Radiology resident interpretation of overnight emergency head CT: Accuracy and clinical impact of misinterpretation

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Disclosure of Commercial Interests

We have no relevant financial or nonfinancial relationship with a commercial organization that may have a direct or indirect interest in the content of this presentation.
Background

- Radiology Residents On-Call (RROCs) interpret studies overnight and on weekends

- Literature has demonstrated low rates of discrepancy between RROCs and attending Radiologists \(^1-6\)

- Clinical services nevertheless request attending Radiologist interpretation citing need for high-quality patient care
Specific Questions

• What is the discrepancy rate of STAT head CT interpretation by RROCs?

• What are the causes of discrepancy in RROC interpretation of head CT?

• What is the impact of misinterpretation of head CT by RROCs?
Methods

• Evaluated RROC preliminary interpretations of noncontrast head CTs
• Independent call starting PGY3 after 2 months Neuroradiology rotation

RROC enters preliminary interpretation into StatConsult®

Attending judges the interpretation following AM
Methods

- 4 years of StatConsult data gathered from single academic institution

- Significant Discordances indicate findings which attending Radiologist believes will change clinical management

- Additional data gathered for Significant Discordances:
  - Imaging findings misinterpreted
  - PGY level of interpreting RROC
  - Clinical outcome of patient after communication of discordance:
    - additional imaging ordered
    - change in treatment
    - need for admission
    - new subspecialty consult request
## Results

<table>
<thead>
<tr>
<th>Description</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Examinations Reviewed</td>
<td>13,131</td>
</tr>
<tr>
<td>Agree/Agree but See Report</td>
<td>12,782</td>
</tr>
<tr>
<td>Mild Discordance</td>
<td>254</td>
</tr>
<tr>
<td>Significant Discordance</td>
<td>95</td>
</tr>
</tbody>
</table>

Upon chart review, there was **no change in clinical management** in any of the 95 Significant Discordance cases.
Results

Discordance Rates

<table>
<thead>
<tr>
<th>Description</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literature reported discrepancy rates from RROC prelim reads (^5-7)</td>
<td>0.7-1.9%</td>
</tr>
<tr>
<td>Discrepancy rates from internal peer reviews (^8)</td>
<td>0.8-2.9%</td>
</tr>
<tr>
<td>Significant Discordance rate from our study</td>
<td>0.7%</td>
</tr>
</tbody>
</table>

RROC discordance rate is in line with that reported in the literature and comparable to rates from internal peer review.
Results – Discordances By Findings

<table>
<thead>
<tr>
<th>Reasons for False Negative (Missed Diagnosis)</th>
<th>81</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Ischemic Stroke</td>
<td>29 (36%)</td>
</tr>
<tr>
<td>Skull Fractures</td>
<td>11 (14%)</td>
</tr>
<tr>
<td>Pediatric</td>
<td>8</td>
</tr>
<tr>
<td>Adult</td>
<td>3</td>
</tr>
<tr>
<td>Hemorrhage</td>
<td>9 (11%)</td>
</tr>
<tr>
<td>Parenchymal</td>
<td>4</td>
</tr>
<tr>
<td>Subdural</td>
<td>3</td>
</tr>
<tr>
<td>Subarachnoid</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reasons for False Positive (Overcalled)</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subdural Hemorrhage</td>
<td>5 (45%)</td>
</tr>
</tbody>
</table>
Results – Discordances By PGY Level

<table>
<thead>
<tr>
<th></th>
<th>False Negative</th>
<th>False Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>PGY-3</td>
<td>38</td>
<td>6</td>
</tr>
<tr>
<td>PGY-4/5</td>
<td>43</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>81</td>
<td>11</td>
</tr>
</tbody>
</table>

† 3 Significant Discordances due to inadequate differential diagnosis of imaging finding

No significant difference by Fisher’s exact test (p=0.75)
• Mild Discordance rate increased with volume
• Significant Discordance rate unchanged despite increasing volume
Conclusions

Discordance rates of RROC interpretation of head CT is similar to that of previously published studies and internal peer reviews.

No Significant Discordances actually led to a change in clinical management.

Likely due to a resilient “backup” system by which Neurology and Neurosurgery also review images prior to making clinical decisions.

The PGY level of the RROC was not significantly associated with rate of Significant Discordance.

The most common findings resulting in Significant Discordance include missed acute ischemic stroke, missed fractures, and missed hemorrhage.

Increasing case volume does not affect rates of Significant Discordance but does increase rates of Mild Discordances.

When facing increased volumes, RROCs likely remain attentive to significant findings but may miss less critical findings.
References

Thank You!

Please direct questions or comments to:

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