RADIOLOGY PICTURE ARCHIVING AND COMMUNICATION SYSTEMS (PACS)

1. REASON FOR ISSUE: This Veterans Health Administration (VHA) directive revises 2011-005 Radiology Picture Archiving and Communications Systems (PACS). Additionally, it addresses the long-term storage of radiology images to VistA Imaging (VI) for the purpose of non-radiology clinical viewing of images and image sharing beyond the Veterans Integrated Service Network (VISN).

2. SUMMARY OF MAJOR CHANGES: No major changes. Minor changes include general language changes for clarification per user feedback.

3. RELATED ISSUES: None.

4. RESPONSIBLE OFFICE: The National Director, Radiology Program, Diagnostic Services (10P11D) is responsible for the contents of this directive. Questions may be referred to 919-384-8593.

5. RESCISSIONS: VHA Directive 2011-005, dated February 8, 2011 and VHA Directive 99-061, dated December 14, 1999, are rescinded.

6. RECERTIFICATION: This VHA directive is scheduled for recertification on or before the last working day of September 2022. This VHA directive will continue to serve as national VHA policy until it is recertified or rescinded.

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1. PURPOSE

This Veterans Health Administration (VHA) directive provides policy for establishing and maintaining Veterans Integrated Service Network (VISN) Picture Archiving and Communication Systems (PACS) to support storage for the display and interpretation of radiologic images. This directive also addresses the long term storage of radiology images to Veterans Health Information and Systems Technology Architecture (VistA) Imaging for the purpose of non-radiology clinical viewing of images and image sharing beyond the VISN. This policy includes voice recognition and its important role with PACS and VistA. **AUTHORITY:** Title 38 United States Code (U.S.C.) 7301(b).

2. BACKGROUND

a. PACS have been acquired and implemented in various configurations within VHA. It is beneficial to establish VISN-wide PACS with a common interface standard in order to facilitate the care of patients referred amongst facilities within a VISN, efficiently utilize radiologists by means of cross-facility interpretation agreements, reduce the cost of equipment and maintenance contracts, ensure interface compatibility with VistA, share technical equipment expertise within a VISN, and ensure continuity of service in the event of a disaster. PACS achieve VISN wide interoperability for diagnostic imaging interpretation.

b. PACS expedite health care decisions by making images available anywhere in the medical facility as soon as they are acquired. PACS, coupled or integrated with voice recognition systems, are responsible for very significant improvements in report turn-around times within VHA.

c. PACS are usually acquired to serve an entire VISN, with the images shared across all the sites. The interfacing of PACS and diagnostic imaging modalities with VistA Imaging is critical for the timely exchange of patient data and diagnostic images to facilitate quality patient care, and should be addressed in the statement of work for a PACS procurement.

d. In order to ensure this multi-facility interoperability, an enhanced Health Level 7 (HL7) Version 2.4 interface has been developed. This interface improves on the older HL7 interfaces by ensuring truly unique case numbers and study instances are generated by VistA. Unique identification is necessary to ensure compliance with the Digital Imaging and Communication in Medicine (DICOM) standard, for the proper operation of VISN PACS, and if VA decides to transmit studies to a national archive.

3. DEFINITIONS

a. **Archiving.** Archiving refers to the action and or method of storing records as set forth and approved by the National Archives and Records Administration in VHA Records Control Schedule (RCS) 10-1. Archiving from PACS to VistA Imaging is required and must be maintained at all times to ensure Veteran care is available

throughout VHA. This also allows for interoperability with the Department of Defense, future care in the community, and redundancies during contingency situations, e.g., flood, fire, storms, etc.

b. **Caching Server.** The caching server is local storage of PACS images allowing for local area network (LAN) retrieval to improve system performance. Caching servers must be coupled to a contingency PACS server that allows for continuity of operations during wide area network (WAN) or central server failures.

c. **Digital Imaging and Communication in Medicine (DICOM).** DICOM is a standard for specifying, handling, storing, displaying, and transmitting information in medical imaging. It includes a file format definition and a network communications protocol. DICOM enables the integration of diagnostic imaging equipment, scanners, servers, workstations, printers, and network hardware from multiple manufacturers into a PACS.

d. **DICOM Router.** A DICOM router allows the automatic and simultaneous distribution of DICOM images to multiple receiving entities such as medical devices.

e. **Health Level 7 (HL7).** HL7 is the standard based electronic message format supporting administrative, logistical, financial, and clinical processes. Within the radiology framework, messaging occurs at the radiology package interface and consists of both outbound orders and inbound results messages.

f.   **Imaging Modality.** Imaging Modality is the image acquisition or capture device used for the purpose of diagnostic reporting. Modalities include Computerized Tomography (CT), Magnetic Resonance Imaging (MRI), General Radiology, Ultrasound, Nuclear Medicine, Mammography, etc.

