable of DICOM functionality.
- ◆ Equipment that has DICOM capability is not standard and may not have full DICOM functions such as MWL.
- ◆ None of the standard radiology units are DR units; all sites will require the use of digital CR plates and readers to convert acquired analog images to digital display.
- ◆ The CR units installed at the women's facilities cannot produce digital mammography as stated in the original bid.
- ◆ Newly installed CR equipment does not have standard software packages across the Corrections' facilities. Most are missing QA software functions.
- ◆ Fuji CR was incorrectly configured at some facilities and is now dropping off current images as opposed to the first acquired images.
- ◆ A significant amount of Corrections equipment was found to have no network or DICOM capabilities. However, the majority of this equipment had DVI outlet jacks allowing for installation of DICOM conversion boxes (not recommended).
- ◆ Contracted CT scanners did not have native DICOM on board and will require integration to DICOM conversion boxes (not recommended).
- ◆ Contracted vendors have limited access to field engineers capable of managing their network/DICOM configurations and integrations.

Recommendations

1. Purchase and install CR equipment of the same vendor at the remainder of Corrections' facilities in order to standardize. In addition install mammography CR readers for image-processing at the three (3) women's facilities.

MSI discovered that facilities have begun experiencing issues with hard drives filled to capacity on the CR units. It appears that some systems have been configured incorrectly and are dropping off the most recent image files. This is a major configuration problem and poses multiple risks with film records should the laser printer become inoperable or fail completely.

RATIONALE

- a. By implementing same vendor equipment throughout the enterprise, Corrections will standardize technical support, on-going training of application, integration needs, and leverage with one vendor for future upgrades and purchasing discounts.
 - b. Certain CR vendors have readers capable of reading diagnostic radiography plates as well as mammography plates, utilizing one multi-reader. Such readers would eliminate the need for extra space in the mammography departments and reduce the cost of introducing new vendors and a new line of technical support.
- 2. Prior to the implementation of PACS, ensure that the newly installed CR units have standard software and are reconfigured to retain recently-acquired images instead of removing them from the hard drive.**

RATIONALE

- a. Should the laser printer fail to print the images, the current exam would have to be repeated with unnecessary radiation exposure to the inmate.
 - b. Facilities that have no access to a film duplicator are using CR as their source for copies. Having current images drop off the hard drive is a major problem. Staff will have to provide the original record (not recommended) or consider purchasing film duplicators in the near future.
- 3. Ensure newly purchased CR equipment has full DICOM capabilities to include DMWL for RIS integration. In addition, conduct a complete evaluation of available software modules for the current CR units to allow for complete QA of acquired images.**

RATIONALE

- a. MSI did not have administrative access to the CR software to fully evaluate DICOM functions. Should the current software lack MWL functions, Corrections may have to purchase such software prior to PACS integration.
- b. DMWL is highly recommended for full DICOM integration; however, this function is not always sold in a single DICOM package.
- c. Corrections imaging staff currently relies on CR software functions for QA prior to completing the exam. These functions should be available to all imaging departments statewide to establish a standard within the workflow.
- d. After PACS implementation, staff will be required to use additional software functions, such as “free text entry” and the “pan/zoom function”, to evaluate images and insert comments for the radiologists.

4. Purchase and install the remainder of Corrections diagnostic equipment to include full native DICOM capabilities for complete integration with PACS.

RATIONALE

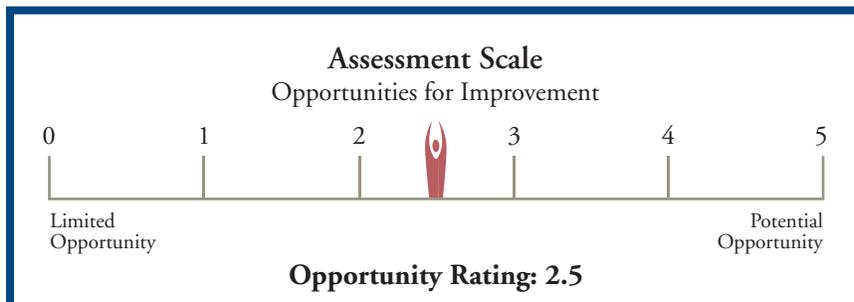
- a. More than half of the Corrections equipment is considered analog and will not allow for proper integration with PACS. In fact, equipment lacking network capabilities will not link to the database archive which would create an inconsistent database, posing multiple issues around the radiologist's review and clinician access to digital images.
 - b. Corrections must establish a standard within the enterprise for DICOM imaging equipment. If the DICOM backbone is not established, the PACS will not function as intended and will create operational frustrations.
5. Consider implementing DICOM conversion boxes in lieu of native DICOM only when absolutely necessary.

RATIONALE

- a. Various Corrections equipment, such as C-Arms, requires an evaluation for serviceability. This equipment may be considered for replacement rather than using a DICOM conversion solution.



Dental Imaging Technology



Under direction of the *Perez* court ruling, MSI was requested to evaluate the dental imaging technology along with the medical imaging scope of work. Dental imaging technology is used as a baseline and subsequent diagnostic tool by dentists in evaluating acute and chronic oral pathologies. The imaging element of the dental workflow incorporates only a small piece of the total activity encompassed in the dental health program. Similar to medical imaging, dental x-ray for both the panorex and intra-oral procedural categories have evolved away from the analog use of polymer based film and embraced digital imaging technologies as a standard of care. Corrections has been replacing legacy analog systems with new digital systems in an ongoing effort to make dentistry more interoperable where the need to view dental x-rays is required at the operator, or point of care level. To date, the deployment of digital acquisition devices is not complemented by a system configuration that optimizes the digital acquisition and archiving opportunities that this technology can provide. The current system configuration truncates the efficiencies inherent to the acquisition, archival and retrieval of digital dental technology

Findings

As a direct result of the *Perez* court ruling, the department of dentistry has been working toward providing a higher level of care and improved access to dental services. Many digital intra-oral and panorex imaging devices have been installed in a well distributed fashion at many of the sites we visited. It is our understanding that this deployment will continue as an ongoing effort by retrofitting existing departments with digital dental imaging equipment as well as adding to the overall capacity as part of the build out of new facility clinics. These systems, while boasting digital technology, have

Many digital intra-oral and panorex imaging devices have been installed in a well distributed fashion at many of the sites we visited.

fallen far short of the ability to provide the care giver the imaging information they need at any point of care because they have not been deployed as a system, but rather as individual stand alone devices.

The dental practice must leverage the use of these digital devices by configuring the digital imaging product to act as an enterprise information management system by tying these stand alone systems into a single statewide database and archive server configuration. Currently the caregiver cannot access critical patient digital imaging information unless they are sitting in the exact operator chair used to originally capture the image data. This process is highly inefficient and is equivalent to trying to drive a Ferrari on a dirt road.

MSI has discovered that the software licensing structure purchased with the digital dental imaging equipment will suffice to handle the enterprise-wide configuration; however, it will take a considerable project effort to migrate the data off of the individual units to a central server configuration. We also noted that the dental practice does not make use of a dental practice management system (PMS). A dental PMS, much like a Radiology Information System (RIS) used in medical imaging, is a critical component and a precursor to the deployment of an enterprise information and image management system. The dental PMS works to merge critical patient MPI and ADT data to the image series. This MPI information is the data set that ultimately controls the logic of the database and provides information used for a single and unique point of access at the time of record query. The following bullets represent our most significant findings:

- ◆ Many of the sites have, or are in the planning stages to deploy digital acquisition x-ray devices for both panorex and intra-oral imaging.
- ◆ All the deployed and planned deployment of the systems is using a stand alone CPU configuration with limited network sharing capability.
- ◆ Digital Images stored on the individual CPU's do not make use of any redundant archival solution other than hard copy, low quality paper prints of images.
- ◆ Individual CPU's are configured to purge images "First on, First off" therefore forcing the operations to review paper based images for historical prior study evaluation at diminished quality to the original digitally captured image set.
- ◆ Corrections cannot support the deployment of a central server configuration because of the lack of LAN & WAN network infrastructure at most sites.
- ◆ Corrections has purchased the software licenses required to support the users in a centralized server configuration.
- ◆ A considerable effort will be required to clean and migrate the available digital studies off of the individual CPU's to a central database and archive configuration.

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Recommendations

1. Continue the deployment of new digital dental imaging equipment.

RATIONALE

- a. The equipment being deployed in a distributed fashion will provide for better access to care.
 - b. The digital dental technology will be a basic building block to an enterprise imaging management system.
2. Develop an RFP for selection of a Dental Practice Management System for enterprise-wide use in Corrections.

