White paper

Reducing MRI exam cancellations through workflow optimization

Valley Radiologists

SIEMENS
Healthineers

Reducing MRI exam cancellations

Through workflow optimization

Valley Radiologists

Magnetic Resonance Imaging (MRI) Department

Outpatient imaging practice performing more than 40,000 MRI exams per year

9 MRI systems (5–3T, 4–1.5T)

Mission: Providing medical imaging excellence and patient-centered care through the use of advanced imaging technology for quality and accurate diagnoses.

How can you improve profitability while maintaining excellence in patient-centered care?

Kara Mayeaux, Director of Operations and Marketing at Valley Radiologists, and her team recognized that Valley Radiologists could leverage its MRI departmental and organizational data to drive process improvement; empowering its staff to better support Valley Radiologists' mission. The organization's MRI services spanned across six separate business locations, all supported from a central business office for processes of scheduling, insurance preauthorization, registration, and others. Mayeaux realized that strategically identifying areas of focus, data points, and additional factors to make necessary improvements for the patient experience and improve profitability would require significant time and resources.

To enable this transformation process at Valley Radiologists, the leadership and front-line staff collaborated with the Siemens Healthineers Clinical Innovations and Informatics team (Ci2) for ActExcell, a comprehensive advisory service designed to overcome these challenges. The shared goal of this team was to identify areas for potential improvement through objective data analysis and workflow assessment. The Ci2 team does this by translating data and analytics into improvement opportunities, leveraging change management implementation support setting the basis for continuous performance improvement designed to transform care delivery. Valley Radiologists, and other clients who utilize ActExcell, are paired with consultants from Siemens Healthineers, who form that organization's ActExcell team.

Leveraging data transparency to drive improvement

Smooth operations across Valley Radiologists hinges on efficient MRI scheduling and back office processes. However, Mayeaux suspected open appointment slots indicated inefficiencies within the current MRI scheduling workflow. Valley Radiologists had seen a drop in MRI equipment utilizationdespite consistent demand for MRI services, prompting the need to explore other potential causes.

Valley Radiologists provided a one-year history of detailed operational data, which was uploaded to the ActExcell dashboard tool within the Siemens Healthineers teamplay™ ecosystem. Access to this data helped drive the implementation of a digital, vendor-neutral, performance-monitoring dashboard. Using this business intelligence tool, specific to the ActExcell process, the Ci2 team was able to gather initial objective analysis of Valley Radiologists' operational elements and assess the areas of access, resource usage, reimbursement, and costs for potential improvement opportunities. (Figure 1)
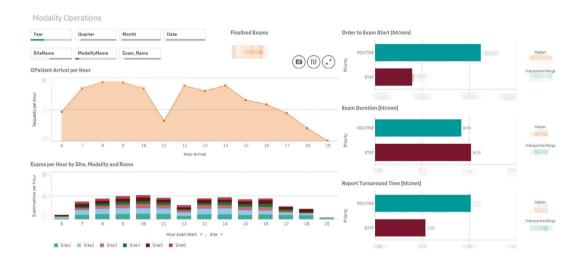

Figure 1: Modality Operations Page from BI Dashboard

The Ci2 team then went on-site to validate performance elements of Valley Radiologists' value stream—from MR exam request to final report delivery. Comprehensive mapping of operational workflows, interviews with key stakeholders, and on-site observations were documented serving as the foundation to detect workflow bottlenecks and process variations to formulate recommendations for improvement. (Figure 2)
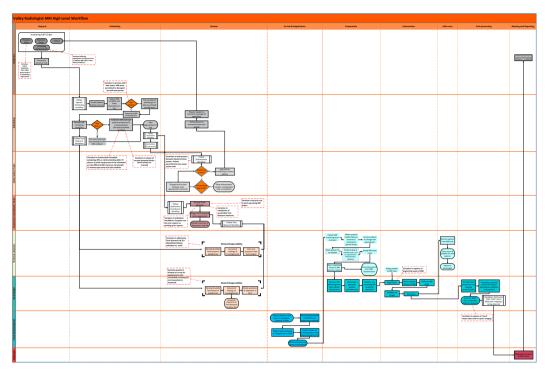
Figure 2: Current State Process Map Detailing Bottlenecks and Process Variation

Following the data analysis, benchmark comparison, and workflow mapping of current-state processes, The Ci2 team developed four defined opportunities in which to target financial performance, MRI equipment utilization, and patient-centered access to MRI services. (Figure 3)
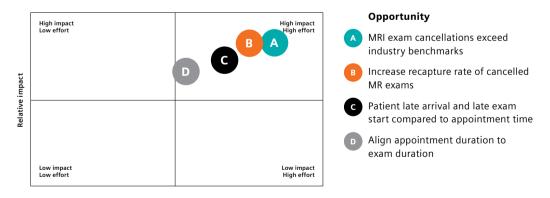

Figure 3: Example Prioritization Matrix

Visibility into the annual volume of MRI exam cancellations prompted Mayeaux to request an improvement project aimed at reducing cancellations to enhance both profitability and access to MRI services. Collaboratively, the Ci2 team and Mayeaux created a project charter to guide the improvement project and define the specific KPIs for project measurement. Next steps included the team probing further into the data to discover causal reasons for MRI cancellations.

