"A tsunami of change is taking place in the way patients, physicians, administrators, regulators, legislators, payers, employers, and society in general views health care, including its quality and safety and the accountability of all involved."

The Institute of Medicine’s landmark report, To Err is Human, concluded that as many as 98,000 Americans die in U.S. hospitals each year as the result of medical errors. That report and the institute’s follow-up study, Crossing the Quality Chasm, a New Health System for the 21st Century, made improving the quality of patient care a national priority.

Today, patients, payers, and regulators now expect every hospital and medical system to have ongoing quality improvement programs that protect patients and guarantee the provision of the best, most cost-effective care.

To guide quality-improvement efforts in the field of radiology, professional associations and credentialing bodies, such as the American College of Radiology and the American Board of Radiology, respectively, have drawn up scores of guidelines, revised technical standards and established new certification criteria.

To date, however, there is no established set of standard best practices that hospitals can use to gauge the quality of their radiology services.

Without such standards, it is impossible for a hospital to identify its radiology service’s strengths and weaknesses, set clinically relevant performance targets, and track the progress of quality improvement efforts.

“Most observers of work in areas of quality and safety point to system factors, not individual performance, as the most important root cause of the problems facing the health care system.”

What should such a set of standard best practices for radiology look like? Ideally, the standards would identify practices that were clearly defined, measurable, and clinically important. In the specialty of radiology, in particular, such standards would address three broad areas of practice quality:

1. **Expertise:** Refers to the medical knowledge and clinical expertise of the radiologists.

2. **Communication:** The quality, accuracy, and timeliness of radiologic reports and consultation.

3. **Leadership:** The radiology service’s contribution to the medical center’s overall mission by full participation in clinical conferences, quality assurance initiatives, and utilization reviews.

Based on extensive research of industry benchmarks and standards, this eBook will examine the 10 Best Practices in Radiology, as detailed on the following page.
To referring clinicians and patients, a good radiologist is one who is accessible, recommends appropriate imaging studies, and provides timely consultation and reports with high interpretation accuracy.


Based on extensive research of industry benchmarks and standards, this eBook will examine the following 10 Best Practices in Radiology:

**Expertise**

1. **Subspecialty Coverage:** Availability of all subspecialities ................................................... 6

2. **Peer Review:** Frequent, random, double-blind peer review .................................................. 7

3. **Concurrence Review:** Second reading of high-risk studies ................................................... 8

4. **Real-time Consultation:** On-demand, direct phone consultations with a radiologist 24 hours a day ........................................................................................................ 9

5. **Interventional Radiology – Onsite:** Full-range interventional services onsite .............................................................. 10

**Communication**

6. **Checklist-driven Structured Reports:** Checklist-driven study review and standardized reports ............................................................................................................. 12

7. **Guaranteed Turnaround Time:** Set turnaround times for acute, emergent, and routine reporting ............................................................................................................. 14

8. **Timely Critical Finding Reporting:** Critical findings communicated promptly and directly to the referring/responsible physician ................................................................................ 15

**Leadership**

9. **Team Participation:** Full participation in medical executive committees, tumor boards, and quality assurance programs ................................................................................ 17

10. **Quality Improvement & Utilization Review:** Routine tracking, reporting and analysis of service performance, quality and imaging utilization by referring physicians, specialty and modality .................................................. 18
“Although the diagnostic accuracy of radiologists is routinely measured at most institutions by means of peer review processes, systems for evaluating procedural competency are not widely available. Consequently, technical skills are seldom, if ever, evaluated or managed.”


01 Subspecialty Coverage

Most hospitals now seek to offer their patients the full range of subspecialty care. Such care should include availability of all subspecialties in radiology.

Repeated studies have shown that subspecialist radiologists provide more accurate and higher-quality interpretations, especially of difficult to read CT and MR images.

For example, a study of emergency abdominal and pelvic CT studies of 512 trauma cases read initially by either a general radiologist or a board-eligible radiologist found a 27% discrepancy between the initial interpretation and secondary readings by specialist radiologists — discrepancies that resulted in a change in treatment in 7.8% of the reinterpreted cases.

Reliance on general radiologists to interpret specialist studies, even as a “first read,” clearly can lead to errors in diagnosis, delay in the initiation of appropriate care, and unnecessary follow-up studies.

Ideally, a radiologic service should be able to provide coverage in the following subspecialties: Cardiovascular, musculoskeletal, neurologic, nuclear medicine, oncologic, pediatric, women’s imaging and body imaging.