RATIONALE

- a. The Dental PMS is a critical precursor to the enterprise-wide imaging management systems as it provides a clean MPI data stream to the digital devices and ensures database logic.
 - b. Database indexing based on MPI information from a single information system enables a single query point for the clinicians.
3. Once the WAN and LAN networks are available, develop a project to implement the digital dental system in a central database configuration rather than the stand alone configuration in use today. Migrate available data on the individual CPU's to the central database and archive.

RATIONALE

- a. A central database configuration would provide the caregiver access to all digital dental imaging studies from anywhere in the state at the point of care.
- b. Configuring the system in a central configuration with the adoption of a disaster recovery archive solution will stop the redundancy of printing the digital image to paper for inclusion in the inmate-patient record.

Background

The California Department of Corrections and Rehabilitation (Corrections) manages professional service contracts to coordinate and assure the availability of providers. For example; mobile services, physicians and technical medical staff are contracted to provide specified services for the imaging operations. Their sole purpose is to provide the necessary ancillary support medical care for the estimated 175,000 inmates currently housed throughout California's thirty three (33) state prisons. These Standard Agreements contain established policies, procedures and guidelines for agencies and departments to employ when acquiring the appropriate goods and/or services. McKenzie Stephenson, Inc. (MSI) focused on the specific language, vendor equipment, scope of service descriptions and perceptible facility functions. Additionally, we interviewed a variety of providers to determine their compliance with the terms and conditions of Corrections' contracts.

It is important to note that MSI did not examine the processes for procuring medical registry services, paying medical contractors, credentialing providers, or identifying conflicts of interest related to procuring those medical services. Those particular functions were reviewed and reported in an April 2007 report by the California State Auditor, Bureau of State Audits.¹ As our report progressed, we discovered numerous items that support various findings within the April 2007 audit. As a result of these discoveries, MSI felt the need to highlight these items to complement or update any changes that may have occurred in the succeeding 12 months.

MSI also understands that the language recommendations suggested in the April 2007 audit may not have cycled through on existing Corrections' contracts. Therefore, various contracts that are currently in the process of redraft may have been completed but were unavailable for our review. Throughout our report, MSI will include examples of specific language or service adjustments that we feel require immediate attention to align the standards of inmate-patient healthcare with the Receiver's medical care objectives.

¹ California Department of Corrections and Rehabilitation, 2006-501-State Auditor Elaine Howle.

A list of documents reviewed and staff interviewed are provided below:

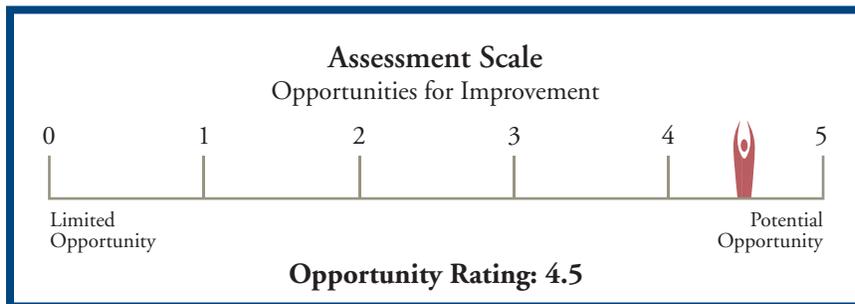
Documents Reviewed

- ◆ Standard Agreement Scope of Work
- ◆ Standard Agreement Equipment Language
- ◆ Invoices for Contracted Services
- ◆ Utilization Management documents (medical imaging referrals)

Staff Interviewed

- ◆ Contracted Providers
- ◆ Institution Utilization Nurses
- ◆ Institution Contract Analysts
- ◆ Personnel from Medical Contracts Section

Contract Services



Corrections’ authorizes its Division of Correctional Health Care Services (division) to deliver the necessary health care to adult inmates. The division’s objective is to provide medical, dental, and mental health care to the State’s inmate population that is consistent with adopted standards for the quality and scope of services within a custodial environment. Throughout this report, MSI will reference delays that reside within the patient care continuum and how these delays can impact the division’s healthcare objective.

To begin this analysis, MSI requested a categorized list of all contractors and related Standard Agreements that provide healthcare radiology services for Corrections inmate-patient population. This request included all providers for outpatient imaging centers, on-site specialty physicians, technologists, temporary medical personnel services, radiological interpretation services and mobile imaging services.

Findings

SERVICE AND SCAN VOLUME MATRIX

To thoroughly examine the processes for each service provider, which includes diagnostic workloads and scan volume production, a uniform and comprehensive list of each radiology service contractor, *per institution*, is imperative before opening the proper examination. This list should also identify all technical service and professional interpretation subcontractors, including hospitals, who perform a service under a Primary Providers Standard Agreement (PPSA).

MSI has determined that the radiology provider master list, which was presented by Corrections to begin our inspection of radiology services, was devoid of the pertinent data that would allow us to identify and examine this objective appropriately. Based on the master list that we reviewed, several service contractors were either excluded from this list entirely, or if identified, were indistinctly designated to the Scope of Work (SOW) description that was listed within their contract. This made it very difficult to reconcile the service designated for each institution.

To begin this analysis, MSI requested a categorized list of all contractors and related Standard Agreements that provide healthcare radiology services for Corrections inmate-patient population.

For example, Colonial Medical Group was not listed under any service description as a provider designate for “Radiology” or “Radiology Services.” During process interviews, it was discovered that not only was Colonial Medical Group a provider for Corrections under a service description titled “Physician, Specialist, and Ancillary Health Care Services”, but that this group also possessed a *Primary Provider* contract to offer outpatient technical and/or professional interpretation of imaging studies for numerous institutions. To further this confusion, Colonial Medical Group then subcontracts these services to various outpatient centers and individuals such as Kern Radiology; Quest Imaging Medical Associates; Bakersfield Imaging; Medical Imaging Centers; Truxtun Radiology Medical Group; Arthur Fontaine, M.D.; and additional unidentified providers.

Colonial Medical Group also performs similar business functions through a related company named Centennial Medical Group, which incidentally was omitted from our Master list as well. This information was not discovered until the final stages of our review, thus, we were unable to explore this contract appropriately. Please see *Outpatient Imaging Centers That Subcontract Services Through A Primary Provider* for related information.

OUTPATIENT IMAGING CENTERS THAT SUBCONTRACT SERVICES THROUGH A PRIMARY PROVIDER

Due to the exorbitant cost of off-site inmate patient transfers to area hospitals, a fixed-site outpatient imaging center that is located within the geographic region of the institution is a logical choice to receive inmate-patient referrals from a *direct service contract* with that particular local institution. For that reason, contracting with a provider that in turn *sub-contracts* this work to an *expected* service provider most likely results in additional diagnostic costs to Corrections.

To determine the cost variation for this exercise, a primary contractor, who currently sub-contracts both technical and/or professional interpretation services to several service providers, was selected to provide information on their subcontracted compensation. The primary contractor that was selected for review adamantly *refused* to identify the amount at which they paid their subcontractors versus what they collected from Corrections.

MSI informed Gary Johnson, Chief, Institutional Medical Contracts Section, of the primary contractor’s refusal to respond to our inquiry. Mr. Johnson’s response indicated that a hindrance exists within this segment of subcontracting. He goes on to reply, *“This is truly a problem, as we run into this issue with Registry services where, in most cases we do not have any idea what they are paying to the sub-contractor, and in most cases [they] do not provide the information.”*

Due to the primary contractor’s reluctance to discuss their collections, MSI began the process of interviewing each of the subcontractors that perform labor or render services under this primary provider’s contract. To organize a list of these subcontractors, MSI attempted to determine whether this primary provider properly submitted their required sub-contractor information. We contacted the Department of Corrections, Office of Contract Services for the specific language defined within their Standard Agreement.

The primary contractor that was selected for review adamantly *refused* to identify the amount at which they paid their subcontractors versus what they collected from Corrections.

We were informed that the current contract language for subcontracting services is defined as:²

- ◆ **Subcontractor means** any person or entity that has entered into a contract with said Provider, either expressed or implied, for the specific purpose of performing any service under this contract.
- ◆ **Subcontractor/Consultant Information** Contractors are required to identify all subcontractors and consultants who will perform labor or render services in the performance of this contract. Additionally, the Contractor shall notify the Department of Corrections, Office of Contract Services, in writing, within 10 (ten) working days, of any changes to the subcontractor and/or consultant information.