To fully understand the reason(s) MRI exams were being canceled, further analysis using the ActExcell dashboard was required. It revealed the two most common reasons for cancellations were: 1) insurance problems and 2) patients canceling exams without rescheduling. Together, these two reasons accounted for 59% of all cancellations captured within the Radiology Information System (RIS).

Based on these findings, the project charter was developed with the following objectives: to decrease the overall number of MRI exam cancellations and reduce the number of cancellations due to the two most common reasons—insurance problems and patients canceling without rescheduling. The baseline measurements for overall MRI cancellation rate and in-scope cancellations were 19.5% and 11.6% respectively. The goal of the project was to reduce the overall cancellation rate by 2% (17.5%) and decrease the number of occurrences within the inscope cancellation category by 20%, bringing the in-scope percentage to ≤ 9.3%. Recognized project constraints of individual insurance authorization practices, physician discretion and/or patient condition(s) could result in canceled MRI exam(s) and were outside the sphere of influence for this project. The targeted timeframe to decrease the number of cancellations was four weeks. The project charter defined a Rapid Improvement Event (RIE) as the start of the project, which was led by the Ci2 team through ActExcell.

ActExcell from Siemens Healthineers

ActExcell is a comprehensive advisory service designed to help health systems and hospitals transform data and analytics into actionable insights. It supports providers in better understanding their utilization of existing imaging technology, acting promptly and effectively on available data and improving productivity, access to care and the patient experience.

Project execution to implementation

With the project's aim and scope established and specific targets set, the Ci2 team went on-site to conduct the RIE, which brings together a small team comprised of stakeholders from each area of the process. Valley Radiologists' leadership pulled together the necessary team for two days to conduct the RIE at its central business office. The team, led by two Ci2 members, consisted of two Valley Radiologists' leaders and nine staff members.

The first day of the on-site RIE began with several activities designed to energize the group for the project ahead, and introduce Lean concepts such as standard work and process mapping. After completing these activities and discussing the results, the project team began to map its current state. A large process map was built on one wall of the room with sticky notes and colored markers so the team could easily see and understand it. The collaboration required to complete this "as-is" picture of the current process led to several eye-opening moments, as group members from different functional areas gained a better understanding of work happening outside their own scope. The consultants then spent time teaching additional Lean concepts, including the eight types of waste, single-piece flow, error-proofing, and visual management. The training concluded with a simulation activity designed to reinforce the concepts in a fun, hands-on way for the Valley Radiologists' team. (Image 1)

At this point, the group was educated and equipped to evaluate their current process. The Ci2 team members facilitated discussions to help the project team identify concerns in their current state and then guide them to design an improved future state. Valley Radiologists pinpointed three key areas that needed to be addressed: the time delay in obtaining records from referring providers, inconsistent staff safety review processes, and a lack of shared understanding about which option to select in the RIS when a patient cancels.

Image 1: RIE Team Mapping the Current State Process

Valley Radiologists' current process required obtaining records from referring providers for insurance preauthorization. This caused delays in the existing workflow. To allow time for receiving the necessary records from referring physician offices and for the insurance carrier to process the request, patients were scheduled 3 to 14 days after receipt of the inbound MRI order. The number of days in advance was determined by following internal scheduling guidelines that had been developed by Valley Radiologists. If preauthorization was not obtained within 24 hours before the scheduled MRI exam, the patient was contacted and the exam canceled or rescheduled to avoid out-of-pocket expenses while insurance authorization was still pending. For its future state, Valley Radiologists decided to allocate the task of requesting provider records to a different functional area, allowing it to be completed earlier in the value stream. (Figure 4)