Subspecialty coverage not only assures referring physicians receive the most accurate interpretations, but it also provides them with expert guidance for selection of the most cost-effective initial and follow-up studies.
The risk that important findings are being missed or misinterpreted is real. In a 1998 paper appearing in the Journal Academic Radiology, researchers reviewed over 11,000 images read by 35 radiologists working in six community hospitals. The researchers found a 4.4% mean rate of interpretation disagreement. A qualitative analysis of the interpretation errors determined there was a mean rate of 3.0% of errors that were considered to be below an acceptable standard of care.

Peer review is clearly one of the best ways to reduce errors and monitor performance. If done well, it can also serve as a powerful, professional development tool, allowing radiologists to continually test and hone their skills.

However, in many departments peer review programs are not as rigorous as they should be, often because radiologists are uncomfortable critiquing their colleagues’ work.

For maximum benefit, therefore, peer review should be double-blind, rigorous, and frequent and incorporated into the workflow so that it becomes a routine and accepted part of practice and professional development.

Peer review should include not only the evaluation of the accuracy of interpretations, quality of reports and consultations, but also the quality of staff and patient interactions.

“For peer review of physician performance, the challenge is to convince radiologists that the task of double reading or reinterpreting studies is beneficial rather than a bureaucratic requirement.”

In cases of critical clinical situations or difficult-to-interpret studies, a concurrent (“second” or “double”) reading should be routine and mandatory. Repeated studies have shown that even the most competent radiologist can fail to see a critical result or misinterpret its significance.

For example, a study published in 2004 by the Journal of the American College of Radiology looked at more than 6,700 cases that were double read by a group practice of 26 radiologists. That paper found an overall disagreement rate of 3.48%, as well as disagreement rates of 3.03% for general radiology, 3.61% for diagnostic mammography, 5.79% for screening mammography, and 4.07% for ultrasound studies. The researchers also reported that disagreement rates by radiologist for the 10 radiologists with at least 20 cases ranged from 2.04% to 6.90%. These and other studies indicate that there can be a wide variation in error rates between individual practitioners and the modality used.

In one recent study of more than 500 CT angiographic studies of the head and neck, a second reading by two neuroradiologists found that 4% of the initial interpretations missed significant findings that would have changed management or follow-up.

A second look by “fresh eyes” reduces the risk of such errors and should be part of the workflow for images concerning defined clinical situations, such as suspected cervical fracture and abdominal trauma, and difficult-to-read studies, such as brain scans of patients with possible early stroke.

Routine “second reading” of studies at risk for significant variation in interpretation and error is a key element in any systems-based approach to mistake-proofing the diagnostic process.
At any time, radiologic expertise may be needed to aid in treatment planning and care.

Consultation with a qualified radiologist can help clinicians select the best diagnostic procedure or intervention. It can also provide additional information and insights to supplement available reports.

The value of expert radiologic consultation is well established. A 1984 study found establishment of a ward-based consultation service at Albert Einstein College of Medicine reduced time to diagnosis by 64% with a 32% reduction in the number of imaging studies for patients with right upper quadrant pain, gastrointestinal bleeding or an abdominal mass. Another study, published in AJR in 1986, found that radiology consultation reduced the average hospital stay length by 2.8 days.

But for a consultation to be of greatest value, it must be timely. Therefore, a radiologic service should be able to provide real-time telephone consultation services 24 hours a day. Such availability greatly enhances a hospital’s ability to provide cost-effective, high-quality services efficiently and avoid potentially dangerous delays in care.
Interventional radiologic procedures have been shown to pose less risk, cause less pain, and require shorter hospitalizations than surgical procedures — thus, a robust interventional radiology service can both enhance patient care and reduce costs.

Although some medical specialists, such as qualified cardiologists, can perform a variety of interventional procedures, only onsite interventional radiologists can provide the full range of minimally invasive diagnostic studies and image-guided interventional services that have increasingly become the standard of care. While the landscape is changing, interventional radiology services need to be provided based on procedure volume and patient care implications at the hospital.

In addition, as a member of the hospital’s team, onsite interventional radiologists provide valuable support to other specialists performing image-guided interventions, aiding them with patient evaluation, procedure selection, and assistance during procedures.
“Communication with referring physicians has always been in the top tier of quality measurement categories for radiology departments, and improvement will likely lead to improved patient care and a better outcome.”