After examining the selected provider's Standard Agreements, MSI could not locate the subcontracted service providers within their contract. We then requested information on the conditions of notice for all subcontractors, in writing, to the Department of Corrections, Office of Contract Services. We were informed that they were unsuccessful in obtaining this subcontractor information. As a result, we were unable to determine if this Primary Provider properly identified each of their subcontractors who perform labor or render services in the performance of their contract.

CONTRACT ANALYST RESPONSIBILITIES

A tenet within Corrections policies and procedures processes currently require that *"The responsibility of monitoring the work and expenditures of the provider's Standard Agreement falls upon the local contract analysts at each institution."* We interviewed several local contract analysts to discuss this directive. Using the example of a typical Mobile MRI and CT contract, we asked the Contract Analysts how they would assess the vendors Scope of Work based on the equipment utilized at their Institution.

None could identify the inherent differences and subsequent service output between MRI and CT, discounting the fact that the original Standard Agreements were not drafted with the accurate equipment requirements or descriptions. Nonetheless, even if the Standard Agreement language were correct, it would be impossible for the Contract Analysts to correlate the poor performance issues of the mobile unit versus what is contractually obligated per service vendor. This issue is undoubtedly growing into a source of frustration for Corrections Contract Analysts and adds costly delays to the patient care continuum.

In a related topic within our *Diagnostic Mobile Services* section, MSI interviewed a mobile diagnostic vendor that could not complete a full scope of MRI exams due to a limited supply of MRI coils available to the unit.

In this instance, a fully trained Contract Analyst could interview the service provider and appropriate institution radiology staff to inquire on the numerous routine MRI exams that were being transported to off-site hospitals. It could then be surmised that a limited number of coils were available to the mobile unit, which the Contract Analyst could then reconcile with the original Standard Agreement. The Contract Analyst could then notify the vendor of the required equipment that is stipulated within their contract.

Even if the Standard Agreement language were correct, it would be impossible for the Contract Analysts to correlate the poor performance issues of the mobile unit versus what is contractually obligated per service vendor.

² Gary L. Johnson, Chief, Institutional Medical Contracts Section

SCOPE OF WORK DESCRIPTIONS AND DIAGNOSTIC SERVICE REQUIREMENTS

There are numerous provider contracts within Corrections that fall under an assortment of diagnostic service titles. Most of these titles are swept into a parent category titled “Radiology Services,” which include on-site radiology interpretation, outpatient technical services, tele-med radiological interpretation, and many other service functions. MSI examined over 100 service contracts that were initially provided by Corrections and we could not establish a *detailed* Scope of Work service function or an accurate diagnostic equipment requirement within any of these Standard Agreements.

However, during an institutional site visit by MSI, we were presented with a provider contract for a company named Omnimed Medical Services. This was a potential diagnostic provider contract under the service bid description of “Radiology Services.” Omnimed Medical Services was being solicited by an institution to provide “on-site radiological and consultation services *and* off-site reading of x-rays and mammograms.” Within the materials accompanying the contract, a secondary, single sheet Scope of Work service description was discovered. It was explained by the local Contract Analyst that on certain occasions a separate Scope of Work service agreement is drafted and presented to the prospective vendor. Since MSI did not receive these Scope of Work “secondary sheets” within the initial Standard Agreements that were presented to our team, we cannot comment on the protocol for their return and attachment to the original agreement.

The Standard Agreement and Scope of Work for Omnimed read:

1. “Omnimed Medical Services scope of service shall include interpretations of mammograms, as well as Dr. Alan Turner to oversee radiology and mammography as an off-site supervisor and operator. Dr. Alan Turner shall also serve as the lead interpreting physician for mammography. Mammography shall be performed, in-house, by the Department of Corrections licensed mammography technologist.”

MSI believes that this Scope of Work would need further clarification on several items before submission to the vendor, including:

- a. Mammography services and general radiology services should be classified as separate bid services and therefore require separate service requirements.
- b. There is no description of Dr. Turner’s “Supervisory Duties” as an off-site supervisor.
- c. There are no descriptions for Dr. Turner’s rate of pay for these “Supervisory Duties.”
- d. There is no explanation for why Dr. Turner would be an “off-site operator.”
- e. Dr. Turner agreed to be responsible for film quality, radiation safety, and provide all supervision. This job description looks very similar to a Radiation Safety Officer (RSO) position. MSI did not locate an RSO contract within the Standard Agreement.

MSI examined over 100 service contracts that were initially provided by Corrections and we could not establish a *detailed* Scope of Work service function or an accurate diagnostic equipment requirement within any of these Standard Agreements.

DIAGNOSTIC IMAGING SUPPLIES

Utilizing bulk purchasing for the purpose of diagnostic imaging supplies contributes significant savings to the overall budget for healthcare services. Due to a singular source purchase agreement (per institution) MSI discovered that Corrections was paying nearly 500% more for the cost of CT Contrast over equivalent sized healthcare systems. This is easily remedied by purchasing supplies through a group contract agreement and not purchasing independently through each institution. For more information, please visit the Operations-Leadership Section.

RADIOLOGY PROVIDERS ARE REQUESTING ADDITIONAL INFORMATION ON PHYSICIAN REFERRAL FORMS

When an inmate-patient presents for illness or injury, the referring physician may determine that additional radiologic screening is required to assist their diagnosis and treatment plan. These requests should be properly detailed upon a diagnostic referral form. The referral form is an important tool to direct the patient in the proper diagnostic direction. In addition, this form is designed to include key medical indicators, patient information, referring physician contact information, as well as to ensure that the appropriate criteria are met for the diagnostic request.

Throughout each institution, referring physicians utilize Form 7362 to requesting a patient additional, and perhaps advanced diagnostic services. This form is also used for Medical, Dental, Mental Health and Medication Refills. After examination of this form, along with several direct requests from the provider community, we believe that Corrections should reformat this important diagnostic tool. MSI believes that this would deliver the following results:

1. **Relevant contact information for the referring physician.** Radiologists, outpatient imaging centers and hospitals have experienced extreme difficulty—oftentimes to no avail—when attempting to contact a referring physician to consult on an inmate-patient's treatment plan. This new form would allow the referring physician to list their cell phone numbers, hospital extensions, pagers and alternative contact information.
2. **Specific examination information** including proper codes, diagnosis and symptoms and prior exams. A number of healthcare providers indicated that referring physicians do not specify their diagnostic requests in detail, which can lead to nebulous exams. One provider also reports that institution referrers order unnecessary duplicate studies, and are oftentimes unaware that the original diagnostic request was previously completed. A copy of this updated referral form could track through the Utilization Nurse or Scheduler, who could then determine that a duplicate exam (CPT) was ordered for the inmate-patient and immediately report that information back to the referring physician before a time-consuming custody escort is performed.
3. **Cross checking capability** by the local contract analysts to reconcile the types of exams and expenditures as related within the providers' Standard Agreements.

MSI discovered that Corrections was paying nearly 500% more for the cost of CT Contrast over equivalent sized healthcare systems.

After examination of this form, along with several direct requests from the provider community, we believe that Corrections should reformat this important diagnostic tool.

To assist referring physicians, utilization nurses and schedulers with detailed exam requests and the appropriate follow up. This would also include additional tools such as an updated diagnostic CPT Coding Guide (see CT example).

As outlined in section IV, easily understood diagnostic tools, such as this CT CPT Coding Guide, would benefit multiple departments within Corrections.

CORRECTIONS HEALTH INSURANCE PORTABILITY AND ACCOUNTABILITY ACT (HIPAA) REQUIREMENTS

We queried several institutions regarding their HIPAA status, and none were able to offer a definitive answer. We discovered that other State correctional systems have declared themselves a “covered entity*” under the provisions of HIPAA (e.g., Florida, per Mary Hackney, Contracts Section).

MSI contacted Nina Dozoretz, an expert on Correctional HIPAA related information, for her opinion on California’s institutions. Ms. Dozoretz stated that “not all correctional facilities fall under HIPAA, as they do not qualify as covered entities. However, HIPAA did not devise a list of who is excluded.”

