Achieving Performance Excellence: The Case for Standards-Based Radiology Quality Assessment

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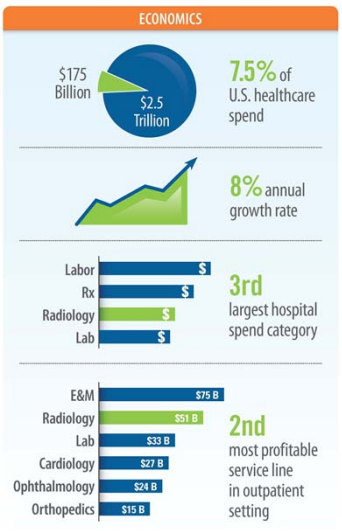
Radiology's Role in the Healthcare Continuum

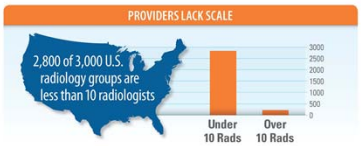
Nearly every hospital patient receives diagnostic imaging services and the quality of the radiology group's professional interpretations are a significant driver of patient safety, ED throughput, inpatient length-of-stay and patient experience.

Because radiologists play such a prominent role in the diagnostic process, it is critical that their interpretations are both definitive and accurate.

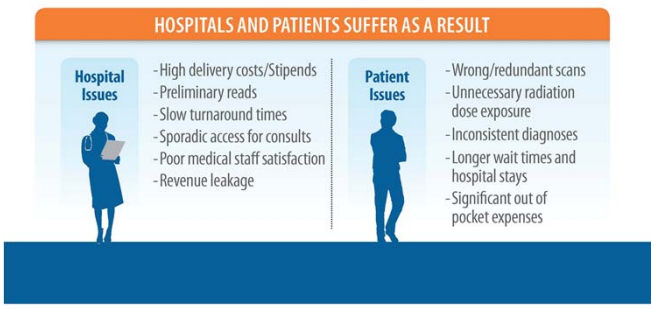


The Current Delivery Model is Flawed

Most radiology groups lack the scale to offer subspecialized interpretation of *complex* imaging studies like breast MRI, PET or CCTA. Small groups cannot reliably provide nighttime or weekend coverage, forcing the hospital to contract for vague and costly preliminary reads. These problems are particularly serious in rural markets.



Radiology Groups Aren't Accountable for Quality



A lack of defined performance standards in radiology leaves hospitals and radiologists uncertain about how to measure and improve quality.

Radiology Performance Measurement Initiatives

Hospital Payers and Accrediting Organizations are Focusing More on Radiology

Radiology Reimbursement is At Risk

Radiology Groups Must Measure Quality—and Improve Performance

PQRS Mandates Physician Reporting of Quality Measures to CMS

- ✓ Still a voluntary program with incentives in 2012; changes to a penalty program in 2013.
- ✓ Physicians (and physician groups) must report on at least three quality measures through claims, registry or EHR.
- ✓ Failure to comply will result in a net .5% reduction in 2013 and a net 1% reduction in 2014. Adjustment figures for 2015 and beyond have not been released.

Health Care Reform & New Payment Models Make Radiology a Cost-Center

- ✓ Hospital-Physician Bundled Payments will include a single payment to cover all hospital and physician services provided during a single inpatient stay.
- ✓ Episodic Bundled Payments will include a single payment for all health services during an episode of care.
- ✓ Shared Savings enables Accountable Care Organizations to receive shared savings payments if spending grows slower than the national rate.

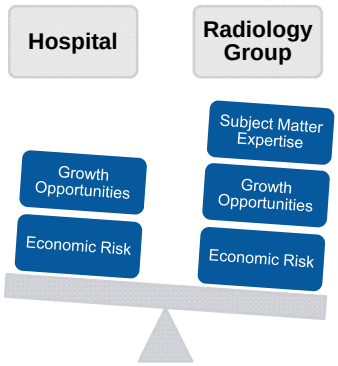
Hospitals Must Include Performance Expectations in the Radiology Contract

- ✓ Joint Commission and the Medicare Conditions of Participation require that radiology contracts include performance expectations and that the hospital holds the group accountable for the terms of the contract.
- ✓ If the radiology group does not perform as expected then the hospital must work with the group to improve performance or terminate the agreement.