The Ci2 team also helped Valley Radiologists identify significant variation in the way clinical staff reviewed and cleared potential patient safety concerns (such as implants and prior surgeries). This led to increased same-day cancellations when questions remained unresolved before patients arrived for their exams. The team decided to create a standardized workflow for these clinical clearance tasks. (Figure 5)
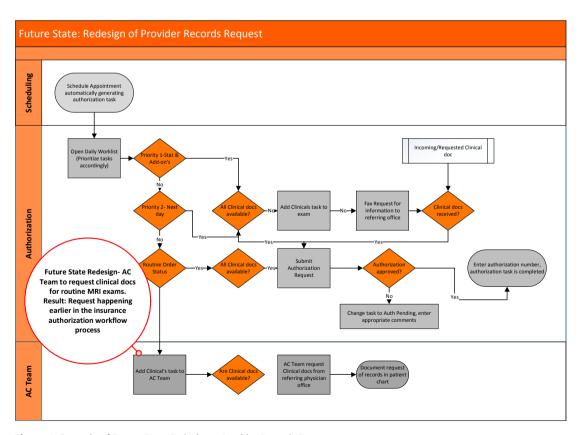

Figure 4: Example of Future State Redesign—Provider Records Request

Start Here (choose appropriate path)

Documentation Available (per patient)
- Call the patient
- Obtain information from the patient regarding implant; card, name of hospital, surgeon and date of procedure
- Add a sticky note with the current information
- Call the hospital, doctor's office or the implant manufacturer
- Provide fax/email information
- Implant card – encourage patient to bring card to the office 24-hours before their appointment to confirm implant safety (3T vs 1.5T vs not MRI safe)
- Documentation is received/researched and cleared by the MRI technologist
- Update the "device" alert (make/model/serial # w/ the tech name – 3T vs 1.5T – include date of implant surgery)
- Scan operative report, user's manual, or card into: patient devices and post-surgery implant information
- Perform the task
- Delete the "sticky note"

Waiting for Documentation (spoke to hospital staff, waiting on fax/email with implant information)
- Make 3 attempts
- Add a "sticky note" with progress
- Communicate with the patient – can the patient call the hospital for their records
- Reschedule the patient 24 hours prior to their appointment if no documentation received
- If we receive the documentation, review and clear by the MRI technologist
- Update the "device" alert (make/model/serial # w/ the tech name – 3T vs 1.5T – include date of implant surgery)
- Scan operative report, user's manual, or card into: patient devices and post-surgery implant information
- Perform the task
- Remove the "sticky note"

Documentation Not Available
- Call the patient
- Patient has no implant card, doesn't remember the hospital name or the surgeon
- Implant surgery was 10+ years – records have been purged
- Can the implant be cleared with X-rays? Consult with a Radiologist if not sure

no ↓

Implant/device cannot be cleared with X-rays due to type of implant/no other documentation available
- Notify the patient
- Notify the referring; fax a referring physician notification form and scan the "confirmation fax" into Fuji for documentation
- Update the "device" alert (document who made the decision to not clear implant with possible X-rays)
- Perform the task
- Notify the site manager via email

yes →

Non-Tech Research: pins, screws, fusion hardware, cataract/Lasik surgery, joint replacements
- Confirm patient is scheduled on correct scanner
- Review or add a "device" or "note" alert in Fuji (include year of surgery). Update if necessary > 3T vs 1.5T

Workflow For Clearing Tech Research List

- Check PACS whether there are prior exams (X-ray, CT, MRI) that a radiologist could review and possibly clear the implant
- Clearing with X-rays – patient must be scheduled for X-rays 24 hours prior to their MRI appointment time and during the week day for the radiologist to review & clear
- Add a "sticky note"
- Update the "device" alert

X-rays Cleared by Radiologist
- Notify the patient – confirm appointment time/date/location
- Update the "device" alert (radiologist who cleared the implant – include date of implant surgery if available – 3T vs 1.5T)
- Complete the task
- Delete the "sticky note"

X-rays Not Cleared by Radiologist
- Notify the patient
- Patient is canceled from the schedule (Fuji > metal in the body)
- Notify the referring; fax a referring physician notification form and scan the "confirmation fax" into Fuji for documentation
- Update the "device" alert (confirm type of implant. Not safe for MRI per the radiologist – include name)
- Complete the task
- Delete the "sticky note"
- Notify the site manager via email