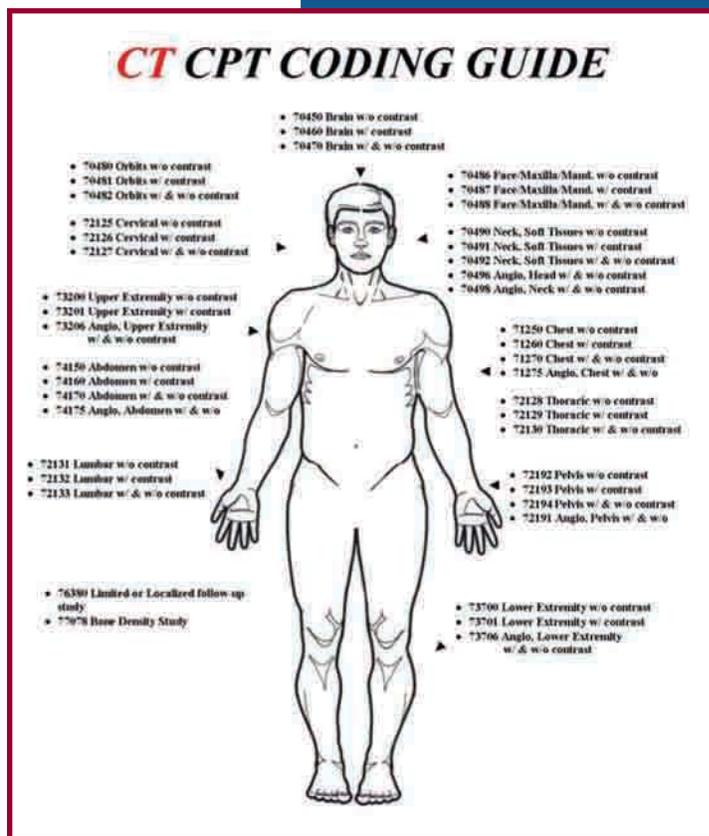
The Health Insurance Portability and Accountability Act (HIPAA) was passed by Congress in 1996 to:

- ◆ ensure the portability of insurance coverage as employees moved from job to job; and
- ◆ increase accountability and decrease fraud and abuse in health care; and
- ◆ improve the efficiency of the health care payment process, while at the same time protecting a patient's privacy.

*HIPAA applies to “Covered Entities,” (CE) defined by the Privacy Rule as

- ◆ a health care provider that conducts certain transactions in electronic form,
- ◆ a health care clearinghouse,
- ◆ a health plan, or
- ◆ a business associate (person or organization performing a function on behalf of the CE for which access to protected health information is needed).

Ms. Dozoretz went on to explain that, “Correctional facilities that do not fall under any item listed above are not considered a covered entity, and as such, HIPAA does not apply to these facilities. That being said, many correctional facilities are still unsure of their status and have opted to procure and utilize IT systems--such as electronic medical records systems, digital imaging systems, teleradiology and telehealth, that do require HIPAA compliance.”



“In addition, hospitals, clinics, and physician’s offices *do* fall under HIPAA, and releasing inmate/prisoner/detainee medical information back to the correctional facility has been difficult if the correctional facility has not obtained patient consent. Many health care covered entities are not aware that correctional facilities are exempt under HIPAA to secure a prisoners/inmates/detainees consent. This has produced delays in releasing medical information from the hospital back to the referring correctional facility. We would encourage communication at the state level between the Department of Corrections and the CA Hospital Association to inform them of these ‘waivers and exemptions under HIPAA’ in order to facilitate and support continuity of prisoner health care between the medical community and correctional facilities.”

Due to a shift toward HIPPA requirements, all institution visitors to health services should sign agreements acknowledging the confidentiality of inmate-patient data.

In addition, hospitals, clinics, and physician’s offices *do* fall under HIPAA, and releasing inmate/prisoner/detainee medical information back to the correctional facility has been difficult if the correctional facility has not obtained patient consent.

We would encourage communication at the state level between the Department of Corrections and the CA Hospital Association to inform them of these ‘waivers and exemptions under HIPAA’ in order to facilitate and support continuity of prisoner health care between the medical community and correctional facilities.

Institution Name	
VISITOR AGREEMENT	
I, _____, understand that all written material including patient demographics and clinical information are confidential, and I will not copy, forward, or discuss any of this information with anyone except those approved, in writing, by the California Department of Corrections and Rehabilitation and/or Institution CMO.	
_____	_____
Signature	Date

Street Address	
_____ () _____	
City, State and Zip Code	Phone
Number	
_____	_____
Signature	Date
Healthcare Designate	
Institution Medical Facility	

DISCOVERY ISSUES

As discussed within our “Background” section of Contracted Services, we note that several service issues arose that were outside of our original scope of work but were directly related to the Receiver’s health care mission and the April 2007 report by the California State Auditor, Bureau of State Audits. These items were never fully explored and as a result are presented with limited detail. Nonetheless, we feel that these items require the attention of the Receiver.

ISSUE 1

Corrections’ contracts stipulate that each institution contact providers in sequence according to established hierarchy when they require temporary medical services, and that they document their attempts. The April 2007 audit by the California State Auditor, Bureau of State Audits reported that the prisons could not always demonstrate that they had done so accordingly. MSI discovered that contract analysts encounter tremendous pressure when attempting to locate and contract an appropriate vendor which will service their health care needs within the required Plata mandate timeframes.

Oftentimes, established hierarchy stipulations are bypassed to a “known” provider. A “known” provider was explained to MSI as a provider that the contract analyst could confidently choose to meet the institution’s health care needs in an expeditious manner.

ISSUE 2

During our assessment of a Corrections Institution, an incident was relayed to MSI that there was a decision to halt all contrast studies, including CT related exams, for an indefinite period of time due to an unidentified MRI Gadolinium reaction. As a result, a number of institutions incurred expenses by transferring out all contrast related studies to local hospitals. It was found that no service protocol issues were ever investigated, organized, and properly communicated to each institution, so the contrast related exams eventually ramped up on their own. Since Gadolinium is considered one of the safest contrasts on the market, composed mainly of saline (salt water), we were unable to determine why a lengthy hold was ordered on these contrast-related exams.

In a study³ dated December 30, 2007, by researchers at the University of Michigan Health Systems in Ann Arbor, Dr. Jonathan R. Dillman, MD, lead author of the study, indicates that allergic reactions to gadolinium-based contrast agents are rare. “The risk of allergic-like reactions is exceedingly low (0.07% of administrations in our study), and no fatal reaction occurred at our institution in more than 78,000 intravenous administrations.” For related information on Mobile Diagnostic prescreening functions, please see *Technology-Mobile Services*.

³ 1. Department of Radiology, University of Michigan Health System, 1500 E Medical Center Dr., Ann Arbor, MI 48109. 2. Section of Pediatric Radiology, C. S. Mott Children’s Hospital, University of Michigan Health System, Ann Arbor, MI. Jonathan R. Dillman¹, James H. Ellis¹, Richard H. Cohan¹, Peter J. Strouse² and Sophia C. Jan¹

ISSUE 3

MSI did not examine the ambulance contracts that currently perform the basic life support (BLS) and advanced life support (ALS) medical transport service for Corrections. However, MSI uncovered numerous operational issues related to several local service designates. For instance, at one local site, if an institution required the use of a BLS transport they would begin the usual process of contacting the ambulance service designate. That particular ambulance service designate would then insist that the institution call 911 for this service. A 911 service call would then elevate this transport to ALS status which would increase the base rate per trip/transport cost by 45%. Using a random sample of transport costs from one ambulance provider, Corrections is contracted to pay \$971.00, plus mileage rates of \$28.00 a mile, for an ALS transport to the nearest hospitals, versus \$665, plus mileage rates of \$23.00 a mile, for a BLS transport to the same destination.

The following bullets represent our most significant findings:

- ◆ Scan volume tracking system and service provider matrix is nonexistent, which makes it very difficult to investigate valid statistical data and reconcile invoices
- ◆ Scope of Work service descriptions are generic, ambiguous and in need of a complete restructuring in order to define vendor requirements and appropriate equipment characteristics
- ◆ Sub-contracting technical and professional services were found to be impossible to audit to reconcile service invoices against services performed
- ◆ Educational efforts for Contract Analysts are minimal with regard to radiological services. To be effective in monitoring contracts for imaging, one must understand the multiple nuances of this service line
- ◆ Communication issues exist between vendors and Corrections. MSI could not identify any one point of contact that could speak to the entire contracting process from initiation to operational compliance
- ◆ Corrections personnel could not relay an official opinion on HIPPA or other related items regarding inmate-patient health information, or how to protect it.