Evaluating Radiology Isn't Easy for Hospitals

Collaboration with the Radiology Group is Needed for Effective Assessment

As the subject matter experts, radiology groups are essential partners in the quality improvement process and should actively demonstrate their value to the hospital rather than simply cooperating with hospital-led performance assessment efforts.



Radiology Performance Elements to Consider

There are many elements of performance that should be evaluated in the radiology department, including appointment wait times, image quality and patient safety. To evaluate the quality of the professional radiology service there are more than a dozen standards to consider.

There are only two of these areas where clear benchmarks for performance have been issued by professional societies or regulatory bodies.

RQI Radiology Performance Standards

The Radiology Quality Institute has developed a set of radiology performance standards that may be used to assess the quality of the service.

Radiology Performance Standards

Coverage
Final reports 24x7x365: No preliminary reads
Standardized and checklist-driven reporting technology
Consultations 24x7x365: <30 minutes
Subspecialty
100% of MR, Neuro, Nuclear and Pediatric imaging interpreted by radiologists with fellowship training and/or CAQ
<10% of all cases (excluding mammography) recommending follow up imaging
Interpretive Accuracy
Proactive double blind peer review: 1-2% of all studies
Clinically significant error rate: <2% of all studies
Automatic secondary reads of select high risk studies*
Turnaround Times
Hyper acute: <30 minutes
STAT: <60 minutes
Inpatient: <4 hours
Routine outpatient: <24 hours
End-to-end ED: <60 minutes
Critical Findings Compliance
Closed-loop communication of findings: <60 minutes
Automated Smart Phone alerts for referring providers
Voice Recognition
No transcription costs
100% self-editing
Utilization Analytics and Performance Reporting
Quarterly analysis of utilization data by physician, site of care, and modality
Quarterly performance reporting at the group and individual radiologist level

*High risk studies should include CBI Ultrasound, CT abdomen/pelvis, MR head and neck, and CT neck.

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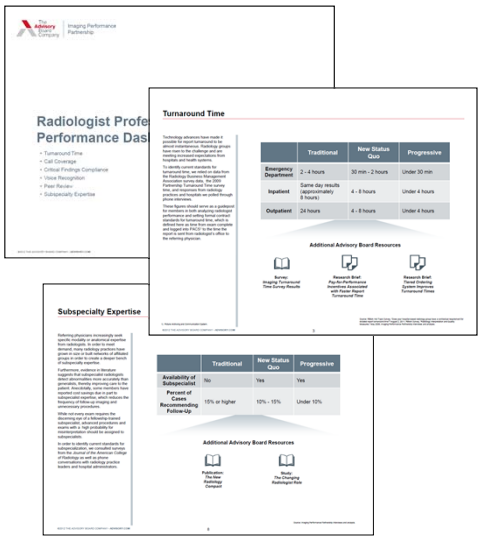
Advisory Board Company Performance Dashboard

The Advisory Board Company's Imaging Performance Partnership has published the "Radiologist Professional Services Performance Dashboard" to help its members benchmark the performance of their radiology group against traditional, status quo and progressive levels of performance.