Figure 5: Example Standard Workflow for Clinical Research Tasks

Cancellation Reason Crosswalk

If appointment is cancelled because: / Choose this reason in Fuji:	Authorization denied	Patient financial reason	Authorization pending	Med Guide GAD conflict	Claustrophobic	Metal in body	Contrast allergy	Equipment down	Exam cancelled due to labs out of range	Incomplete prep	Patient cancelled exam did not reschedule	Patient could not tolerate exam	Patient has pacemaker	Pregnancy or possibility of pregnancy	Patient was no show	Duplicate scheduled exam	Patient went to the wrong location	Referring physician cancelled exam	Scheduling error	Unable to access vein	Unable to obtain order	Waiting for authorization before rescheduling
Insurance authorization denied	x																					
Patient refused exam due to cost		x																				
Patient not able to have exam due to implant or metal in body						x																
Claustrophobic					x																	
Patient did not follow or receive prep, did not reschedule exam										x												
Patient had a family emergency											x											
Patient has pacemaker													x									
Patient could not complete exam due to pain												x										
Patient could not complete exam due to length of exam												x										
Patient wants to discuss with referring before rescheduling exam												x										
Patient did not show up for exam															x							
Patient is allergic to GAD/iodine							x															
Patient refuses to R/S when scanner goes down								x														
Unable to perform exam without contrast when labs are out of range									x													
Patient scheduled incorrectly, office is unable to accommodate																			x			
Referring physician office cancels patient exam																		x				
Auth pending patient would not reschedule			x																			
Patient refused exam after receiving Gad Med Guide				x																		
Patient is pregnant														x								
We cannot get a valid script/verbal																					x	
Unable to perform exam without contrast but unable to start IV																				x		
Patient showed up at wrong location, unable to accommodate																	x					
Duplicate exam/IBO																x						
Waiting for authorization before rescheduling																						x

Figure 6: Example Cancellation Reason Crosswalk Tool

Additionally, the Valley Radiologists team discovered there was no shared understanding among employees about which cancellation reason to select from the list of available options in their RIS when an appointment was canceled. Due to the lack of specificity in cancel reasons, it was presumed that most insurance preauthorization concerns were captured either in the category titled Insurance Problem or Patient canceled exam, did not reschedule. This led to a lack of confidence in the data, which prohibited Valley Radiologists from being able to make process step changes driven by data. The group decided to create a job aid for all employees that clearly defined which cancellation reason to use in specific circumstances so that future workflow decisions could be informed by reliable, meaningful data. Additionally, Valley Radiologists added several, more specific reasons, such as authorization denied and authorization pending to their list of available options to select when giving a reason for an exam cancellation. (Figure 6)

The second day of the RIE began with the Ci2 members leading the team in a discussion about the specific actions required to move Valley Radiologists from the current to the future state. For each required task, an owner was identified, and a target completion date was set. To maintain momentum and early wins, the team was urged to select the earliest achievable target dates. Once this implementation framework was finished, the team began to work on the tasks.

By the end of day two, the Valley Radiologists team had made significant progress toward the work needed to transform from the current state to the future state. Drafts of standard work had been created and were ready to be reviewed with the rest of the organization. Valley Radiologists leaders began this process by communicating the insurance authorization process changes to their employees and encouraged them to share their feedback as the new process was implemented. The ActExcell digital dashboard, which would allow Valley Radiologists to track their progress toward the goal, was introduced to the team.

After the on-site RIE, Ci2 members scheduled a weekly check-in call with Valley Radiologists leaders to monitor progress and provide coaching and course-correction as needed during project implementation. In addition, the Ci2 team worked remotely with members of the Valley Radiologists' project team to refine and complete their tasks. As with any improvement effort, it was important for the organization to understand that they would be making changes as part of a continuous Plan-Do-Check-Act cycle, and that they would likely need to adjust some aspects of the initial plan based on feedback and results. Mayeaux and Beth Allen, Valley Radiologists Manager of Clinical Operations, created an email group to keep everyone informed of the progress and engaged with the project. They named their project team the MRI Cancellation Avengers (Image 2).

"Thank you to the Ci2 team for all of their direction in this process. It has been a fantastic learning opportunity for all of us. We look forward to utilizing our new skills in other aspects of our practice."

Beth Allen CRA RT (R) (CT)
Manager of Clinical Operations, Valley Radiologists

Image 2: MRI Cancellation Avenger Team

Driving Performance to Results

A customized dashboard page (Figure 7) was created in the BI tool to monitor the defined KPIs and track changes in identified input areas. All members of the project team had access to the tool and were able to view the trended change of MR cancellations by day with line-of-sight to the aggregate of cancel reasons selected. Profitability improvement was displayed as a dollar amount based on the difference between the baseline average number of cancels per day compared to the baseline average of cancellations per day within the project timeframe and an average reimbursement for MR exams.

