WRONG GENDER RADIOLOGY REPORTING ERRORS

What the female prostate can teach us about radiology reports
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NOTHING TO DISCLOSE

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NOTHING TO DISCLOSE
OUTLINE

The Problem
- A patient story and why it is important
- Characterizing the problem - What are the root causes?

The Project
- Data collection and methods

The Data
- The results
- Who or what to blame

Taking action
- Steps taken towards improvement
- Follow up data
- Long term goals
BASED ON A TRUE STORY

- A woman is on the phone and upset about their CT read...
- She cannot believe that the radiologist mentioned “an enlarged prostate”
  - Did they read the right patient? Are they incompetent? Did they even look at the study?!
A gender anatomy mismatch is an easy-to-spot and embarrassing problem for radiology reports. While generally innocuous clinically, these errors can call into question the validity of the entire report to patients. Our purpose was to analyze these errors and apply targeted strategies to reduce the occurrence rate.
CHARACTERIZING THE PROBLEM

• What are possible root causes of gender mismatch errors?
  • radiologist template choice errors
  • voice recognition (VR) errors
  • system mis-assigned gender (in the RIS)
  • dictating on the wrong patient
  • errors in EMR entry

• transgender or genitourinary abnormalities
• Mistakes in image interpretation
To study gender mismatch errors, we need a set of reports that contain those errors.

Approach: use the PACS search function to perform a gender specific search for an organ that the gender does not have.

- **Male**: Ovary and ovaries, Uterus
- **Female**: Prostate, Penis, Testicle and testicles

Anonymized list of reports that contained gender mismatch errors
To study gender mismatch errors, we need a set of reports that contain those errors.

Approach: use the PACS search function to perform a gender specific search for an organ that the gender does not have.

Anonymized list of reports that contained gender mismatch errors

Each report was reviewed and a mistake category was assigned

Transgender patients were tallied but excluded from further analysis

Results
EXAMPLES OF ERRORS

- “Dense calcifications in the cavernous segments of the internal carotid ovaries bilaterally”
- “Frontal and lateral uterus of the left elbow”
- Prostate Gland/Seminal Vesicles: Unremarkable.
  - (on a female patient with diverticulitis)
- Visualized Reproductive Organs: Normal prostate.
  - (female liver transplant patient)

Most common mistake
THE DATA

• 2.9 million reports were searched (5 year period)

• 552 reports containing errors were identified and reviewed
  • 30 cases were excluded for transgender patients or GU malformations

• Most common mismatch = female prostate
• Most common reason = template choice errors

• 280 of the cases were CT abdomen and pelvis studies
### THE INITIAL DATA

<table>
<thead>
<tr>
<th>reason for discrepancy</th>
<th>male ovaries</th>
<th>male uterus</th>
<th>female prostate</th>
<th>female testes</th>
<th>female penis</th>
<th>total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voice recognition error</td>
<td>42</td>
<td>49</td>
<td>31</td>
<td>17</td>
<td>10</td>
<td>149</td>
<td>25.60</td>
</tr>
<tr>
<td>Template choice error</td>
<td>27</td>
<td>120</td>
<td>243</td>
<td>0</td>
<td>0</td>
<td>390</td>
<td>67.01</td>
</tr>
<tr>
<td>Transgender patient</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>18</td>
<td>3.09</td>
</tr>
<tr>
<td>Ambiguous genitalia</td>
<td>4</td>
<td>5</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>12</td>
<td>2.06</td>
</tr>
<tr>
<td>eRecord/H+P</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>0.52</td>
</tr>
<tr>
<td>RIS mis-assigned gender</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>9</td>
<td>1.55</td>
</tr>
<tr>
<td>Wrong patient</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0.17</td>
</tr>
<tr>
<td>Total</td>
<td>80</td>
<td>184</td>
<td><strong>284</strong></td>
<td>21</td>
<td>13</td>
<td>582</td>
<td></td>
</tr>
</tbody>
</table>

The Problem

The Project

The Data

Taking action
BLAME THE RESIDENTS !?