Radiologist Profe
Performance Das

- Turnaround Time
- Call Coverage
- Critical Findings Compliance
- Voice Recognition
- Peer Review
- Subspecialty Expertise

Turnaround Time

	Traditional	New Status Quo	Progressive
Emergency Department	2 - 4 hours	30 min - 2 hours	Under 30 min
Inpatient	Same day results (approximately 8 hours)	4 - 8 hours	Under 4 hours
Outpatient	24 hours	4 - 8 hours	Under 4 hours

Additional Advisory Board Resources

Survey: Imaging Turnaround Time Survey Results

Research Brief: Pay-for-Performance Programs Associated with Faster Report Turnaround Time

Research Brief: Tiered Ordering Associated with Faster Turnaround Time

Subspecialty Expertise

	Traditional	New Status Quo	Progressive
Availability of Subspecialist	No	Yes	Yes
Percent of Cases Recommending Follow-Up	15% or higher	10% - 15%	Under 10%

Additional Advisory Board Resources

Publication: The New Radiologist Compact

Study: The Changing Radiologist Role

Essential Radiology Performance Standards

To ensure quality and safety, the assessment process for the radiology group should evaluate, *at a minimum*, five essential performance standards.

Report Turnaround Time

Why It Matters

- Vital to ED physician satisfaction and is an important driver of ED throughput.
- Strongly tied to hospital outpatient satisfaction, where consumerism is on the rise and referral leakage to freestanding facilities is a significant threat.
- Significant influence on hospital length of stay.
- The standard of care for stroke includes availability of brain imaging results within 45 minutes of ED arrival. Radiologists own 20 minutes of this window to interpret and communicate the exam.

How to Measure

- Report TAT should be measured by place of service, including emergency department, inpatient and outpatient.
- Average TAT and the percentage of cases completed within the contractual service levels should be evaluated.
- Special reporting should be provided for stroke protocol patients to ensure compliance.
- *Optimal assessment would also include end-to-end reporting times for key segments such as the ED.*

The Med Staff Feels the E2E Turnaround Time

Emergency Department End to End Turn-Around Time By Priority								
Priority	*Total Cases*	*# Late*	*% in TAT*	*Avg Order to Scan*	*Avg Scan to Send*	*Avg Received to Validate*	*Avg Radiologist TAT*	*Avg E2E TAT*
Hyperacute	296	39	86.82%	0:37:36	0:18:46	0:07:08	0:18:03	*1:21:34*
Stat	10866	580	94.66%	0:29:54	0:28:38	0:08:05	0:28:56	*1:35:33*
Expedited	2	0	100.00%	0:06:16	1:13:52	0:38:40	3:11:33	*5:10:21*
Routine	15	0	100.00%	0:48:36	2:56:38	8:58:38	4:13:19	*16:57:11*
Total	**11179**	**619**	**94.46%**	**0:30:11**	**0:28:36**	**0:08:53**	**0:28:59**	**1:36:39**

Departmental Workflow Efficiency | **Radiologist Performance** | **Bottom Line for the Patient**

- By measuring end-to-end turnaround time, the performance of all participants in the radiology service is captured.
- Data should be analyzed by priority level and also by modality.
- Identifies insufficient imaging capacity plus opportunities for improvement to the administrative workflow or radiologist interpretation times.

Case Study: The Impact of Turnaround Time

ED physicians complained that imaging report turnaround times were too long; the radiology group pushed back and indicated their data demonstrated report TAT of just 18 minutes. End-to-end analysis revealed that total TAT was more than 2 hours!

Southview ED Total Cycle Time December 2011						
Modality	*Total Cases*	*Order to Scan*	*Scan to Send*	*Receive to Validate*	*Radisphere TAT*	*E2E TAT*
CR	*1,511*	*00:28*	*01:02*	*00:10*	*00:16*	*01:56*
CT	*414*	*00:45*	*00:30*	*00:08*	*00:19*	*01:43*
US	*171*	*01:15*	*00:36*	*00:21*	*00:20*	*02:33*
Total	*2,096*	*00:49*	*00:43*	*00:13*	*00:18*	*02:04*

Southview ED Total Cycle Time November 2012						
Modality	*Total Cases*	*Order to Scan*	*Scan to Send*	*Receive to Validate*	*Radisphere TAT*	*E2E TAT*
CR	*1,509*	*00:31*	*00:23*	*00:08*	*00:20*	*01:23*
CT	*496*	*01:12*	*00:18*	*00:06*	*00:22*	*02:01*
MR	*1*	*01:05*	*01:05*	*00:04*	*00:25*	*02:40*
NM	*2*	*00:24*	*00:55*	*00:03*	*00:05*	*01:29*
US	*178*	*01:00*	*00:39*	*00:16*	*00:26*	*02:23*
Total	*2,186*	*00:42*	*00:24*	*00:08*	*00:21*	*01:37*

Long delays in front end workflow were identified in the emergency department E2E analysis. Performance improvement efforts over twelve months reduced E2E TAT by 27 minutes (more than 20%).

