Five Elements of an Effective Quality Assurance Program in Radiology

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Five elements

Michael Lewis' novel Moneyball (also released as a full-length feature film) chronicles the work of Oakland A's general manager Billy Beane who overcame the disadvantages of a small team payroll to build a winning major league baseball team.

Beane eschewed traditional statistics and observations used to gauge players' abilities and relied on more empirical statistical evidence tied directly to wins and losses. In doing so, Beane ran counter to the collective "wisdom" of managers, coaches, scouts and many others who had been in major league baseball's front offices for decades.

Despite having access to the same statistical evidence that Beane employed, these lifelong baseball people refused to review or even acknowledge it, much less develop an analytical approach to it from which they could benefit.

In many ways, the story Lewis tells is analogous to the practice of radiology when it comes to the issue of quality.

With healthcare's shift away from fee-for-service to outcome-based models well underway, much of radiology remains unprepared to demonstrate quality.

"The American Board of Radiology examination will no longer be the definitive imprimatur of quality and value," wrote Eugene C. Lin, MD, of Seattle's Virginia Mason Medical Center department of radiology, in the October 2011 issue of American Journal of Roentgenology. "Rather, radiologists must provide additional evidence to hospitals and payers that what they do is valuable."

Unfortunately, a culture or "system" of quality and quality improvement that should be the cornerstone of a robust QA program is lacking in radiology. It is common for group partners to "QA" their own studies by checking "agree" or "disagree," and many only collect basic data for reporting.

More importantly, the data is rarely used to benchmark the practice and drive radiologist performance and future quality improvement. Looking ahead, prevailing QA programs will not meet the needs of the rapidly changing healthcare landscape, which will demand measured quality and demonstrated quality improvement.

Recognizing the opportunity to leverage its substantial technology infrastructure, Virtual Radiologic (vRad) initiated a quality assurance program in 2004. Since then, vRad has issued more than 20 million reports, the majority of which were preliminary reports, overread by clients.

And, of the vRad interpretations that are currently issued as final reports, one percent are pulled randomly each day for review. All discrepancies resulting from both sources have been uniformly coded and captured since 2004 for purposes of benchmarking, routine radiologist performance evaluation, quality reporting and radiologist improvement.

The vital information vRad is able to glean from those cases offers a wealth of knowledge with which no amount of anecdotal observation can compete. And it is the foundation on which vRad has established the following five elements of an effective quality assurance program.

One: Stringent radiologist hiring standards
Setting the tone on day one: A culture of quality

When prospective radiologists learn they must pass a clinical exam before becoming part of the team, many are taken aback.

Rarely does anyone test radiologists prior to their hiring, whether for a private practice job, academia or elsewhere. Much of that stems from an historical dearth of radiologists.

Lacking the staff necessary to cover all the work, few recruiting efforts take the time to scrutinize an individual's credentials or performance. While practices and hospitals have reviewed the prospective radiologist's curriculum vitae (CV) and might have even checked their references, few take the time to test their skills.

Another layer of scrutiny

With only a 61 percent passing rate, vRad's clinical review of unknown patient studies (which includes pediatric and neuro specialty tests where appropriate) represents a stringent test and an important complementary screen to the board examination (which records a 92 percent passing rate).

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Indeed, as surprised as many are at the existence of a test, an equal number emerge from the test astonished at its level of difficulty, despite forewarnings.

The challenge of the test is that it accurately reflects the needle-in-a-haystack challenge that is inherent to radiology. Prospective radiologists should be challenged to find the one image out of a 200-image study that reveals an abnormality—not simply a single image from a cross-sectional study.

"Walking a path that has not been tread"

Given the nature of vRad's business — and its roots in emergency teleradiology — such rigorous screening procedures quickly became a vital element to the young company's success.

In the early days, all vRad interpretations were prelims, mostly for emergent cases, resulting in all being overread by clients. Under such intense scrutiny, a radiologist whose performance was less than precise would have undermined hard-earned credibility and client relationships — analogous to the critical relationships between local private practices and their hospital clients.

Today, vRad radiologists remain challenged by a caseload heavy with emergency room and urgent care clinic studies where patients develop acute symptoms and seek medical care often without a delineated medical history and multiple prior studies. vRad radiologists approach each new study, for the most part, de novo — walking a path that has not been tread.

For these reasons, the clinical exam remains a standard element of the hiring process.

Cultural benefits

While the role of the test is, first and foremost, to help identify exceptional radiologists, it also offers important cultural benefits.

Simply by its existence, the test underscores the importance of quality and sets a tone for radiologists' employment. Those who pass the test feel a sense of accomplishment and know that they are part of a select team of radiologists who have met the rigorous standard.

The culture of quality that newly hired radiologists experience is reinforced throughout their career via the institutionalized quality assurance program and quarterly radiologist reviews (see point four below).

While largely intangible, the significance of such a culture of quality and pride in one's work cannot be overestimated when it comes to building your quality assurance program.