Communication error is one of the most common causes of medical errors. This is especially true in radiology, where much depends on the accuracy, completeness, and readability of the radiologist’s report. Systematic reporting requirements can greatly reduce the chance of errors in communication.

Standardized, checklist-driven structured reports help reduce errors of omission and enhance the readability.

First developed to reduce pilot error in the cockpit, checklists have been adopted in a variety of industries including healthcare to “mistakeproof” processes.

Radiologists who adhere to checklist-driven protocols are much less likely to miss rare, easily overlooked, often incidental — but crucial — findings.

Diagnostic checklist-driven reports, in turn, assure that critical results are highlighted and that interpretations are as readable and informative as possible, further reducing the risk of miscommunication and error.

Structured reporting also helps accelerate report turnaround time, simplify documentation for billing and regulatory compliance, and ease the process of data extraction for utilization review, quality assurance, and research.
Checklists From Flight Deck To O.R.

The value of best practice standards was vividly demonstrated in the landmark 1999 New England Journal of Medicine article, “A surgical safety checklist to reduce morbidity and mortality in a global population.”

In that study, the implementation of a simple, 19-item checklist, modeled on the pre-flight, safety checklists used by pilots in the aviation industry, reduced postoperative complication rates by 36% on average and death rates by 47%.

“If someone discovered a new drug that cut down surgical complications with anything remotely like the effectiveness of the checklist, we would have television ads with minor celebrities extolling its virtues. Detail men would offer free lunches to get doctors to make it part of their practice. Government programs would research it. Competitors would jump in to make new and better versions. If the checklist were a medical device, we would have surgeons clamoring for it, lining up at display booths at surgical conferences to give it a try, hounding their hospital administrators to get one for them — because, damn it, doesn’t providing good care matter to those pencil pushers?”

– Atul Gawande, The Checklist Manifesto
A major source of physician — and patient — dissatisfaction is the lack of timely reporting of test results, especially when findings are important for clinical decision-making.

In a recent study, 95% of patients surveyed say they wanted to receive the results of their radiologic studies “within hours,” suggesting timely reporting is now an important factor in patient satisfaction.

But more important to the quality of care, failure to report results in a timely fashion can lead to dangerous delays in diagnosis, unnecessary additional testing, and inappropriate treatment.

Appropriate report times will vary depending on the clinical situation: ranging from within 60 minutes for emergent cases of acute critical need, to within shift for routine in-patient studies, to within 24 hours for routine studies, such as outpatient screening exams. Some radiology groups that diligently track their turnaround times are able to deliver final reports in less than 30 minutes for emergent cases and in less than five hours for regular cases, on average.

To assure timely reporting, turnaround times should be clearly established, tracked, and reported.
Radiologists must not only document critical results in their reports, but they must also proactively contact referring physicians by phone at the time of diagnosis to communicate those findings.

Studies have shown that delay in reporting of critical results is common. Delays occur for a variety of reasons. The radiologist may not communicate the results directly to the referring physician, relying instead on email, for example, allowing the information to be overlooked or received by the wrong physician. A 2010 study of a sophisticated computer alert system, appearing in the Archives of Internal Medicine, found that of 123,638 studies, 1,196 images (0.97%) generated alerts. Of these, 217 (18.1%) were unacknowledged by the health care provider. “Nearly all abnormal results lacking timely follow-up at four weeks were eventually found to have measurable clinical impact in terms of further diagnostic testing or treatment,” the researchers reported.

The most reliable way to assure critical results are communicated to a physician caring for the patient is direct phone contact.

A survey conducted by the Physician Insurers Association of America found that communication errors were the fourth most frequent primary complaint in malpractice suits filed against radiologists. In cases involving failure to communicate urgent or unexpected findings, the radiologist failed to directly communicate with the referring physicians in nearly 60 percent of cases. “This high rate of error,” noted Dr. R. James Brenner, clinical professor of Radiology and Biomedical Imaging at the UCSF School of Medicine, and colleagues in a review of the survey, “is influenced by the fact that in one-sixth of the cases no system was in place to identify and communicate significant findings to referring physicians.”

To meet today’s standard of practice, the type of findings meriting expedited reporting should be defined, a clear protocol for reporting to the referring physician established, and an audit trail should document the successful communication of the results to the referring physician.
Leadership
Increasingly, health care systems are adopting a team approach to health. Participation and engagement with the team is essential for effective quality improvement. The radiology service has substantial contributions to make to such initiatives.