Critical Results Communication

Why It Matters

- Effective communication of critical results is a TJC National Patient Safety Goal
- Up to 80% of closed radiology malpractice claims involve failure to communicate as a causal factor, including both reliability and timeliness of the communication.
- Rapid reporting of radiology results directly contributes to good clinical outcomes. Example: administration of antibiotics within 4 hours of arrival to the ED decreases mortality by 15% in Medicare patients with community acquired pneumonia.

How to Measure

- Compliance should be audited by reviewing radiology reports for the presence of critical results with no documentation of enhanced communication.
- Average time to communicate, and the percentage of communications completed within the required timeframe, should be measured.
- Outlier cases should identified for root cause analysis and follow-up.
- *Automated critical results communication tools encourage radiologists to directly communicate more findings and enable easy analysis and reporting*.

Sources: Houck, Peter et al. "Timing of Antibiotic Administration and Outcomes for Medicare Patients Hospitalized With Community-Acquired Pneumonia." Arch Intern Med. 2004;164:637-644 and Brenner, James et al. "Communication Errors in Radiology: A Liability Cost Analysis." J Am Coll Radiol 2005;2:428-431

Automation Enables Robust Reporting

Documentation of critical results communication should always appear in the final radiology report; automated tools can also capture and record any historical communication attempts that take place before the communication loop is closed, enabling root cause analysis when a communication does not occur within expected timeframes.

Critical Findings			
Total Study Volume:	4,731	**Critical Finding Volume:**	337
% of Study Volume with CF:	7.12%	**Average Time to Communicate:**	00:29
% Called on Time:	99.20%	**Compliance Audit Result:**	100.00%

* Critical Finding Turn Around Time is 1 hour

Case Study: Radiology Communication Failure

15 yr. old male presents to ED with trauma after ATV accident. Child is known to be accident prone and was treated two months earlier for injuries to left lower extremity after a skate board accident. X-rays of multiple extremities and chest are performed; all x-rays are negative for fracture but radiologist notes the presence of a 5.6 x 6.4 x 4 cm soft tissue mass in the left hilar region and anterior mediastinum. *Radiologist recommends CT for further evaluation but does not call the ED physician to discuss the finding and ensure follow-up.* Child is discharged to home.

3 months later the child presents to the ED again with persistent facial pain related to the accident; x-ray of nasal bones are negative and child is again discharged to home. 4 months later the child returns to the ED with back pain; x-ray of the lumbar spine is normal and x-ray of thoracic spine notes mild degree of lost bone height at T-10. Child is discharged to home.

6 months after the ATV accident the child returns to the ED after a fall with continued back pain. The large chest mass is now detected on thoracic x-ray; CT and MR imaging demonstrate that the size has massively increased to 14.4 x 9.6 x 8.3 cm with metastasis at T-9. Final Dx: Stage IV Hodgkin's Lymphoma

Interpretive Accuracy

Why It Matters

- TJC requires ongoing professional practice evaluation. For radiologists this is typically accomplished using peer review.
- A significant percentage of radiology interpretations contain clinically significant errors. Peer reviewed research indicates the rate ranges between 0.8%-9.2% in the community hospital setting.
- Radiology error creates $31B annually in downstream costs.
- It is possible to minimize interpretive error through specialization, use of diagnostic checklists and effective peer review.