"The American Board of Radiology examination will no longer be the definitive imprimatur of quality and value"
Eugene C. Lin, MD, Department of Radiology, Virginia Mason Medical Center

Two: The use of subspecialists
Making full use of available expertise

Research has long affirmed that a physician's degree of specialization and volume of experience reading certain types of scans dramatically increase the probability of accurate diagnosis. According to one study, neuroradiologists were 34 percent more accurate than generalists in interpreting neurologically focused studies.[1]

A separate study found that radiologists who specialize in interpreting mammography studies were 76 percent more likely than general radiologists to detect breast cancer. The subspecialists identified more than 75 percent more cancers in an early stage, dramatically impacting survival rates and overall cost of care. [2]

Unfortunately for small radiology practices, covering multiple hospitals and clinics seven days a week, 365 days a year with the appropriate subspecialists is a daunting task. Even for larger practices with deeper subspecialty resources, geography can present an equally difficult challenge.

Effective workflow system is critical

A technology platform capable of quickly and effectively delivering studies to subspecialists, regardless of their location, can more fully utilize the benefits of a deep subspecialist bench.

Patients get optimal care, the hospital gets the subspecialty service it expects and the practice further strengthens relationships with its clients.

Not only does such a model facilitate better and more cost-effective patient care, it leads to greater professional satisfaction for radiologists who appreciate receiving studies in their area of interest, increasing productivity and performance.

In order to further optimize this technology capability, 98 percent of the radiologists hired at vRad since January 2009 are subspecialists who have an average of nine years of post-certification experience. Over 75 percent of the practice is made up of subspecialty-trained radiologists including pediatrics, neuroradiology, and breast imaging to name only a few.

[1] Clinical Radiology 2008, 63 (7), 791-5

[2] Radiology 224(39), 861-9,2002

Three: An effective, impartial quality assurance process
Capturing the true quality picture

Virtually every practice has a "QA process" — something it can point to for "ensuring quality." In many cases, however, it is limited to a process of collecting and recording data.

While the existence of checks and balances is a vital component of a quality assurance program, it alone is not enough. A QA process that meets the demands of hospitals, health systems and payers must include elements that capture the true quality picture and ultimately lead to quality improvement.

Easy client access

A hospital should be able to conveniently submit a suspected discrepancy to ensure all cases are captured. Ideally, the entire QA process should be facilitated through an online portal where discrepancies can be submitted and administrators can pull QA reports for the entire radiology department or by individual radiologists.

Impartial review

All client-submitted discrepancies and a predetermined number of final reports should be routinely reviewed according to a formalized procedure. A structure that keeps the reviewer at "an arm's length" from the original reading radiologist is ideal to avoid the potential for bias that is present when radiologists in the same practice review a partner's reports.

Standardized coding

The endgame of any QA process should be quality improvement. This requires a database against which an individual radiologist's performance can be compared. Only by adopting a standardized coding system used by all reviewers can such a database be created. Coding that captures severity, conspicuity and impact on patient care is recommended. Figure 1 presents ideas for a basic coding system.

Figure 1

Category	Examples
Complimentary feedback ("good call") or interesting feedback	
Slight discrepancy with no effect on patient care	• Lacune in 90 yo • Simple liver/renal cysts • BPH
Minor discrepancy with no effect on patient care	• Old CVA • Emphysema
Minor discrepancy with effect or possible effect on patient care	• Gallstones • Non-obstructing renal stones • Indeterminate liver/renal lesion
Major discrepancy	• PE • Appy • Bleeds • Fxs • Ureteral stones • SBO • Diverticulitis • Acute CVA • Probable cancer

Review by the interpreting radiologist

If a discrepancy is suspected by the QA reviewer, the original interpreting radiologist should be required to review the case and report back if they stand by their original interpretation or agree that an error has been made. The educational benefit of involving the radiologist to this degree is enormous and critical to developing a practice's culture of quality.

Closing the loop with the client

At the conclusion of the review process, the final decision of the QA reviewer should be provided to the facility, either verbally or in writing, if requested. This feedback not only closes the loop on individual cases, but also reinforces to our constituents the commitment radiologists have to their patients and to continuous quality improvement within our profession.

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vRad Quality Assurance Process

- One percent of final reports randomly pulled daily for overreading
- Suspected discrepancies submitted online
- QA committee review
- Interpreting radiologist review
- Client notification of resolution
- Statistical analysis

Four: Performance accountability and quality improvement
An endgame that brings value to healthcare

Ultimately, any quality assurance process should be aimed at improving performance on a case-by-case and radiologist-by-radiologist basis. It's a process of incremental improvements, the benefit of improved quality revealing itself over time.

The only reliable method of honing the performance of individual radiologists and of a practice is through a consistent process for capturing, studying and acting upon data.

Involving the reading radiologist and always closing the loop with them to improve future performance is critical. Failure to directly address whatever factor(s) may have contributed to the discrepancy represents a failure of the entire quality assurance process.

vRad has the benefit of an enormous QA database containing more than eight years of data. Because it was collected using a uniform coding system, the data allows us to draw conclusions and instill measures to address quality issues.