g. **Integration.** With respect to PACS and voice recognition, integration allows the correct patient report window to automatically open in the voice recognition software/system as the user selects a patient's images on PACS. This ensures the correct patient is selected simultaneously in both systems during the interpretation process.

h. **Modality Work List.** The modality work list is the DICOM service that provides patient registration information to imaging modalities enabling the operator to select the patient and examination from a list. Modality worklist source data originates from VistA and may be available from PACS.

i.   **Picture Archiving and Communication Systems (PACS).** PACS are computer-based medical systems dedicated to the storage, retrieval, distribution, and presentation of images. The medical images are stored in an independent format. The most common format for image storage is DICOM. Analytic and functional software for respective imaging modalities may be available from PACS vendors at an additional cost.

j.   **Veterans Health Information and Systems Technology Architecture (VistA).** VistA is VA's core system for the electronic health record. VistA Radiology and VistA Imaging are component packages of VistA.

k.   **Voice Recognition System.** The voice recognition system refers to automated speech-to-text conversion systems, which provide the capability for the radiologist to dictate, edit, and sign a report at the time of interpretation. Such systems are typically interfaced to PACS and VistA to provide a unified result entry capability into the electronic health record.

4. POLICY

It is VHA policy that every facility within each VISN utilize the same PACS. All patient information in PACS will be archived in VistA Imaging at the respective VA medical facility. PACS and voice recognition systems must be integrated to facilitate efficient work flow and mitigate wrong patient selections with two independent systems.

5. RESPONSIBILITIES

a.   **Under Secretary for Health.** The Under Secretary for Health, or designee, is responsible for ensuring compliance with this directive.

b.   **Deputy Under Secretary of Health for Operations and Management.** The Deputy Under Secretary of Health for Operations and Management (10N), or designee, is responsible for:

(1) Communicating the contents of this directive to each of the VISN Directors;

(2) Ensuring that each VISN Director has the resources required to support the fulfillment of the terms of this directive in all VA medical facilities within that VISN; and

(3) Providing oversight of VISNs to assure compliance with this directive, relevant standards, and applicable regulations.

c.   **Deputy Under Secretary for Health for Policy and Services.** The Deputy Under Secretary for Health for Policy and Services (10P) is responsible ensuring this directive is updated and disseminated to ensure the national administrative and clinical oversight of Radiology Programs and Diagnostic Services. This policy is used to support the Deputy Under Secretary for Health for Operations and Management's operational oversight to ensure all PACS systems are in compliance.

d.   **Director, Radiology Program, Diagnostic Services.** The Director, Radiology Program, Diagnostic Services, or designee, is responsible for evaluating changes to PACS and VistA systems that would necessitate a change to this directive.

e.   **Veterans Integrated Service Network (VISN) Director.** The VISN Director, or designee, is responsible for:

(1) Acquiring, implementing, and operating compliant VISN-wide PACS.

(2) Ensuring that all diagnostic radiology images for their VISN are stored in both PACS and VistA Imaging systems. This can be done by a DICOM Router, store and forward, and or multi network data transmission from the modality. Appendix A is a graphic illustration of how a DICOM router can be utilized to ensure images are available simultaneously in PACS and VistA Imaging. ***NOTE:*** *All studies must be transferred to VistA Imaging and must be available in VistA Imaging for the ordering clinician and others to review so that patient care delays are avoided.*

(3) Ensuring Bio Med, Office of Information and Technology (OI&T), and Radiology form a consistent and ongoing working relationship to minimize connectivity issues such as installation of new devices, troubleshooting network and bandwidth, minimizing downtime, meeting network security mandates, etc.

(4) Ensuring funding for the PACS from the VISN capital or operating budget.

(5) Chartering and or maintaining a PACS Evaluation Team to review, select, and coordinate implementation of the PACS for the VISN. This team, at a minimum, must consist of the following:

(a) Radiologist;

(b) Chief Radiology Technologist;

(c) PACS Administrator;

(d) Biomedical Engineer;

(e) Radiology Automated Data Processing Application Coordinator (ADPAC);

(f) OI&T representative.

NOTE: *It is recommended that the team include representation from all VHA facilities in the VISN.*

(6) Ensuring the PACS have a consolidated archive, such that any study in the VISN may be viewed at any facility in the VISN without importing the images from one facility PACS database into another. This ability applies to both the radiologist and the clinician viewing client. The archive must be located within a controlled space (see VA Directive 6500), such as a data processing center.

(7) Ensuring a VISN-wide voice recognition system that allows any study to be dictated from any facility, with automated upload of the report to the originating facility VistA system. ***NOTE:*** *This technical capability does not negate the requirement for clinical privileges at the originating medical facility.*

(8) Ensuring the DICOM modality work list service is provided by either the PACS or VI and that all modalities are capable of using this service as per the Joint VA-DoD DICOM Conformance Requirements for Digital Acquisition Modalities.

