Florida Hospital

Performing more than 120,000 ultrasounds on an annual basis, the Radiology Department at Florida Hospital was seeking an efficient solution that could transmit data from imaging devices directly to voice recognition reports and decrease errors due to manual translation. By implementing ModLink, a vendor and modality neutral translation engine, Florida Hospital reduced radiologist reading times by 19%-28% and eliminated reporting errors.

Florida Hospital is owned and operated by Adventist Health System. It is one of the country's largest not for profit health care providers, with 8 hospital campuses in the greater Orlando area. Operating under one license, Florida Hospital provides care for more patients than any other hospital in the country. It has been recognized as the best hospital in Florida by U.S. News & World Report for the last 3 years.

The Radiology Department provides services at each of the 8 hospital locations along with 5 freestanding Imaging centers. The department performs more than 1.2 million exams each year. Radiology Specialists of Florida (RSF) employs more than 90 radiologists, providing leadership, oversight and interpretation for the department. In addition to covering the greater Orlando market, RSF provides services for 5 other hospitals within the Florida market that are also owned and operated by the Adventist Health System.

- **Products in use:** ModLink, ModLink WebForms

Challenge

The department performs over 120,000 ultrasound procedures per year. For several years, the Radiology Department sought a solution for transmitting data from imaging devices (particularly ultrasound units) directly to radiology reports generated by Nuance® PowerScribe® 360. This would increase efficiencies for both the radiologists and sonographers as well as reduce errors caused by manual translation of data.

The old process included the following steps:

- Sonographers wrote measurements on a paper form along with other narrative findings.
- The form was then scanned into the picture archiving and communication system (PACS) for the interpreting radiologist to review.
- The radiologist would read the form, and dictate measurements and other relevant findings into the patient's report.

The manual nature of the process created many opportunities for variation in how the measurements were documented, dictated and transcribed. The department employed half of a full-time employee (FTE) to review all obstetric (OB) ultrasound reports to ensure the data on the paper form matched what was transcribed in the final report.

> *"Now we have the metrics to prove we have eliminated reporting errors, which definitely impacts patient safety and changes patient management. The 19-28% improved physician reading time has made a positive impact on our practice. All of this is directly attributed to the Lexmark ModLink and PowerScribe 360 data integration."*
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> **Dr. Joe Bancroft**
> President
> Radiology Specialists of Florida

Lexmark™ Healthcare

"Ultrasound studies, particularly OB ultrasound, are now more popular for our radiologists to read. Before ModLink, the process of getting the right measurements into the patient's report was time consuming and error prone. Eliminating the dictation of measurements has made ultrasound studies something the radiologists want to interpret."

Marquita Williams
Ultrasound Modality Manager

"Once our first ultrasound department was prepared and the templates were built, the other site deployments were very straightforward and easy to implement. The expansion to our other imaging sites was handled internally by our team. We are planning on expanding the deployment to other modalities such as dual energy absorptiometry (DXA), enhanced CT, nuclear medicine and others as soon as possible."

Steve Gonzalez
PACS Administrator

Solution

After review of several options, Florida Hospital selected the ModLink DICOM Structured Report (SR) system. ModLink is a vendor and modality neutral translation engine that accepts DICOM SRs and HL7 messages, translates and normalizes values per department specifications and forwards the translated values to a voice recognition system via an API or HL7 message. ModLink is an easily-implemented software solution that transfers DICOM structured report measurements from any capable device directly into PowerScribe 360. ModLink WebForms can be added to streamline and enhance the data capture process. Florida Hospital has implemented forms with ModLink.

Like other businesses, radiology practices must enhance the customer experience, improve quality and reduce costs to remain profitable in today's highly competitive markets. Tools like ModLink enable radiologists to focus on clinical narrative, convey depth of expertise, maintain required levels of productivity and increase quality of life.

Deployment began in January 2015, on 40 ultrasound units manufactured by multiple vendors. Templates were first developed for the top 5 ultrasound studies. These studies comprised 50% of the total ultrasound volume. The process was implemented once testing was complete, and started with the busiest ultrasound sites. Additional exams continue to be added.

The new process is comprised of the following steps:

- Electronic form
  - Sonographers use an electronic form in ModLink to document narrative information about the study.
  - The form is also populated with the study measurements coming directly from the ultrasound unit.
  - The form is sent to PACS.
- The interpreting radiologist reviews the images and narrative information on the electronic form to create the final report in PowerScribe 360.
  - The measurements automatically populate the report template in PowerScribe 360 as part of this process.

Results

Radiologist Productivity

The adoption to ModLink was an easy transition for radiologists. Anecdotally, they reported improved workflow and an increased confidence in the data elements of the ultrasound reports. Prior to ModLink, radiologists might avoid reading some ultrasound studies due to the difficulty in getting all of the data transferred quickly and accurately from handwritten forms. Post ModLink that issue went away. Most of the information was filled in for the radiologists and they had less information to review and input.