How to Measure

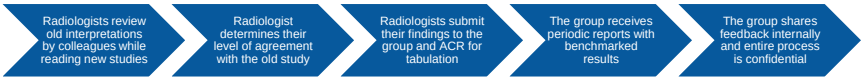
- MQSA medical outcomes audit to evaluate the positive predictive value of mammography.
- Disagreement rates between radiologists can be measured using self-reported peer review data (e.g. RADPEER™). This method is cost-effective but underestimates error due to problems with selection, detection and reporting bias.
- *Prospective, double-blind peer review provides a statistically valid and objective assessment of interpretive accuracy for benchmarking purposes.*

Sources: Siegle, RL, Baram, EM, Stewart, RR, et al. Rates of Disagreement in Imaging Interpretation in a Group of Community Hospitals. *Acad Radiol.* 1998 Mar;5(3):148-54 and "A New Radiology Delivery Model", Radisphere 2011

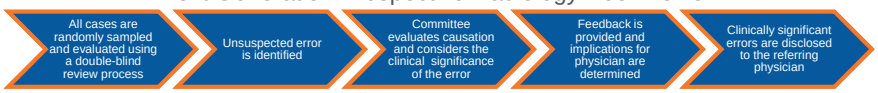
Best Practice for Radiology Peer Review

Traditional Model of Retrospective Medical Peer Review

RADPEER Retrospective Radiology Peer Review



Next Generation Prospective Radiology Peer Review

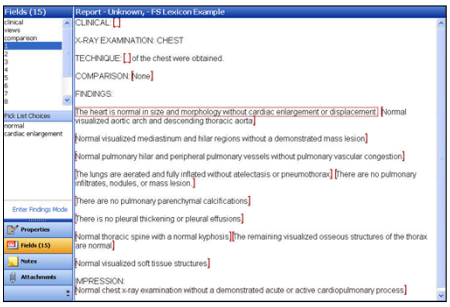


- Statistically valid sampling enables accurate estimation of error rates.
- Eliminates any potential bias by ensuring that reviews are double-blind.
- Rapidly uncovers previously unsuspected errors to facilitate the correct treatment.
- Helps radiologists by increasing opportunities for feedback and learning.

Systems Approach to Quality & Safety

Spotlight: Diagnostic Checklists

- Radisphere's proprietary structured examination reporting system provides a diagnostic checklist for more than 400 examination types.
- Framework for systematic inspection of all images & anatomic structures, lessening the likelihood that obvious pathology will distract the reader from detecting a subtle or unexpected finding.



Diagnostic checklists ensure reports are consistently formatted & promotes consistency in report terminology.

Case Study: Diagnostic Error in Radiology

78 yr. old female presented to the ED with intractable neck pain one week after a cervical spine epidural injection for pain management was performed. Cervical spine MR was performed; the radiologist correctly identified the patient's multi-level severe stenosis and associated cord compression but failed to appreciate the posterior and left lateral epidural hematoma extending distally from C3-C4.

Shortly after this the patient suffered an acute MI, was hospitalized and started on anti-coagulation therapy because the presence of the epidural hematoma was unknown. The patient suffered progressively worsening neurological impairment after anti-coagulation so three days after the initial MR the patient had a follow-up MR of the cervical and thoracic spine.

Dx: Epidural hematoma in the dorsal central canal greater on the left extending from C3 through the upper thoracic region, demonstrating cord impingement and peripheral enhancement.

Outcome: Patient was immediately taken to surgery to evacuate the hematoma but she never recovered, failed to wean off of the ventilator and expired two weeks after the initial pain management procedure.

