

<b>Project Title:</b>	Improving Care in a Rural Region with Consolidated Imaging
<b>Principal Investigator:</b>	Coleman, Robert M., B.S.
<b>Organization:</b>	Maine Medical Center
<b>Mechanism:</b>	RFA: HS04-011: Transforming Health Care Quality Through Information Technology (THQIT) – Implementation Grants
<b>Grant Number:</b>	UC1 HS 015328
<b>Project Period:</b>	09/04 – 12/07
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<b>Summary Status as of:</b>	December 2007, Conclusion of Grant

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**Strategic Goal:** Develop and disseminate health IT evidence and evidence-based tools to support patient-centered care, the coordination of care across transitions in care settings, and the use of electronic exchange of health information to improve quality of care.

**Business Goal:** Implementation and Use

**Summary:** While quality and patient safety initiatives increasingly focus on the use of health information technology, the development of health information exchange (HIE) systems has not progressed as well as expected. The challenges associated with establishing these systems likely play a significant role in slow adoption rates. Few HIE initiatives have included radiology in their systems, even though some argue that radiology is an ideal first step in HIE.

With patients' increasing mobility across health care organizations, radiologists have difficulty acquiring relevant prior exams (RPs), which compromises the ability to provide accurate diagnoses. Some health care organizations, especially those in rural areas, have not adopted picture archiving and communication systems (PACSs) because they are expensive to buy and operate. Many of the health care organizations that have adopted PACS have not been able to operate them effectively.

This project offered three hospital radiology departments the option of sharing one PACS. A large urban tertiary hospital in Maine implemented a shared PACS with two rural hospitals to provide the rural hospitals with access to PACS, improve the quality and cost of providing radiology services at all three hospitals, and improve each hospital's ability to share radiology information with the other hospitals.

The evaluation focused on: 1) implementation challenges and their solutions, 2) realized benefits, and 3) the impact of a shared PACS on access to and use of RPs. Information from pre- and post-implementation interviews with radiologists, emergency department (ED) staff, and management, site visits, and analysis of post-implementation data from the shared PACS was used to examine implementation and impact (e.g., access to and use of relevant prior exams).

### Specific Aims

- Implement a regional, consolidated approach to PACS using a partnership model within a rural health network. **(Achieved)**
- Evaluate the process of implementation, including the technological, clinical, economic, environmental, and cultural factors that impeded or accelerated the process. **(Achieved)**
- Quantify the impact of the PACS regional implementation on health care access, cost, and quality. **(Achieved)**

**Impact and Findings:** The hospitals in the project anticipated that the shared PACS would bring more benefits than a standalone PACS, including greater access to RPs, cost savings, and assistance with

radiology coverage. Overall, the staff at all three hospitals felt that the shared PACS met these expectations. Additionally, the ability to read exams remotely saved time for radiologists who would have had to drive to other locations, often in inclement weather. Interviews indicated that radiologists perceive a change in their access and use of RPs before and after implementation. The radiologists all stated that they had improved access to RPs, especially in situations where they were not aware that an RP existed. Before the shared system, radiologists only knew there was an RP if it was within their own institution or if a patient said s/he had a prior exam at another facility. Both radiologists and ED physicians also commented on how access to and use of RPs improved the quality and efficiency of care.

Several technical challenges were encountered during the shared PACS implementation. For the system to be effective, it must be able to share clinical and administrative data from disparate systems. Developing an enterprise master patient identifier (EMPI) for the shared PACS was a significant challenge. Due to limitations in the EMPI product and its implementation, all potential “first-time” matches had to be reviewed by a person. Because radiologists often dictate radiology exams within a few minutes of exam acquisition, these delays are significant. Both rural hospitals had significant problems with wide area network (WAN) connections and transmission costs. To obtain their WAN connections and adequate bandwidth from their local telecommunication providers, the hospitals had to wait at least a year. This problem may lessen in the future as the telecommunications infrastructure improves in rural areas.

Unexpected differences in knowledge, workflow that could not be changed, and limited human resources also challenged the team. The knowledge differences made it more difficult for rural staff to communicate what they wanted in the system and for the implementation staff to fully comprehend the needs of the users. Furthermore, the PACS implementation at the urban hospital had been tailored to their desired workflow. The needs of the other organizations were not always met because of limitations of the software to support disparate workflows, or because a change in workflow would impact all sites using the shared system.

This project demonstrated that a shared PACS is not only feasible but can provide more benefits than standalone systems. While implementing a shared system can be challenging, most users at the participating hospitals felt that the process went smoothly overall. Benefits of the system include improved access to and use of RPs from other hospitals, availability of more information to make better diagnoses, and improved communication between physicians to assist in clinical decisionmaking. Access to RPs across organizations also improved the quality and efficiency in providing care for patients transferred from the rural hospitals to the urban hospital. Lastly, the shared system increased the availability of back up radiology coverage to the participating rural hospitals and improved radiologists’ efficiency in delivering this coverage.

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## **Selected Outputs**

Loux S, Coleman R, Ralston M, et al. Evaluating the implementation and impact of a shared Picture Archiving and Communication System (PACS). Annual conference of the National Rural Health Association; 2008 May 7-10; New Orleans, LA.

Loux S, Coleman R, Ralston M, et al. (2008). Consolidated imaging: Implementing a regional health information exchange system for radiology in Southern Maine. In *Advances in Patient Safety: New Directions and Alternative Approaches*. Vol. 4. Technology and Medication Safety. (pp. 43-54). Rockville, MD: Agency for Healthcare Research & Quality.  
Available at: [http://www.ahrq.gov/downloads/pub/advances2/vol4/Advances-Loux\\_36.pdf](http://www.ahrq.gov/downloads/pub/advances2/vol4/Advances-Loux_36.pdf).

Coleman R, Ralston M. Sharing of a single PACS by several disparate hospitals and business entities. Radiology Society of North America Conference; 2007 November; Chicago, IL.

Coleman R. Maine Consolidated Imaging: A regional approach to PACS. Rural Health Information Technology Conference; 2007 September 12-14; Kansas City, MO.

Loux S, Coleman R, Ralston M, et al. Evaluating the implementation of PACS in two rural hospitals. Rural Health Information Technology Conference; 2007 September 12-14; Kansas City, MO.

Coleman R. Utilization of an Enterprise Patient Index to enable a regional consolidated imaging record. The Society for Imaging Informatics in Medicine Conference; 2006 April; Austin, TX.

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**Grantee's Most Recent Self-Reported Quarterly Status (as of December 2007):** Grantee did not provide self assessment.

**Milestones:** Did not report.

**Budget:** Did not report.