(9) Ensuring the PACS has an automated back-up or disaster recovery system placed in a controlled space (see VA Directive 6500).

(10) Ensuring each instance of VistA in the VISN has a separate HL7 interface. If the VISN has a consolidated VistA system then each division must have a separate HL7 interface.

(11) Ensuring PACS meets the qualification process for HL7 Version 2.4 interface, as jointly agreed to by OI&T and Office of Patient Care Services (PCS). PACS vendors being evaluated by the VISN need to have completed, or be in active qualification testing for, the HL7 Version 2.4 interface. Only PACS that have met the HL7 Version 2.4 interface requirement can be purchased and installed.

(12) Ensuring that, if a facility is realigned into the Director's network, the new facility must be on the same PACS delivery platform.

(13) Ensuring adequate operational and technical support staffing to sustain PACS operations at the facility and VISN level.

f. **VA Medical Facility Director.** The VA medical facility Director, or designee, is responsible for:

(1) Ensuring all diagnostic radiology images for their facility are stored in both PACS and VistA Imaging systems. This can be done by a DICOM router, store and forward, and or multi network data transmission from the modality. Appendix "A" is a graphic illustration of how a DICOM router can be utilized to ensure images are available simultaneously in PACS and VistA Imaging. *NOTE: All studies shall be transferred to VistA Imaging and must be available in VistA Imaging for the ordering clinician and others to review so that patient care delays are avoided.*

(2) Providing adequate operational (typically Radiology) and technical support (typically Biomedical Engineering and OI&T) staffing to sustain PACS operations.

(3) Auditing the storage process periodically to ensure studies are being stored in VistA Imaging as noted above. If studies are interpreted on a dedicated modality specific workstation, as is often the case for mammography or nuclear medicine, periodic audits of the process by which those studies are transferred to PACS or VistA Imaging before being deleted from the workstation must be performed.

(4) Ensuring that all imaging studies performed at the VHA medical facility, performed at an outside facility on contract, or performed as Non VA Care and stored in VistA Imaging are accompanied by an imaging procedure order in the Computerized Patient Record System (CPRS). This creates a unique index to store the radiology report in VistA and stores the images in PACS and VistA Imaging. *NOTE: Entry of the*
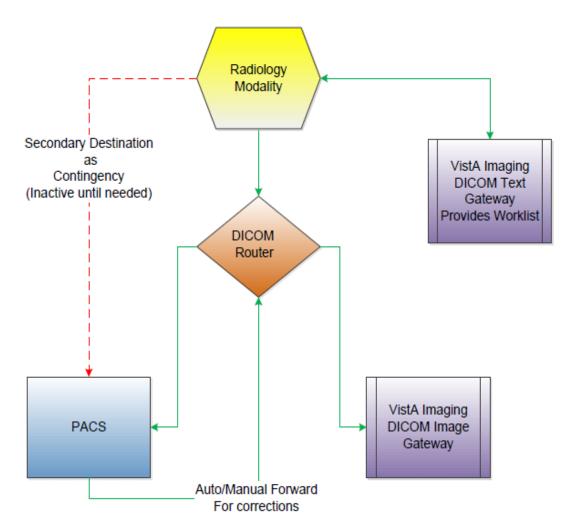
radiology order ensures workload capture and transmission of activity to national databases.

(5) Ensuring processes are in place for image and demographic reconciliation of PACS and VistA Imaging. This ensures the two archives are synonymous during the image interpretation process.

6. REFERENCES

a. VA Directive 6500, Managing Information Security Risk: VA Information Security Program.

b. VA Directive 6550, Pre-Procurement Assessment for Medical Device/Systems.

c. VHA Records Control Schedule 10-1.

d. Veterans Health Administration Decision Memo: Standardization of VISN-Wide PACS. February 2009.

e. Joint VA/DoD DICOM Conformance Requirements for Digital Acquisition Modalities, Version 3.0. September 2005.

DICOM ROUTER INSTALLATION DIAGRAM

DICOM ROUTER INSTALLATION DIAGRAM DESCRIPTION

Flow diagram of a typical DICOM Router installation:

The Radiology modality receives its text based worklist from the VistA imaging gateway. The Radiology modality (equipment) passes off the patient information and images to the PACS through the DICOM Router and the DICOM Router also sends the same information simultaneously to the VistA Imaging DICOM Gateway for historical storage in the electronic health record.

As a contingency, the Radiology Modality (equipment) can send to the PACS as a stand-alone process.

If there are any corrections that need to be performed such as changes to dates of birth, age, etc. the changes are sent back through the DICOM Router and PACS equipment.