Recommendations

1. **A comprehensive radiology provider matrix should be drafted by each institution to identify, record, and monitor all radiology exams performed within and for Corrections.**

RATIONALE

- a. To thoroughly examine the processes for each provider, which includes case workloads and scan volume production, an updated list of each radiology service contractor, *per institution*, is imperative before beginning this initiative. In addition, this list should identify all technical service and professional interpretation subcontractors who perform a service under a primary provider's Standard Agreement.

2. Draft consistent service function requirements to address the standard of care to be provided, in addition to a firm policy to return each scope of work/service description, including single source institution contracts, to the original Standard Agreement.

RATIONALE

- a. Vague and multiple descriptions for a particular service function often result in an inconsistent standard of care. MSI suggests that each *service function* be uniformly identified directly within the original *Scope of Services*. This will enable analysts, auditors, or consultants the ability to monitor and assess each provider and their respective service functions as drafted within their specific Standard Agreements.

Topics would include scheduling considerations, personnel experience, diagnostic equipment requirements (listed by each modality), designated parking for Institution transport vans, interpretation TAT's, communication procedures, etc.

3. **Sub-contracting has value for specific registry services where key medical personnel are difficult to locate and retain, but not for readily available outpatient technical and/or professional services that are located within the geographic area of the institution.**

RATIONALE

- a. We feel that the current method of sub-contracting the technical and professional portion of a diagnostic exam should be reexamined, and when appropriate, that the service provider performing the referred procedure be directly contracted and ultimately responsible for the designated care requested.

This would ultimately require that the direct service provider for the referred medical exam be held to the specific terms and conditions set forth within the General Services' Standard Agreements, and not regulated by a minimally drafted Professional Service Agreement through the primary contractor.

We understand that the State's interest is protected by the terms and conditions set forth within the primary provider's contract. However, we feel that a direct service provider contract will raise the level of communication and service performance, while the cost per procedure will diminish through the elimination of a third-party broker.

4. **A complete diagnostic training program for Contract Analysts, which would include equipment and scope of service descriptions.**

RATIONALE

- a. Contract Analysts are instructed to monitor the work and expenditures within each provider's Standard Agreement(s). This request is unachievable without a complete understanding of the diagnostic equipment utilized for their Institution. We recommend instruction seminars to educate each Contract Analyst on the characteristics and technical service requirements for all diagnostic equipment utilized by Corrections. This would allow them to troubleshoot service issues and reconcile provider invoices.

5. Reformat and expand the information on physician referral forms to assist in the proper request, diagnosis, treatment and follow-up of diagnostic exams.

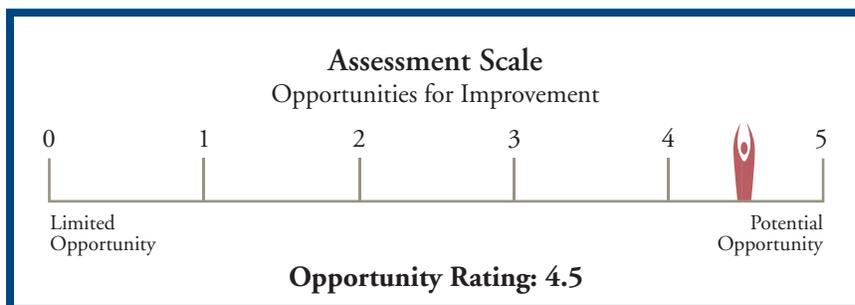
RATIONALE

- a. Corrections is currently experiencing incomplete and/or duplicate diagnostic requests which result in multiple issues (custody, interpretation, diagnosis, treatment, follow-up) within the care continuum. A content-based diagnostic referral form would formulate and ensure that each step is properly requested with the appropriate diagnostic criteria.
6. Establish HIPAA standards and/or official opinion on the handling of inmate-patient records.

RATIONALE

- a. Based on personnel interviews throughout 18 institutions, MSI could not secure an official opinion on the security of inmate-patient data. We discovered numerous items, such as diagnostic film, radiology reports, and medical charts, which were either missing or destroyed.

Diagnostic Mobile Services



Charged with the custody and care of approximately 175,000 inmates housed throughout multiple facilities, Corrections requires timely diagnostic services. Mobile diagnostic services provide a viable solution for a portion of these needs in that Corrections can contract for state-of-the-art imaging equipment that is directly transported within the institution's perimeter, which provides an ideal opportunity to scan the patient in a cost-contained, custody-controlled environment.

To provide these services, Corrections currently contracts with multiple vendors to furnish MRI, CT, US, and Mammography. Two of the four mentioned services require the use of large mobile coaches to house the diagnostic equipment. When these mobile units are transported within the institution's gates, finding a suitable location to temporarily park these expensive diagnostic trailers presents a logistical challenge, due to varying institutional designs and facility space constraints.

MSI examined the operations of various mobile providers and the pad locations at contracted institutions. We discovered numerous items that could be recognized as a hindrance to the patient care continuum and the division's healthcare objectives. Should Corrections continue to utilize mobile services, we believe that various items require immediate adjustments to attain a safe and effective environment for diagnostic healthcare. These adjustments include suggestions for particular contract language, in addition to the recommended "minimum" mobile pad requirements for each institution.

Findings

THE LANGUAGE DRAFTED WITHIN THE STANDARD AGREEMENTS DOES NOT CONTAIN ACCURATE EQUIPMENT SPECIFICATIONS.

Corrections' utilizes numerous vendor contracts to supply CT, MRI, Ultrasound and Mammography for the purpose of determining the proper diagnosis of an inmate-patient's illness or injury. The contract language for each diagnostic apparatus should outline a variety of features and specifications that are inherent with that particular modality. We discovered numerous

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errors and omissions within the Standard Agreements under the subsection “*Equipment Requirements for Mobile CT and MRI Units.*”

For instance, current language within this paragraph stipulates for the mobile CT equipment to provide “*MRI compatible ECG systems; MRI compatible Automated Oscillometric Blood Pressure Monitors; and MRI compatible Pulse Oximetry devices.*” One must understand that there are inherent differences in each mechanism, as well as differences in complexity and applications. MRI equipment is not compatible or interchangeable with CT equipment and vice-versa. Even with cross anatomy applications, each modality has distinct equipment characteristics and adjoining hardware that must be properly drafted into the contract to assure that the appropriate equipment is being deployed and utilized.

Another item drafted within the Mobile CT requirements is a section outlining the Mobile CT equipment capability, titled “*Contractors equipment must be capable of providing the following*”:

1. 60 centimeters (cm) of continuous helical rotation.
2. Scan speeds of at least one second.
3. Minimum 1 millimeter (mm) slice thickness.

While it is true that the above numbered requirements relate directly to a CT’s operational capability, there are no stated conditions that require the unit to perform these functions, as needed, for *each and every exam*. This loophole is presently exploited by a current diagnostic provider.

Shared Imaging is the Primary Provider for mobile MRI and CT services based on a Standard Agreement drafted on July 1, 2005 (ICM05018). MSI examined the mobile CT unit that is currently operated by Shared Imaging which provides service for numerous institutions. It is our opinion, based on the minimally drafted equipment capabilities described above, that the General Electric Prospeed mobile CT unit that is currently deployed by this provider is *technically* meeting the specified language requirements within their contract. However, the percentage of time that it meets those requirements, based on a standard range of CT exams ordered in a typical diagnostic department, falls in the range of roughly 30%. For additional details on this subject, please visit the ***Technology-Mobile Services*** section.

For the reasons listed above, we consider the GE Prospeed CT a *suboptimal* diagnostic instrument to perform the necessary range of CT functions that are required of a typical diagnostic imaging department. We contacted the representatives from Shared Imaging to discuss their fleet of mobile equipment. Shortly thereafter, Shared Imaging introduced a Siemens SOMOTOM Emotion 6 CT system with advanced applications and software. We have not examined this particular unit, but we feel confident that it will provide excellent image quality along with advanced clinical capabilities. Shared Imaging’s new Siemens CT has been introduced to several institutions; however, the older GE Prospeed systems are still utilized in the majority of their mobile coaches. It should also be noted that California Technologies—another service provider for Corrections—is also utilizing the GE Prospeed.

CURRENT MRI CONTRACT LANGUAGE

Mobile MRI contracts stipulate that the vendor provide a “*fully equipped mobile unit with a minimal magnet strength of 1.5T (Tesla).*” One can only assume what “fully equipped” might depict. Standard Agreements should avoid these general terms and instead list the actual hardware and software by name. To understand the required Tesla strength, it must first be explained that the units of measure relating to magnetic field strength are called Tesla or Gauss Units.