Imaging Utilization

Why It Matters

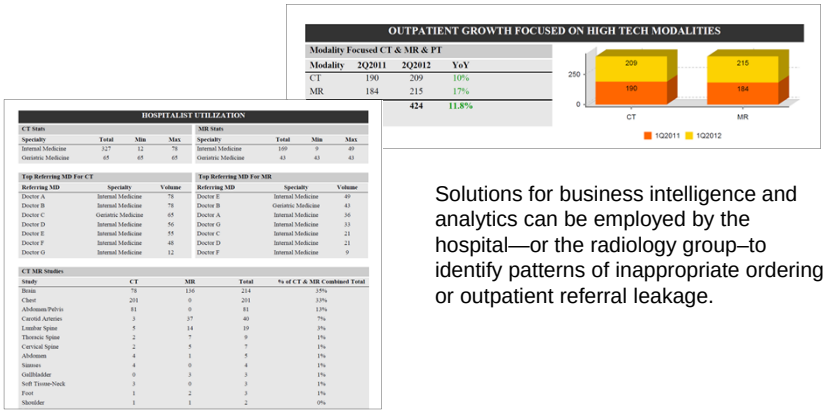
- About 30% of health spending, or roughly $750 billion a year, is wasted on unnecessary services.
- Unnecessary imaging increases risk from radiation exposure, provokes costly investigation of incidental findings and prolongs hospital length of stay.
- ABIM's "Choosing Wisely" campaign aims to curb low value tests. More than half of the recommendations issued target diagnostic imaging.
- Campaigns like Choosing Wisely are focused on education…for now. Risk based payment will up the ante in the future.

How to Measure

- Mammography recall rates should be evaluated as part of the MQSA medical outcomes audit.
- The radiologist's rate of recommendation for follow-up imaging can be calculated by auditing reports.
- *Imaging utilization metrics help hospitals identify patterns of inappropriate ordering, the need for new services, or where investment is needed to expand capacity.*

Sources: "Best Care at Lower Cost: The Path to Continuously Learning Health Care in America", Institute of Medicine, 2012 and www.choosingwisely.org

Leveraging BI for Utilization Insight



OUTPATIENT GROWTH FOCUSED ON HIGH TECH MODALITIES

Modality Focused CT & MR & PT

Modality	2Q2011	2Q2012	YoY
CT	190	209	10%
MR	184	215	17%
	424		11.8%

HOSPITALIST UTILIZATION

CT Stats

Specialty	Total	Min	Max
Internal Medicine	327	12	78
Geriatric Medicine	65	65	65

MR Stats

Specialty	Total	Min	Max
Internal Medicine	169	9	49
Geriatric Medicine	43	43	43

Top Referring MD For CT

Referring MD	Specialty	Volume
Doctor A	Internal Medicine	78
Doctor B	Internal Medicine	78
Doctor C	Geriatric Medicine	65
Doctor D	Internal Medicine	56
Doctor E	Internal Medicine	55
Doctor F	Internal Medicine	48
Doctor G	Internal Medicine	12

Top Referring MD For MR

Referring MD	Specialty	Volume
Doctor E	Internal Medicine	49
Doctor B	Geriatric Medicine	43
Doctor A	Internal Medicine	36
Doctor G	Internal Medicine	33
Doctor C	Internal Medicine	21
Doctor D	Internal Medicine	21
Doctor F	Internal Medicine	9

CT MR Studies

Study	CT	MR	Total	% of CT & MR Combined Total
Brain	78	136	214	35%
Chest	201	0	201	33%
Abdomen/Pelvis	81	0	81	13%
Carotid Arteries	3	37	40	7%
Lumbar Spine	5	14	19	3%
Thoracic Spine	2	7	9	1%
Cervical Spine	2	5	7	1%
Abdomen	4	1	5	1%
Sinuses	4	0	4	1%
Gallbladder	0	3	3	1%
Soft Tissue-Neck	3	0	3	1%
Foot	1	2	3	1%
Shoulder	1	1	2	0%

Solutions for business intelligence and analytics can be employed by the hospital—or the radiology group–to identify patterns of inappropriate ordering or outpatient referral leakage.