To make that contribution, radiologists need to be fully engaged in a hospital’s clinical program. This includes active participation in medical executive committees, tumor boards, grand rounds, and quality assurance programs.

There, they can provide their insights into the diagnosis of disease, discuss the capabilities and limitations of other radiologic examinations, and explain the advantages and disadvantages of possible image-guided interventions.

In the area of patient safety, radiation dose reduction has become a major concern. The hospital’s radiology team must take a leadership role in educating the medical staff about alternative imaging examinations, such as MRI and ultrasound which do not involve ionizing radiation, and in drawing up and implementing revised CT master protocols to eliminate triple-phase scanning wherever possible.

Such input is essential for patient care and staff education. Radiologists, in turn, have much to gain from participation in department conferences, learning about the latest in clinical care from their colleagues in medical and surgical practices.

A hospital’s radiologic service should be an active member of the hospital’s team and dedicated to the hospital’s overall mission.
Finally, application of the preceding best practice standards will not be successful without ongoing, systematic, data-driven review. That means metrics to track radiology service quality and imaging utilization need to be clearly defined, systematically measured and actively managed.

To be successful, this process requires full transparency between the radiology group and the hospital. Such a systematic and open approach demonstrates to the hospital’s medical and surgical staff that its radiology team is performing optimally, that the team’s quality meets the highest standards, and that the hospital’s equipment and facilities are being used most productively — greatly enhancing the medical staff’s satisfaction with its radiologic service.

Metrics should track two key areas: radiology team performance and imaging utilization. Team performance metrics should detail peer review and concurrent reading rates, turnaround times, and critical result reporting. Such reporting assures quality standards are being met and identifies areas for improvement. Required reporting of performance metrics assures that the radiology team is meeting or exceeding its performance targets and is actively involved in quality improvement efforts.
Image utilization metrics track the volume and usage of the hospital’s imaging resources. These metrics should include not only the types of services being performed, but also should identify the referring physicians, their specialty, and the circumstances of the referral. Such information not only assures that the best evidence-based care is provided, but it also makes it possible for the hospital administration to identify the requirements of referring physicians and the need for additional services — be they outpatient, specialist, or interventional — and to identify areas, such as mammography, women’s imaging, or other specialty services, where investment is needed. Imaging utilization metrics can also help guide the purchase of the costly next generation CT scanners and noise-reduction software necessary to achieve patient safety radiation-dose reduction targets.

Through this kind of open, accountable partnership, hospitals can look to their radiology providers for critical guidance and assistance in managing costs and maximizing return on investment in a way that directly affects the hospital’s bottom line.
Pressure for health systems to provide high-quality, safe and cost effective care is only going to grow in the coming years. Patients, payers, and regulators are expecting results. The U.S. Department of Health and Human Services has launched its HospitalCompare.hhs.gov website, where physicians and patients can compare hospitals side by side. Employers and payers have formed associations, like TheLeapFrogGroup, demanding more cost-effective care and ranking hospitals through a number of quality-of-care measures. Patients also are becoming increasingly proactive, seeking out information on the Internet about the quality and service of hospitals and health providers. This means everyone in the healthcare continuum — including radiology groups — must act as transparent, accountable partners in an effort to provide the safest, most efficient and cost-effective care.

Hospitals and medical centers can meet these growing demands by adopting a systematic approach guided by a clear set of benchmarks. Setting these 10 “best practices” as the standards your radiology service should meet and holding your service accountable with a continuous quality improvement program are essential first steps toward creating a hospital that delivers the 21st century standard of care and quality your staff aspires to and your patients expect.
1. Subspecialty Coverage: Availability of all subspecialties
2. Peer Review: Frequent, random, and double-blind
3. Concurrence Review: Routine second reading of high-risk studies
4. Consultation: On-demand radiologic consultation, 24/7
5. Interventional Radiology: Full-range of interventional services onsite
6. Structured Reports: Checklist-driven study interpretation and standardized reports
7. Guaranteed Turnaround Time: Guaranteed times for acute and routine reports
8. Critical Findings Reporting: Critical findings communicated promptly to referring physician
9. Team Participation: Full participation in hospital conferences, initiatives, and quality assurance programs
References


Baker SR, Stein HD. Radiologic Consultation: its application to an acute surgical ward. AJR 1986;147:637-640


“Average Turn-around Time Data,” Radisphere, 2012.