Figure 7: Customized Project Dashboard Page with KPIs

The implementation plan included confirming the newly defined standard work and communicating and deploying the developed tools along with ActExcell digital dashboard training for Valley Radiologists' team members. All communication and standard work tool deployment was accomplished by the targeted deadlines. (Figure 8)

Week One	Week Two	Week Three	Week Four
Developing	**Training**	**Verifying**	**Analyzing**
• Standard work: cancellation reason	• Standard work: cancellation reason	• Standard work: cancellation reason	• Standard improvement in cancellation rate
• Standard work: clinical research	• Standard work: clinical research	• Standard work: clinical research	• Financial impact in revenue potential
Training	**Verifying**	**Adjusting**	• Identification of next steps to continue driving improvement
• Workflow redesign: provider records request process	• Workflow redesign: provider records request process	• Data collection related to manual authorization processes	
• Visual Management: digital dashboard			

Monitoring KPI performance using digital dashboard

Figure 8: Implementation Timeline

At the completion of the four-week project timeline, statistical testing comparing baseline measurements to post-implementation data confirmed that redesigned insurance preauthorization process yielded a statistically significant improvement of 4.4 fewer cancellations per day over the course of the project, representing an 8% reduction. This conveyed a reduction to the overall MRI cancellation rate from 19.6% to 18.1%, with a potential annual revenue impact of more than $384,300.

Overall MRI equipment utilization increased by 3% over the project period, climbing to 62% from a baseline of 59%. Improved scheduling efficiency was realized due to fewer canceled appointments each day. One of the largest impacts of the process redesign was the reduction in the number of patient no-shows. During the monitoring period, the number of no-shows dropped by 49%. Because appointment no-shows are so disruptive to the daily operations in the clinical sites, this improvement was especially meaningful to the clinical staff at Valley Radiologists. (Figure 9)

Results

+3% in overall MRI equipment utilization

+2.4% in MRI gross revenue charges

-1.5% in overall MRI cancellation rate

-8% in MRI cancels per day

-4.4 MRI cancellation occurrences per day

49% decrease in patient no-show occurrences
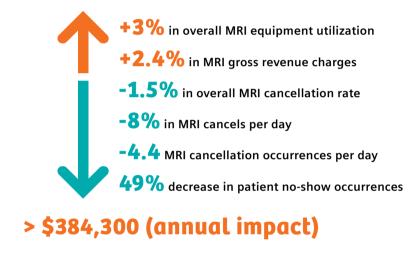
> $384,300 (annual impact)

Figure 9: MRI Cancellation Project Results

Through the course of the project, the defined in-scope reasons of insurance problem and patient canceled and did not reschedule increased to 12.1% from 11.7% and this may be in part from changes in insurance payer's practices regarding authorization for MRI exams. During the baseline measurement, some insurance payers did not require preauthorization for MRI exams, however, this condition changed during the project scope. Another contributing factor to the increase could be a result of having more insurance-related cancel reasons available to Valley Radiologists for selection. Increased clarity and specificity in cancel reasons was part of the standard work created from the RIE and therefore, more cancel reasons were counted and included in the in-scope reasons compared to the baseline measurement.

Transparency of Valley Radiologists' data and clarity provided from the added cancel reasons offered new insight into insurance-related MRI cancellations. Cancellations caused from insurance authorization denials became clearly understood, which was not known prior to the improvement project. Further data collection will advance the understanding around insurance providers and their denial rates.

Together, Valley Radiologists and the Ci2 team were able to improve profitability and the patient experience within the MRI service. The collaborative success demonstrated the value of data transparency in driving operational decision-making and help define the framework of process improvement across the organization. Mayeaux and Valley Radiologists' project team members will continue to monitor the MR cancellation rates and have proposed next-step actions to further drive performance improvement.

Given the positive results shown during the 4 week duration of the project and commitment of Valley Radiologists to remain focused on ongoing improvements in reducing MRI cancellations, the trajectory of increasing profitability and access to MRI services are expected to continue in a positive direction.

"The moment we initiated this project the level of support and management from the Ci2 team to facilitate and assist in executing our goals with reducing MR cancellations was tremendous... The rapid improvement event generated a tangible revenue impact and gave us a framework for future improvement projects."

Kara Mayeaux
Director of Operations and Marketing at Valley Radiologists

Summary

Patients

Patients of Valley Radiologists have a reduced chance of having their MRI appointment canceled due to lack of insurance authorization or incomplete clinical clearance.

Staff

Valley Radiologists staff have more clearly defined processes. Business office staff experiences less need for rework and clinical staff experience fewer no-show patients. Communication between both functions has become more effective.

Leaders

Valley Radiologists has achieved increased revenue potential and improved the profitability of MRI services by redesigning its workflow and reducing variation. Leaders at Valley Radiologists state that their partnership with Siemens Healthineers has given them a different perspective on all their processes, and its Ci2 team are excited to continue their journey of continuous improvement.

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