The Harm Associated with Too Much Imaging

Choosing Wisely®
An initiative of the ABIM Foundation

Things Physicians and Patients Should Question:
Early Imaging for Non-Specific Low Back Pain

	Medical Expenses after MRI Performed	Days of Disability	Occurrence of Surgery
Early MRI	$10,411	65	23.8%
No MRI	$1,487	10	2.9%

Source: Webster B, "Relationship of magnetic resonance imaging for work-related acute low back pain with disability and medical utilization outcomes," J Occup Environ Med, 2010; 52:900-7;

- Low back pain is the fifth most common reason for all physician visits.
- Imaging is often performed in the absence of signs of serious underlying illness such as cancer or infection.
- *Early imaging of the lower spine (in less than 4 weeks) is associated with higher expenses, more surgery and longer disability.*

Medical Leadership

Why It Matters

- Medical staff satisfaction is closely tied to radiologist participation.
- The radiologist is the hospital's subject matter expert for the dept.
- Regulatory pressure to address key safety concerns in radiology
  - Joint Commission Sentinel Alert on radiation risks
  - California Medical Radiation Safety Act
  - CIN as a HAC? Potentially yes. CMS proposed it for 2012, and withdrew based on concern that ICD-9 will not support accurate identification of the condition.

How to Evaluate

- Interview department staff to identify the level of radiologist participation in protocol development, tech training, etc.
- Assess radiologist contributions to hospital-wide quality and safety initiatives such as radiation dose reduction.
- Track radiologist attendance at medical staff meetings, tumor boards and quality committees.
- *Periodic medical staff satisfaction surveys provide vital feedback.*

Keeping Watch on Referrer Satisfaction

Name (Optional):_____
Your Specialty:_____

	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree
1. I trust the radiology interpretations that I receive	☐	☐	☐	☐	☐
2. Radiology reports are delivered in a timely manner	☐	☐	☐	☐	☐
3. I am able to consult with radiologists in a timely and efficient manner	☐	☐	☐	☐	☐
4. The report format and content I receive meet my needs	☐	☐	☐	☐	☐
5. I have adequate access to IR services	☐	☐	☐	☐	☐
6. I would refer the current radiology service to a colleague	☐	☐	☐	☐	☐

Surveys of the medical staff:

- Provide a periodic snapshot of satisfaction with the radiology service
- Can identify potential sources of referral leakage
- Reveal opportunities for performance improvement and better collaboration

Achieving Excellence in Radiology

The Process Starts When the Goals are Defined

- The task of developing radiology performance metrics is best accomplished when the hospital and the radiology group collaborate. The requirements for basic professional performance metrics like report turnaround time should be included in the group's contract with the hospital.
- Stakeholders should review of published standards and research from credible industry sources like the American College of Radiology (ACR) and the Radiology Business Management Association (RBMA).
- Industry information provides the framework in the goal-setting process, but expectations for performance must be further refined based on the available resources, capabilities and current level of performance.

The Bottom Line

To achieve excellence in radiology the hospital and radiology group must be:

- Aligned in their objectives
- Curious about performance
- Transparent about results
- Driven to improve quality

Willing to invest the resources necessary to do it!

Additional Resources

- The Advisory Board Company has published the "**Radiologist Professional Services Performance Dashboard"** under its Imaging Performance Partnership. This resource provides specific benchmarks that hospitals can use to evaluate the performance of their radiology group on elements like report turnaround time, critical findings compliance and peer review.
- The Radiology Quality Institute has published "**Diagnostic Accuracy in Radiology: Defining a Literature-Based Benchmark"** which provides insight on interpretive accuracy based on a review of peer reviewed research.
- The Radiology Quality Institute has also published an eBook entitled **"Ten Best Practices for Remodeling Radiology"** to help hospitals learn how adopting a systematic approach to radiology performance assessment can help meet the growing demand to provide high-quality, safe and cost-effective care.

About the Radiology Quality Institute

The Radiology Quality Institute (RQI) is a collaborative research organization dedicated to the identification and promotion of radiology quality standards and process improvements. With access to Radisphere's extensive quality data, analytics, and outcomes, the Radiology Quality Institute is focused on developing performance benchmarks and sharing relevant information to deliver measurable improvements in radiology quality for unparalleled levels of patient care.

For more information please visit www.radiologyqualityinstitute.com *and join the "Radiology Quality Institute" group on*

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