"We found that Lexmark ModLink would automatically normalize and send all the SR data elements from our ultrasound systems or any other system into our PowerScribe 360 report templates. The value of one solution to map consistency in measurement reporting was the clear benefit experienced," says AJ Scarlato, Assistant Director, Management Information Systems (MIS).

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Analysis of actual interpretation times confirm what radiologists felt. Table 1 shows the results of an initial study of time savings for the first nine procedures measured. Typically, Florida Hospital is seeing time savings of 20% to 25%; or, on average, 60 seconds per exam of dictated time. Due to this initial success, since the nine exams were measured, Florida Hospital has added 20 more ultrasound exam types, is presently implementing dual energy absorptiometry (DXA) and is looking through all departments for data that is routinely in a report to map as well.

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"Ultrasound studies, particularly OB ultrasound, are now more popular for our radiologists to read. Before ModLink, the process of getting the right measurements into the patient's report was time consuming and error prone. Eliminating the dictation of measurements has made ultrasound studies something the radiologists want to interpret," says Marquita Williams, Ultrasound Modality Manager.

In the table below, time saved is directly correlated to the number of measurements per exam type with only six measurements in renal exam, saving an average of 37 seconds, and an ultrasound pregnancy routine exam with 19-23 typical measurements, saving on average 2 minutes and 31 seconds. Total time savings from just these nine exam types amounted to almost 90 hours per month.

Table 1. Average radiologist interpretation times before and after ModLink implementation (table form)

	Before ModLink	After ModLink				
	n(Studies)	n(Studies)	# SR Measurements	Avg Savings (minutes)	Savings %	Time Savings*
US Abdomen Complete	1686	2411	13	01:01	24.34%	12.00 Hr/Month
US Abdomen Limited	368	412	7	00:48	20.08%	1.73 Hr/Month
US Carotid	49	73	10	01:18	27.72%	0.50 Hr/Month
US Gallbladder	2447	3698	7	00:46	21.41%	12.38 Hr/Month
US Pregnancy < 14 weeks	1326	2184	13-15	01:32	20.69%	16.84 Hr/Month
US Pregnancy Routine	519	810	19-23	02:31	25.11%	12.55 Hr/Month
US Renal	2240	3559	6	00:37	18.06%	9.97 Hr/Month
US Thyroid	1333	1862	7	00:44	18.59%	11.44 Hr/Month
US Transvaginal Non-OB	2561	4055	10	01:14	24.81%	10.59 Hr/Month
Total	12529	19064		00:59	21.37%	88.00 Hr/Month

*Avg Savings times Monthly Volume

"We conducted our own internal audit of our radiology ultrasound reporting before Lexmark ModLink was implemented. The data proved we reduced the 3.5% error rate to 0% in the first two months after ModLink Deployment. This has significant impact with our referring physicians and our complete confidence in knowing any measurement data is automatically and electronically moved from any device to reports without physicians needing to manually dictate the values anymore. It is now no longer necessary to dedicate a 0.5 FTE for this auditing purpose. Lexmark solved that problem."

Lester Rilea
Imaging Enterprise Director

Error Reduction

One of the key drivers for implementing this product was the need to reduce data translation errors in the final reports, particularly with OB exams. An audit of 744 OB exams pre- and post- ModLink deployment demonstrated elimination of errors caused by legibility of worksheets, voice recognition, units of measurements and inaccurate worksheet documentation. The data from the ultrasound units was accurately transferred to the final report.

Period	n	Value Errors	%
Pre ModLink	342	12	3.50%
Post ModLink	402	0	0.0%
Total n	744		

Future Opportunities

Florida Hospital's implementation of ModLink has been highly beneficial in a number of areas, including:

- Elimination of ultrasound measurement reporting errors
- Significant reduction in radiologist read times
- Quick adoption across Florida Hospital's imaging enterprise

"Once our first ultrasound department was prepared and the templates were built, the other site deployments were very straightforward and easy to implement. The expansion to our other imaging sites was handled internally by our team," says Steve Gonzalez, PACS Administrator. "We are planning on expanding the deployment to other modalities such as dual energy absorptiometry (DXA), enhanced CT, nuclear medicine and others as soon as possible."

Additional opportunities include deployment at five other hospitals within the Florida Hospital system outside of the greater Orlando area, along with adding other modalities. Bone densitometry is also being implemented, and Florida Hospital is also seeking solutions to computed tomography (CT) contrast volume documentation and CT angiography measurement recording with ModLink. Nuclear Medicine is another modality that can benefit from ModLink's capability.

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