

## **Better Use of Radiology Department: Radiology Errors, How to Manage?**

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Radiology is one of the fast advancing branches of medicine. With the rapid advancement in machine technology, physicians are relying on radiology examinations/report to confirm a diagnosis or even for establishing a diagnosis for a questionable problem.

“The radiology report is the most critical component of the service provided by a radiologist. It constitutes the formal documentation and communication of the results of the examination, study or procedure performed<sup>1</sup>”.

Errors in image interpretation are a common problem in radiology<sup>2</sup>. Errors are inevitable, although they can be minimized and to some extent prevented. Reviewing the literature, researchers have reported a substantial frequency of reader errors, even among experienced radiologists<sup>3</sup>. The royal college of radiologists in United Kingdom has a self-monitored audit system for reporting and tracing errors emphasizing potential clinical consequences of such errors<sup>4</sup>.

Understanding the causes of these errors and the ways of managing them are the main purpose of this editorial, hoping to create a cultural shift in which radiologists as well as the referring physicians assume better use of the radiology procedures and examinations/report.

### **What Is an Error?**

Error is an inaccurate or incomplete diagnosis and or treatment of a disease with harmless or fatal consequences to the patient<sup>5</sup>.

### **To Err Is Human**

The American institute of medicine issued a report in 2001 concluding that nearly 100,000 lives are lost every year due to medical errors (accounting for a mortality that exceeds the number of deaths from breast cancer and motor vehicle accidents combined)<sup>5</sup>.

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In the report, radiology was not recognized as a potential cause of patient harm.

In the report, it has been also concluded that six measures should be taken to close our performance gap including patient safety, effectiveness, timelines, equity and patient centeredness<sup>6</sup>.

In England, an average of 38 claims per year were reported in the period of 1995 to 2006 (most radiology departments perform between 100,000-200,000 examinations per year)<sup>7</sup>. From this survey it is clear that the clinically significant radiology errors which are taken to court are generally low.

### **Malpractice Stress Syndrome**

A radiologist who had been litigated against may suffer psychological or physical effects including anxiety, anger, helpless feeling, disappointment, distress, humiliation, fear of work stability and defamation. Also feeling of guilt was reported in 10.7% of these who self-reported their feelings<sup>8</sup>.

The cause of litigation varies from the attitude of the media which may be unfavorable to physicians, the possibility of compensation and extensive patient demand<sup>9</sup>. Defensive measures may be taken by the radiologist including long reports, changing opinion, multiple diagnoses, abandoning some practice, keeping the error as secret and suggesting further examinations which may be sometimes inappropriate.

### **Types of Errors**

1. Misregistration of the Patient Name or Side Marker
2. Technical Faults
3. Individual Variation (Discrepancy)
4. False Localization
5. Inaccurate Differential Diagnosis
6. Lack of Clinical Data
7. Lack of Previous Films
8. Typing Errors
9. Miscommunication

The overall errors can be either failure to detect a finding, wrong interpretation of a finding as abnormal, recognizing an abnormality but dismiss it as normal, recognizing an abnormality but assigning incorrect cause and failure to recognize the limitation of the technique<sup>2</sup>.

Errors usually fall into recurrent patterns. There is a need for greater emphasis on error traps in radiology teaching, research and publications<sup>3</sup>.

## **Satisfaction of Search**

Detecting an abnormality in a radiology examination may stop the radiologist looking for another one, which may be important or even more than the first one<sup>10</sup>.

## **Radiology Report**

Radiology report is frequently the only source of communication of the examination result. It should communicate the relevant information about the diagnosis, response to treatment and or the result of the procedure performed. The report should answer the clinical question raised by the referring physician. Report inversion (conclusion is more than the discussion) should be avoided; the impression or the conclusion should be short and clear<sup>11</sup>.

The use of a standard format (we are using the American College of Radiologists) improves the ability of effective communication significantly.

1. The title: the name of the examination or study under reporting.
2. Indication which is usually given by the referring physician, not necessarily represents the true indication. The radiologist has the responsibility that the study was performed for an appropriate reason.
3. Findings/Discussion: including the relevant information from previous studies and discussing the findings mentioned.
4. Impression: can be a summary, conclusion or diagnosis. May be the only part of the report which is read. It is better to limit the conclusion in one or few sentences. May also contain the recommendation for further studies. Lengthy reports are less likely to be read.