- ◆ 1 Tesla = 10,000 Gauss
- ◆ Earth = .5 Gauss
- ◆ 1.5 Tesla = 15,000 Gauss

A majority of hospital radiology departments utilize 1.5T units. The drafted equipment requirements by Corrections’ stipulates a mobile unit with a “*minimal magnet strength of 1.5T (Tesla).*” While a 1.5T magnet may be universally accepted as a satisfactory Tesla strength for a typical diagnostic department, most experts would agree that MRI hardware in use today is crucially dependent on the software platform that accompanies it. Outdated software can severely limit the image quality that is necessary for a sound interpretation. There are three consequences that occur when older equipment or outdated software is utilized on a 1.5T magnet, oftentimes resulting in poor image quality:

- a) the contracted radiology group may reject the image, and/or
- b) re-order the exam, and/or
- c) suggest the exam be performed on alternative equipment.

Each option represents a delay in patient diagnosis and alternative costs. Due to the broad range of health conditions throughout Corrections, the latest technological advances in radiology are recommended to keep pace with the inherent time constraints of custody-assisted healthcare. Proper hardware and software requirements for all radiology equipment that services each institution would greatly assist in this endeavor. We recommend that all diagnostic equipment standards include a minimum software requirement in addition to periodic reviews for industry software updates.

Below is an example of an upgrade that Corrections might receive should software requirements be included in future Standard Agreements. Each application would increase the equipment’s diagnostic capabilities and ultimately benefit the diagnosis and treatment of care.

New applications for a GE 1.5T Excite might include:

◆ PROPELLER

PROPELLER is a revolutionary MR technique that has the ability to “freeze” patient motion and decreases susceptibility artifacts. This is especially useful for confused patients.

◆ LAVA (Liver Acquisition with Volume Acceleration)

LAVA is a 3D volumetric imaging technique specifically designed to take pictures of the liver with unprecedented definition, coverage and speed. The spatial resolution and coverage are now 25% higher while the breath holding is 25% shorter.

◆ **VIBRANT (Volume Imaging for Breast Assessment)**

VIBRANT permits high definition imaging of both breasts simultaneously in axial or sagittal planes. This technique is used with a breast coil that has a 30% higher signal-to-noise ratio (SNR) than previous breast coils.

◆ **TRICKS (Time Resolve Imaging of Contrast Kinetics)**

TRICKS is an MR angiography technique that is simple, reliable and fast without compromising spatial resolution, allowing arterial imaging without venous contamination.

◆ **MR Echo (Fast spin Echo)**

Images of the heart can now be obtained without breath holding and EKG gating. The result is a reliable and fast functional examination of the heart even in patients with arrhythmias.

MOBILE MRI COILS

A mobile coach depends on a full complement of MRI coils to increase the signal to noise ratio (SNR), which is the foundation of image generation in an MRI system. These coils envelope various portions of the anatomy and provide a valuable assist to image quality. Several MRI imaging coils are necessary to handle the diversity of imaging applications. Corrections currently stipulate that the “Contractor shall provide the following coils:”

1. Brain/Head
2. Shoulder
3. Knee
4. Elbow
5. C-Spine
6. L-Spine
7. Torso

For routine MRI exams including MRA (Magnetic Resonance Angiography), and MRCP (Magnetic Resonance Cholangiopancreatography), the following coils would be recommended for a GE 1.5T Magnet with the appropriate software:

- 1) 8 Channel Head Coil
- 2) 8 Channel Spine Coil
- 3) 4 Channel Knee Coil
- 4) 4 Channel Neuro Vascular
- 5) 8 Channel Torso Array Coil
- 6) Shoulder Array Coil with large and medium cup

Additional coils may be considered, such as a High Resolution Wrist Coil for small extremity applications, a Flex Coil for multiple anatomy applications and a Breast Coil for advanced breast imaging at the female institutions.



At one Institution site, the MRI provider could not complete a number of patient exams due to the limited inventory of available coils designed for the unit. Because of this limitation, the patients who could not be examined were transported off-site, resulting in the extension of patient exam diagnosis and the additional expense of transport and custody costs.

Throughout our section topic on *Mobile Diagnostic Services*, MSI explains the importance of drafting the specific language requirements that we consider necessary of the mobile diagnostic equipment brought on-site to various institutions. We feel that these guidelines should also relate to each outpatient imaging center and hospital that performs similar functions. For instance, a 1.5T MRI, with the same hardware, software, and coils, is unchanged whether it's sitting in a mobile coach or stationed within an outpatient imaging center or hospital—discounting the technologist's experience factor. In view of this similarity, the same standards and qualifications for Corrections' mobile MRI vendors should also apply to any outpatient imaging centers that perform the same diagnostic service.

CORRECTIONS DOES NOT PROVIDE THE PROPER INFRASTRUCTURE FOR MOBILE SERVICE PROVIDERS

MSI analyzed the composition of mobile MRI and CT site locations at each institution and the subsequent service failures that result from these procedures. These locations were examined for electrical requirements, phone ports, data ports, types of pad (concrete, asphalt, dirt or gravel), and pad grade (slope). Of the 33 institutions throughout Corrections, three do not currently offer mobile MRI or CT. The remaining facilities offer the following infrastructure:

- ◆ **One phone line** – 12 Institutions
- ◆ **Two phone lines** – 0 Institutions
- ◆ **Fax Line** – 0 Institutions
- ◆ **Internet** – 0 Institutions
- ◆ **Shore Power** – 14 Institutions
- ◆ **Level Pads**
 - Yes – 22 Institutions
 - No – 8 Institutions
- ◆ **Pad Foundations**
 - Concrete – 11 Institutions
 - Asphalt – 16 Institutions
 - Dirt – 3 Institutions

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CDCR Mobile Pad Information						
SITE	Location	Shore/Gen	Phone Y/N	Data Y/N	Level Y/N	Pad
ASP	Avenal	Generator	N	N	N	Dirt
CAL	Imperial Valley	Shore	N	N	Y	Concrete
CCC	Susanville	Shore	N	N	Y	Concrete
CCI	Tehachapi	Generator	N	N	N	Dirt
CCWF	Chowchilla	Shore	Y	N	Y	Concrete
CEN	Imperial Valley	Generator	N	N	Y	Concrete
CIM	Chino	Generator	N	N	Y	Asphalt
CIW	Norco	Generator	N	N	N	Asphalt
CMF	Vacaville	Shore	Y	N	Y	Concrete
COR	Corcoran	Shore	Y	N	Y	Concrete
CRC	Norco	Generator	N	N	N	Asphalt
CSATF	Corcoran	Shore	Y	N	Y	Concrete
CTF	Soledad	Shore	Y	N	Y	Concrete
DVI	Tracey	Generator	Y	N	Y	Asphalt
FOL	Folsom	Generator	N	N	N	Asphalt
HDSP	Susanville	Shore	Y	N	Y	Concrete
ISP	Blythe	Shore	Y	N	Y	Concrete
KVSP	Delano	Generator	N	N	N	Dirt
LAC	Lancaster	Shore	N	N	Y	Asphalt
MCSP	Ione	Generator	N	N	Y	Asphalt
NKSP	Delano	Generator	N	N	Y	Asphalt
PVSP	Coalinga	Shore	Y	N	Y	Asphalt
RJD	San Diego	Generator	N	N	Y	Asphalt
SAC	Sacramento	Generator	N	N	Y	Asphalt
SCC	Jamestown	Generator	N	N	Y	Asphalt
SOL	Vacaville	Generator	N	N	N	Asphalt
SQ	San Quentin	Generator	N	N	N	Asphalt
SVSP	Soledad	Shore	Y	N	Y	Concrete
VSPW	Chowchilla	Shore	Y	N	Y	Asphalt
WSP	Wasco	Shore	Y	N	Y	Asphalt
PBSP	Crescent City	No service				
CMC	San Luis Obispo	No Service				
CVSP	Blythe	No Service				

1. PHONE LINES-FAX LINE-INTERNET

Only 12 Institutions (40%) provide one phone line for the MRI and CT mobile service providers, and none offer a second phone line, fax port or internet connection. This is an area that we feel requires immediate attention. Due to the risk of an emergency situation, a direct line of communication must be established between the mobile unit and the department that serves as a central communications point for all in-house emergencies (i.e., Code Red and Code Blue).

