Value of reporting and categorizing radiologic errors as a part of a Quality Assurance Program

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Introduction

“Quality is the extent to which the right procedure is done in the right way, at the right time, and the correct interpretation is accurately and quickly communicated to the patient and the referring physician.”

Errors in abdominal cross-sectional imaging are often identified in retrospect on follow-up imaging.

A Quality Initiative Program (QUIP) was developed at The Ottawa Hospital: a confidential, semi-automated method of documenting and following-up on identified errors.

QUIP is sent as a standard email template to radiologists, radiology division chief and administrative assistant on the Outlook email folder.

The email template has fields that can be filled in with case identifiers, date of study in question, and a brief description of the event requiring attention.

Recipient radiologist replies to section chief by selecting one of three options.

The database is reviewed by section chiefs for the purpose of quality assurance in the department.

This quality initiative was instituted at our tertiary care center in 2009, where we evaluated findings of cross-sectional abdominal and pelvic imaging after the first year of the program and reported our results.

Materials and Methods

Obtained research ethics approval for this review and quality initiative project.

Reviewed all QUIPs related to abdomen and pelvis at our hospital for the second year of the program (January 1, 2010-December 31, 2010).

Compared number of QUIPs to the first year of the program (2009).

Categorized QUIPs based on imaging modality, and single vs. double read.

Categorized errors based on type:

1. False-negative (abnormality is present but is not described)
2. Satisfactory-search error (type of false-negative error where one abnormality is present and reported but a second one is not reported)
3. False-positive (abnormality is described which is not real)
4. Cognitive (abnormality is identified but the wrong diagnosis is made)
5. Technical (e.g. there was motion artifact on the images which made interpretation non-diagnostic)
6. Communication (e.g. transcription error in the report which could change the meaning of the report)
7. Ordering (wrong imaging test was prescribed by the radiologist for the provided indication)

Errors were also categorized based on organ or structure involved.

2 fellowship-trained abdominal radiologists reviewed the QUIP cases to determine the effect on patient outcome and quantified it on a 4-point scale:

1) No effect on patient outcome (e.g. did not mention simple renal cyst)
2) Mild effect on patient outcome (e.g. delayed therapy but no likely change in overall outcome)
3) Moderate effect on patient outcome. (e.g. intervention such as a biopsy or surgery which could have been avoided)
4) Severe effect on patient outcome (e.g. death or ICU admission)

Each QUIP was reviewed to determine the length of time between the original report and the time the QUIP was generated.

Response rate and actions of receiving radiologists as a result of the QUIPs, was also recorded.

Results

- Jan 1, 2010 to December 13, 2010: 238 QUIPs were sent regarding 219 patients (vs. 113 QUIPs sent in 2009).
- 144 men and 75 women with average age of 63 (range 23-91 years).
- 154 cases (65%) were single-read by a staff radiologist, 84 cases (35%) double-read with either a resident or fellow.
- 18 cases were sent to more than one radiologist reporting different imaging examinations over time (e.g. 2 CT consecutive scans did not describe a growing metastasis).
- Average time from original report to received QUIP was 216 days, with a median of 90 days.
- Total number of errors identified was 328- some errors were classified as more than one type (e.g. false-positive and cognitive errors).
- 153 (64%) QUIPs likely had no clinical effect on patient outcome, 66 (27.7%) had minimal effect on patient outcome, 18 (7.5%) of QUIPs had a moderate effect on patient outcome, and one (0.035%) had a resultant ICU admission.

Table 1: Number of QUIPs by cross-sectional imaging modality in 2009 versus 2010

<table>
<thead>
<tr>
<th>Modality</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT</td>
<td>168</td>
<td>176</td>
</tr>
<tr>
<td>CT colonography</td>
<td>n/a</td>
<td>6</td>
</tr>
<tr>
<td>Ultrasound</td>
<td>20</td>
<td>23</td>
</tr>
<tr>
<td>MRI</td>
<td>34</td>
<td>33</td>
</tr>
</tbody>
</table>

Table 2: QUIP categorization by error type in 2009 versus 2010

<table>
<thead>
<tr>
<th>Error Type</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>False Negative</td>
<td>65%</td>
<td>60%</td>
</tr>
<tr>
<td>False Positive</td>
<td>11%</td>
<td>10%</td>
</tr>
<tr>
<td>Technical</td>
<td>5%</td>
<td>3%</td>
</tr>
<tr>
<td>Communication</td>
<td>4%</td>
<td>7%</td>
</tr>
<tr>
<td>Cognitive</td>
<td>4%</td>
<td>17%</td>
</tr>
<tr>
<td>Ordering</td>
<td>3%</td>
<td>2%</td>
</tr>
<tr>
<td>TOTAL # of QUIPs</td>
<td>204</td>
<td>328</td>
</tr>
</tbody>
</table>

Table 3: Response rate of radiologists to QUIPs in 2010

<table>
<thead>
<tr>
<th>Template email Response</th>
<th>Percentage response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case Reviewed</td>
<td>45%</td>
</tr>
<tr>
<td>Amendment Dictated</td>
<td>19%</td>
</tr>
<tr>
<td>Physician called</td>
<td>2%</td>
</tr>
<tr>
<td>No response</td>
<td>34%</td>
</tr>
</tbody>
</table>

Conclusions

- Number of reported QUIPs increased in number since last year but distribution of error types is similar, except for an increase in the number of musculoskeletal-related QUIPs.
- Majority of errors in the QUIP database were considered to be of no or minimal clinical significance to the patient.
- There has been expansion of the program to include a separate Technical QUIP and Positive QUIPS.
- Standardized reporting templates have been created for CT reporting in our division which may help remind radiologists to review areas which are more frequently associated with errors.

Limitations

- May not be systematic since it is done on a voluntary basis.
- Same error could be identified more than once, unless the original radiologist issues an addendum to report.
- Experience/level of training.

Contributors

I would like to thank my supervisor Dr. Ania Kielar for allowing me to help analyze the database and categorize the various different types of errors that were made. I would also like to thank her for giving me an opportunity to work with her at the University of Ottawa.

References


Figure 1: Sample QUIP email

Figure 2: Satisfaction-of-search error: 64 year old man with prostate cancer underwent CT as part of his staging work-up. A) The CECT abdomen showed retroperitoneal lymph nodes. B) The base of lungs were included and in retrospect there were some errors were classified as more than one type (e.g. false-positive and cognitive errors).