## **Imaging Cycle**

Patient management starts when the referring physician examines him/her, requesting a relevant radiology test with complete clinical data conveyed to the radiologist. Then the radiology reception should make a correct patient identification and examination, site and side requested. These steps may be repeated by the technician or the radiologist performing the examination or procedure. Then it is the time for reporting by the radiologist after observing the examination, checking the quality and comparing with the previous scans. Communicating with the referring physician may be an important step in this process. It is important to think of patient management as a cycle rather than a request and a report. Errors could arise at any stage of this cycle; when the request is inappropriate or was not on time, when registration was wrong and/or misinterpretation for any of the previously mentioned reasons.

## **Communication**

Probably it is the most important cause of errors. Communication may be the root cause of many sentinel problems, which could be traced to radiology report. Clinicians should

be aware of the seriousness of lack of clinical information needed by the radiologist to issue his full report.

### **How Much Error Rate Is Acceptable?**

The answer should be as low as possible. Godard in BJR in 2001 reported that 2-20% clinically significant or major errors could happen<sup>12</sup>. Fitzgerald in his article in European Radiology in 2005 reported 8-26% error rate<sup>13</sup>. In that article he also stated all radiologists have the potential for improvement.

The classification of a particular report as accurate or inaccurate depends on the subjectivity of the radiologist. Excess workload, departmental dysfunction, interruptions, fatigue, stress, illness and lack of motivation could contribute and increase the rate of errors.

### **Clinical History**

It is the responsibility of the referring physician to provide relevant history on requesting radiology examination or procedure. It has been found that clinical information affects the radiology report. If the clinical information is accurate, it has beneficial effects and is reflected in the report.

In a study, fifty patients who attended a radiology department for CT scan were studied by two consultants before and after the knowledge of clinical information, 19 reports were changed and 10 reports were accurate<sup>14</sup>.

### **Double Reading**

In a study, double reading is a common practice in university and local hospitals. It is less common in private practice. Double reading is most common in PET/CT and mammography. In this study they stressed on the importance of double reading to assure quality in radiology<sup>15</sup>.

### **Peer Review**

This is a method of assessing a colleague's competence by asking a peer radiologist to re-read cases and determine if he/she agrees with the initial report. Missed findings or disagreements can be a source of learning for other members, but unfortunately there is no way to know if the second review opinion is correct and also this method can sample only a tiny component of a radiologist work.

Our experience in peer review is similar to others; it failed to translate into widespread learning and may be viewed as a punitive exercise<sup>16</sup>.

### **Can Errors Be Reduced in Radiology?**

- I. Improving knowledge
  - Available clinical information
  - Previous studies for comparison
  - Systematic analysis of all anatomical compartments
- II. System improvements
  - Improving work conditions
  - More time for reporting
  - Equipment improvement
  - Double reading
  - Discrepancy meetings
  - Clinical meetings

## **Management of Errors**

We are humans and humans err.

Errors imply that radiologist could have done better. This may be the case for part of the error as recorded on many reviewed articles but some discrepancy from the final findings is always inevitable.

If we suspend every doctor who makes an error, that will not eliminate future errors. It must be realized that error is purely a measure of variance from the perfect result<sup>17</sup>.

In practice, errors can be reduced when a framework is followed including safety, efficiency, outcome and satisfaction.

Safety measures include correct patient identification, avoiding contrast medium reaction and proper management if it occurs, critical result reporting and correct image labeling.

**Efficiency or Process Improvement:** This measures the frequency with which the referring physician may request the most appropriate examination to answer his clinical question.

**Professional Outcome:** This is measured by peer review, double reading, complication rate, radiation dose and procedure time.

**Procedural Outcome:** Where the radiological examination is scored to a reference standard proof such as knee MRI compared with arthroscopy and abdominal ultrasound or CT scan with the operative findings. Not all radiological examinations have a reference standard proof and data collection requires big effort to trace medical records.

**Satisfaction:** Where the satisfaction of the referring physicians, patients, medical students as well as radiologists is measured. Improvement in satisfaction cannot occur until the problems are identified by listening to the voice of the concerned groups.

**Discrepancy Meetings:** These meetings are a sign of well-functioning department. There is no right way to run them, but there are plenty of wrong ways which at worse involve bullying, harassment and blame. The benefit of these meetings is in their educational values. These meetings can never be used to calculate error rates because we know that it will never be eliminated<sup>18</sup>.

## CONCLUSION

**Radiology errors will require cultural shift that embraces key outcome measures related to quality, safety, teamwork and process that leads to highly reliable care. Leadership, dedication to cover values and translational impact on behaviors are the threads of that fabric that have the most sustainability<sup>1</sup>.**

**Errors can be reduced by improving both knowledge and system. The greatest reduction in error rate is likely to come from changes in the system.**

**We should always remember that safety is institutional and errors do not mean negligence.**

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