High risk patients with the following conditions are at the greatest risk for complications during MRI and must be monitored very closely in case of emergency.

- ◆ Likely to develop seizure or anxiety reaction
- ◆ Greater than normal potential for cardiac arrest
- ◆ Unconscious, heavily sedated, or confused patients

When various Institutions were queried to explain their Policies and Procedures (P & P's) for emergency response to the mobile unit, it was explained that this task was relegated to the mobile provider. Only two institutions (SVSP and CTF) offered the required P & P's and designated phone extensions protocols. Two additional sites (CCI and LAC) have begun development of such procedures. *Every hospital or institution should develop and adopt its own policies and conventions for notification of personnel in the event of emergencies.* This responsibility should fall directly to the Institution's Central Medical Facility and *then* be coordinated with the service provider for each modality. To compound this problem, there are a number of mobile pads that are located a considerable distance from the Central Medical Facility, a condition which presents extensive liabilities.

A secondary point would be that a direct line of communication with the referring physician and/or the contracted radiologist would offer a proactive and cost efficient way for technologists to inquire about specific scan recommendations, and/or obtain insight on "suspicious" adjacent areas under study. This could prevent a costly follow-up exam and possible delays in treatment.

2. ELECTRICAL REQUIREMENTS

Corrections' offers shore power (direct electrical connection to institution power source) at 14 of the 30 sites that provide MRI and CT service. At the remaining 16 sites, mobile service providers utilize an onboard diesel generator to supply the necessary electrical requirements. An MRI's primary component is a large powerful magnet kept cool in a thermos-like vacuum container whose temperature must remain at 4 degrees Kelvin, or as close to absolute zero, in order to keep the magnet energized. Failure to keep the magnet windings properly cooled could result in a fast boiling of the liquid helium, called a "quench." Should the generator develop a clogged fuel filter, or other mechanical problems, the unit would be inoperable until service maintenance could be summoned.

Ideally, an onboard or separate supply generator (which burns approximately 3 gallons of diesel an hour @ \$5.50 a gallon) is not the preferred method

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to generate the electricity needed for an MRI. Mobile coach manufacturers and operations personnel do not consider the electricity drawn from a generator to be a clean, stable and ample power source to operate an MRI for extended periods. Various mobile units that service Corrections can oftentimes idle for up to 16 hours on a generator unit for just one service day (considering the scenario of previous night delivery and operating one full service day). A generator source should only be utilized on a temporary basis until the proper electrical infrastructure can be reviewed and constructed.

3. LOCATION MOBILITY AND PROPER FOUNDATION

This picture of CSP-Folsom indicates a severe slope which is not recommended for MRI equipment. In fact, 8 Institutions provide a pad location to their MRI providers which are not level. Pad slope should not exceed *one eighth inch* in ten feet in any direction over the pad area (front and rear) or the system performance may be affected. Pads must generally conform to the surrounding grade to provide easy access to pad and proper operation of patient lift, but the pad must be level to provide optimum MRI performance. If a combination of front and rear pads is used, the difference in elevation should not exceed four inches.



With the overall weight of the trailer at approximately 60,000 pounds, a reinforced concrete pad that measures 52'-5" x 10'-11" is recommended. Corrections' currently offers a concrete pad at 11 sites, an asphalt pad at 16 sites, and a dirt surface at 3 sites. Since asphalt is a flexible pavement and has the potential of moving slightly under heavy loads, it should be utilized only as a temporary solution until a proper concrete foundation can be constructed. A dirt foundation should not be utilized under any circumstances. We believe that three institutions (ASP-Avenal, CCI Tehachapi, and KVSP-Delano) require immediate modifications, as none offer shore power (a generator is used for electricity), required phone lines, required data ports or a proper MRI pad location (each offers a dirt surface).

The following bullets represent our most significant findings:

- ◆ Accurate Equipment Language is critical to ensure that the contracted services vendor is capable of providing the full scope of services for any particular modality
- ◆ Outdated and sub-optimal CT Scanners are being used to provide services to Corrections inmate-population. This is resulting in duplicate studies at increased costs of transport and repeat procedures when the inmate-patient is taken off-site.
- ◆ Mobile Provider telephone connections to the Central Health Services building are a critical life-safety factor that must be addressed immediately.
- ◆ Mobile provider pad infrastructure is non-existent or not up to minimum standards in slope, material, power, network or telecom
- ◆ Institution emergency procedures for responding to the mobile coaches must be codified, standardized and adopted by both the institution and the contracted mobile provider

Recommendations

1. Due to outdated technology, we recommend that Shared Imaging and California Technologies upgrade their respective GE Prospeed mobile CT units that are currently utilized at several institutions.

RATIONALE

- a. The latest generation of CT equipment provides a significant increase in anatomy detail which allows for enhanced interpretation results and subsequent treatment options.
2. We recommend that each mobile unit be equipped with three telephone lines.

RATIONALE

- a. Each telephone line would provide the following support:
 - ◆ Line 1- Emergencies; inquiries to referring physicians; communication to contracted radiologists; and to facilitate the scheduling and custody transfer of inmate-patients.
 - ◆ Line 2- Remote system diagnostics and repair which would aid fault diagnosis and prevent downtime.
 - ◆ Line 3- Dedicated fax line for transmitting patient data to referring physicians, contracted radiologists, and institution personnel.
3. Corrections' offers shore power at 14 of the 30 sites that provide MRI and CT service. Self contained on-board generator units are not recommended to supply the proper electrical requirements for extended service periods. It is also important to note that current and future MRI equipment is not and will not be equipped with onboard generators to power the magnet accordingly. Therefore, it is recommended that Corrections construct the necessary infrastructure now, or it will be obligated to utilize older MRI scanners on a go-forward basis, or worse, rent expensive stand-alone generator units to power newer technology.

Oshkosh specialty mobile coaches specify the following minimum shore power recommendations:⁴

- ◆ Requirements are 480 volts A.C., 3-phase, WYE, 150-200 amp service. The five-wire receptacle (neutral and ground) is a Russellstoll weatherhead #DF2504FRAB supplied by Russellstoll division of Midland Ross, (201) 992-8400, Livingston, N.J. Installation would conform to local codes. We recommend weather protection. A disconnect switch must be located near the receptacle.
- ◆ Power should be supplied from a single source (clean, stable, ample power is required). Power variation must be limited to:
 - ◆ Maximum Allowable Daily Line Voltage Variations: 456 to 504
 - ◆ Frequency: 60HZ and $\pm 5\%$

⁴ Specifications and features for an oshkosh specialty vehicles tri-axle magnetic resonance imaging system

- ❖ {Regulation of 4% maximum at 60 KVA }KVA : KVA varies from 75 KVA to 150 KVA depending on system.
- ❖ Phase Balance: Phase balance of + or - 2% maximum phase-to-phase line voltage difference from the lowest phase
- ❖ Transient Surges: Transient Voltage Surges must not exceed $\pm 10\%$ nor exceed five cyclic duration and must not occur more than 10 times per hour
- ❖ Ground Conductor: An insulated *copper* ground conductor sized in accordance with national, state and local codes but not less than #1/0 AWG should be installed between the facility vault and the Russellstoll receptacle. This ground must not have a resistance of more than 2 ohms.
- ◆ Special Ground Notes:
 - ❖ The Mobile MR Imaging Unit must have an earth-driven ground rod within five (5) feet of the facility power receptacle. A grounding cable of a minimum of four (4) GA must be connected between the grounding rod and the grounding pin of the hospital receptacle. The cable should be kept as short as possible, and must not exceed eight (8) feet in length under any circumstances. A separate grounding conductor must still be run with the phase conductors to the source of power from the grounding pin of the Institution power receptacle in accordance with the National Electrical Code.
 - ❖ Shore power service should be located on the trailer road side of the pad area approximately 10 feet from the side of the pad and approximately 10 feet to the rear of the front pad (two pads), and mid-point (single pad).
- ◆ Special Note: The bottom of the Russellstoll receptacle should be at least 3 feet from the ground.