The system, encompassing more than 15 million studies, reveals everything from accuracy percentages for specific organ systems and modalities to CT scan readings completed on Thursday evenings between 7 and 8 p.m. Access to such precise performance-related data also serves a vital purpose with regard to radiologist accountability.

Performance-improvement efforts

From the information revealed in these reports, a radiology practice is able to activate perhaps the most useful element of its accountability program: efforts aimed at performance improvement. Based on the findings, radiologists can engage in ongoing quality improvement mechanisms, including:

- internal periodic continuing medical education
- training with medical director staff, including periodic quality-improvement reminders and suggestions
- formalized and published report standards
- shared case studies
- internal research opportunities
- encouraged participation in professional societies

Through the use of data, a reliable productivity number for each radiologist can be identified. While there is no universal point at which a radiologist's performance can be expected to deteriorate, if reading too quickly is determined to be an issue, an individual's productivity "sweet spot" can be identified — allowing them to adjust their reading speed accordingly.

Simply being aware of one's performance within the group can positively impact the group's performance as a whole. All vRad radiologists receive an anonymous quarterly performance report (Figure 2) which identifies how their performance compares by modality, including any misses. This report provides transparency letting all radiologists know exactly where they stand among their peers. The professional pride and competition evoked through this report continues to foster the culture of quality that began with the pre-employment exam.

Figure 2
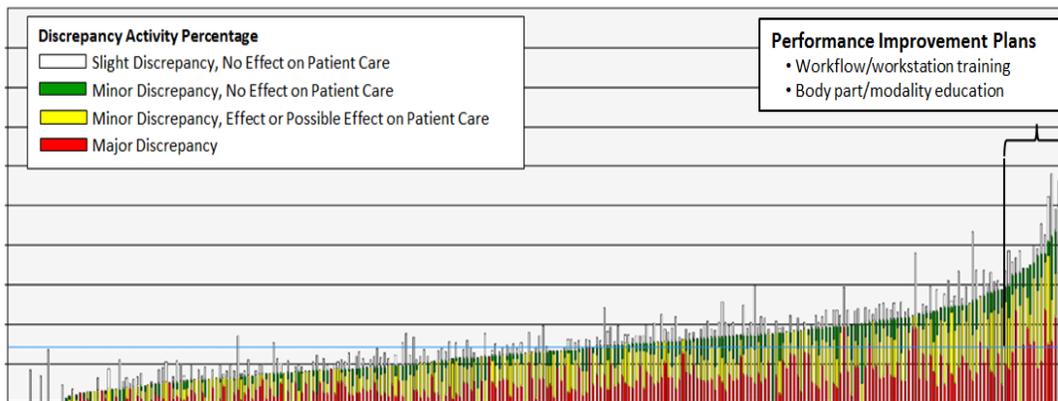
Ultimate accountability

Of course, the foundational component of any true performance accountability program involves the termination of underperformers – radiologists who fail to meet established objective benchmarks. There is no question that this ultimate accountability, in contrast to the traditional "tenure" model in radiology, is a significant factor in vRad's quality performance.

Technology can also play a role in quality improvement. For example, all vRad radiologists have the ability to consult in real time with any of their colleagues around the country on difficult or rare cases by simultaneously viewing and discussing synchronized images.

Five: Documentation
Prove quality and value

As the shift away from fee-for-service toward more accountable, outcome-based care models continues, anecdotal quality assurance will be pushed aside in favor of more verifiable metrics. The ability to document and demonstrate quality will be more than a competitive advantage for radiology practices — it will be compulsory.

This means not only documenting and studying the data, but becoming willing partners with hospitals, health systems and payers — sharing processes, data and lessons to raise the industry standard for quality assurance.

Incremental improvements to vRad's quality assurance program mentioned in this paper have resulted in a 99.8 percent documented accuracy rate. This statistic includes all significant misses impacting patient care, putting vRad in the top tier of radiology quality. It is a benchmark of which we are proud, but by no means satisfied. Our efforts at gleaning knowledge and drawing conclusions from our data have only just begun.

A world of possibilities

There remains a whole world of data-mining possibilities using vRad's database.

For instance, how frequently does a study intended to rule out appendicitis come back positive? And how does that information affect referring clinicians' willingness to order a study for appendicitis?

Examples like these could have an enormous impact on the national practice of medicine — not just radiology.

With access to millions of studies within which that knowledge is embedded, vRad continues to develop new and improved methods of data mining. Our ultimate goal is not only to further enhance our knowledge of radiology, but to improve the efficiencies and effectiveness of all forms of medical care.

Dr. Benjamin Strong is an active practitioner and is Chief Medical Officer of Virtual Radiologic, a national radiology practice working in partnership with radiologists and hospitals to optimize radiology's pivotal role in expanding access, improving quality and reducing the total cost of care. Dr. Strong is board certified in both radiology and internal medicine is licensed to practice in all 50 U.S. states and holds credentials in a number of foreign countries.

If you'd like to learn more, please click here to speak with a vRad expert advisor.