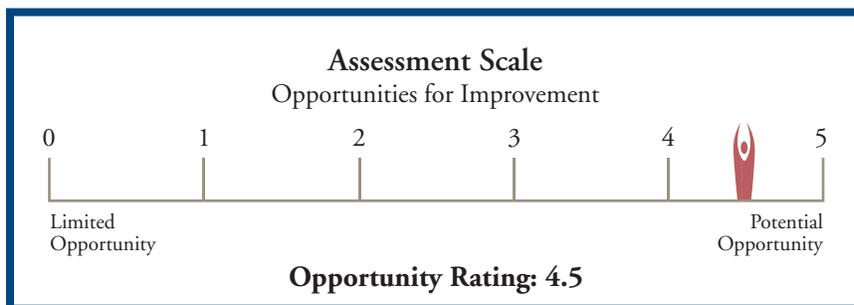
RATIONALE

- a. To assure that Corrections infrastructure meets the recommended minimum specifications required of each modalities manufacturer.
4. **Organize a medical action team to develop a system-wide policy for mobile service inmate-patient emergencies. This assignment is currently pushed to the diagnostic provider.**

RATIONALE

- a. Every hospital or institution should adopt and utilize its own policies and conventions for notification of personnel in the event of emergencies.

Professional Interpretation



With Corrections presently undergoing extensive construction build out, computerization, and a system wide networking of all institutions, the proposed future (centralized) platform for Corrections radiology services will provide an efficient work flow to render a timely and accurate interpretation.

Currently, these services are stretched among multiple radiology service contractors which provide varying degrees of physician specialties, report turnaround time, and on-site support. Several institutions are experiencing recruitment problems along with significant delays in report turnaround time. Several remote institutions are oftentimes forced to contract with smaller radiology groups at higher than market rate compensation. These predicaments often result in lengthy delays to patient diagnosis and treatment.

Findings

INMATES-PATIENTS OFTEN REPORT TO OFF-SITE IMAGING FACILITIES WITHOUT PRIOR FILM FOR INTERPRETATION COMPARISONS

When an inmate-patient has completed a diagnostic exam, their film becomes a principal legal image source for their current medical record and assists in the diagnosis and treatment of any future medical care. Due to the high cost of diagnostic studies in a custody-controlled environment, these images should be readily accessed and archived accordingly to provide referring physicians and radiologists the patient's relevant prior history.

A number of off-site imaging locations have reported that inmate-patients are oftentimes not reporting with previous diagnostic studies. When these Institutions were asked for the storage locations of their prior film, we discovered a number of startling conclusions. One Institution had multiple film jackets strewn about in a storage cabinet (see photo), with no semblance of organization.



Several institutions are experiencing recruitment problems along with significant delays in report turnaround time.

These predicaments often result in lengthy delays to patient diagnosis and treatment.

Additional institutions stored their images in on-site Conex storage containers in which the excessive summer heat rendered the film completely useless. These items necessitate immediate attention, in that potential liabilities may exist with regard to State medical record requirements or if the film is required for litigious review.

CONTRACTED AGREEMENTS FOR RADIATION SAFETY OFFICER DUTIES

We found numerous contracts within “Radiology Services” that indicate an additional Scope of Work service description to include a Radiation Safety Officer or Radiation Department Director (RSO/RDD). Within our review, we did not locate any institution in which the full duties of this contracted service were being performed. We contacted one radiology group in which the RSO/RDD requirement was listed as an additional compensated duty. The radiology group explained that they only performed a portion of these duties. MSI was unable to determine if their full scope of duties were fully compensated, or at what portion thereof, as stated within their original Standard Agreement. For related information and a list of these duties, please visit Operations (Regulatory Requirements).

CRITICAL COMMUNICATION BREAKDOWNS

Multiple communication breakdowns are creating a damaging effect throughout various points of the patient care continuum. The following examples require attention due to the Receiver’s health care objective.

Mobile service providers require a direct line of continuous communication with radiologists, referring physicians, institution health care managers, contract analysts, and utilization nurses. Each entity has multiple duties around which communications must be consistently maintained and harmoniously cultivated to ensure an efficient workflow. We were informed by a large mobile provider that certain radiology groups refuse to communicate relevant interpretation information, which has resulted in workflow issues, patient delays, and additional diagnostic costs for Corrections. For instance, the MRI provider has stated that a direct request to the contracted radiology group for exam protocols – which is a stated list of requested anatomy views that are utilized to articulate a professional interpretation—has been ignored. In fact, both parties seem indifferent to the other, this is not the relationship you would expect from two sources that have a dependent need on the other to succeed. This particular relationship appears broken.

A related incident involves the same two parties in which the radiology group is rejecting the imaged film that is performed on the provider’s MRI mobile unit. The radiology group insists that the imaged studies are of poor quality. The MRI mobile provider has communicated that the radiology group has refused to discuss this issue and remains puzzled as to why the radiology group has not returned his calls to discuss relevant inmate-patient information.

When MSI looked into it, we discovered that when the imaged film is rejected by the contracted radiology group, those inmate-patients are then rescheduled at the same hospital/outpatient imaging facility in which the radiology group has a business relationship and holds Directorship positions. We then analyzed the service provider’s MRI equipment and found it to be

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of good quality, but we were unable to examine the technologist's skill set, which could provide valuable insight on the rejected studies. We also did not have the rejected studies analyzed by a third-party radiologist.

IMAGE VOLUME BACKLOG

Remote institutions are experiencing difficulty in recruiting, contracting, and retaining radiologists. We discovered one institution where diagnostic images had not been interpreted for several months. This institution also employed an orthopedic physician to interpret certain studies as a final report. This undoubtedly creates a potential for medical errors in that most physicians do not receive extensive radiology training during their residency. The accountability of non-radiologist physicians performing X-ray interpretations has been a legal issue for many years.

Currently, the treating physician for emergency services is responsible for making the initial X-ray interpretation, and they formulate their treatment and disposition based on that reading. Without a proper (and timely) final interpretation from a Board Certified radiologist, certain medical abnormalities may go unnoticed.

The following bullets represent our most significant findings:

- ◆ Proper film storage and management is of great concern and holds the potential of harsh liability to Corrections
- ◆ Prior films are not being provided to the interpreting radiologist as a correlate or relevant prior. This issue is caused by a lack of policy and procedure to locate and transport the relevant prior, but mostly from the fact that film file management is so dire that the relevant prior study in most instances cannot be located
- ◆ Communication with service providers and the interpreting radiologists is non-existent. Often times the technologists require direct communication to a radiologist in order to protocol a study based on the patient history and clinical indicator. Without this process in place, the study can be sub-optimal and ultimately end in a repeated procedure or limited diagnostic interpretation
- ◆ Board Certified radiology interpretations should be sought out in-lieu of interpretations from other specialty physicians such as orthopedic surgeons. Imaging studies incorporate physiology well beyond the scope of orthopedics. It is not recommended to pursue interpretation arrangements with anyone other than a board certified radiologist

Recommendations

1. We recommend that Corrections explore the communication issues that currently exist between the referring physicians, imaging providers, contracted radiology groups and institution personnel to reestablish an effective working relationship and set forth a productive set of policies and procedures.

We discovered one institution where diagnostic images had not been interpreted for several months.

RATIONALE

- a. Under a previous section titled *Radiology Providers Are Requesting Additional Information On Physician Referral Forms*, we report that radiologists, outpatient imaging centers and hospitals have experienced extreme difficulty—oftentimes to no avail—when attempting to contact a referring physician to consult an inmate-patient’s treatment plan.
 - b. A joint study⁵ conducted by the American College of Radiology (ACR) and the Physicians Insurance Association of America (PIAA) demonstrated that “communication failures” was the fourth most common primary allegation in malpractice lawsuits against U.S. radiologists. According to the study, about one in five radiology departments had no formal policies and procedures regarding communication and that “ineffective communication resulted in awards that were twice as high as when effective communication was used and were 15 times as high as a percentage of total indemnity payments to plaintiffs.”
 - c. Regrettably, most of these cases fall into preventable categories in that radiologists failed to contact a referring physician; a high-risk report wasn’t delivered to the correct physician’s office; or that the radiologist simply didn’t properly document what communication actually took place. This difficulty can be eliminated with an effective referral form and the proper communication procedures for each institution.
- 2. Imaging studies that are rejected for poor quality by a contracted radiology group, which results in a re-examination in an affiliated hospital/outpatient facility, should be examined by a third-party independent radiologist for quality control issues.**

RATIONALE

- a. A third-party examination would prevent any perceived conflict of interest and would provide insight on the qualifications and skill level of the mobile MRI technologist.

This difficulty can be eliminated with an effective referral form and the proper communication procedures for each institution.

⁵ Communication Errors in Radiology: A Liability Cost Analysis, R. James Brenner, MD, Lori Bartholomew, MPA, Journal of the American College of Radiology 2005; 2:428-431

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