<table>
<thead>
<tr>
<th></th>
<th>total incorrect</th>
<th>(%)</th>
<th>corrected</th>
<th>% initial reads corrected between preliminary and final</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resident/PA/Fellow 1st read</td>
<td>299</td>
<td>54.17</td>
<td>26</td>
<td>8.70</td>
</tr>
<tr>
<td>attending solo read</td>
<td>253</td>
<td>45.83</td>
<td>6</td>
<td>2.37</td>
</tr>
</tbody>
</table>

Account for slight majority of the errors

Taking action

Which are rarely caught by attending's
About 25% of errors are voice recognition mistakes*

44 of 552 errors (about 8%) were made on reports using transcriptionists

*Limitations:
- we assume that the spoken words were correct
- if the errors are random – gender sampling underestimates the problem by at least 50%
BUT WE CORRECTED THESE MISTAKES…RIGHT?

<table>
<thead>
<tr>
<th>Mismatches corrected before finalized</th>
<th>32</th>
<th>5.80 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mismatched reports addended</td>
<td>28</td>
<td>5.07 %</td>
</tr>
<tr>
<td>System errors corrected</td>
<td>7</td>
<td>1.27 %</td>
</tr>
<tr>
<td>Remained incorrect</td>
<td>485</td>
<td>87.86 %</td>
</tr>
</tbody>
</table>
**STEPS TO FIX THE PROBLEM**

- QA lecture to faculty and residents raised awareness of the issue.
  - Warnings were given about personal template use.

- Several templates were corrected
  - Gender limit boxes were applied for system templates
  - Most system templates were edited to make the default text blank or gender neutral

- Cases of system issues were reviewed by IT
### Follow Up Data, 1 Year After

<table>
<thead>
<tr>
<th>Reason for Discrepancy</th>
<th>Male Ovaries</th>
<th>Male Uterus</th>
<th>Female Prostate</th>
<th>Female Testes</th>
<th>Female Penis</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voice Recognition Error</td>
<td>7</td>
<td>19</td>
<td>16</td>
<td>3</td>
<td>0</td>
<td>45</td>
<td>57.69</td>
</tr>
<tr>
<td>Template Choice Error</td>
<td>1</td>
<td>7</td>
<td>18</td>
<td>0</td>
<td>0</td>
<td>26</td>
<td>33.33</td>
</tr>
<tr>
<td>Transgender Patient</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>3</td>
<td>3.85</td>
</tr>
<tr>
<td>Ambiguous Genitalia</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1.28</td>
</tr>
<tr>
<td>eRecord/H+P</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1.28</td>
</tr>
<tr>
<td>RIS Mis-assigned Gender</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>Wrong Patient</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2.56</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>8</strong></td>
<td><strong>28</strong></td>
<td><strong>37</strong></td>
<td><strong>5</strong></td>
<td><strong>0</strong></td>
<td><strong>78</strong></td>
<td></td>
</tr>
</tbody>
</table>
FOLLOW UP DATA

• Fixing templates and problem awareness resulted in quality improvement:

<table>
<thead>
<tr>
<th></th>
<th>Previous</th>
<th>New</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total studies reviewed</td>
<td>2,615,604</td>
<td>560,049</td>
</tr>
<tr>
<td>Errors detected</td>
<td>552</td>
<td>78</td>
</tr>
<tr>
<td>Error rate per 100,000</td>
<td>21.10</td>
<td>13.03</td>
</tr>
</tbody>
</table>

• A statistically significant (p < 0.001) decrease in the most common type of error led to an overall decrease in error rate.
THE NEXT STEPS

- Long term steps
  - Spot checking using PACS search tools and warning repeat offenders - increases awareness

- Continuing improvement of system templates

- Identify radiologist specific patterns to target self improvement

- Consider deploying “spell check” type software to screen reports and alert to the problem
• **Acknowledgements**
  
  • Members of the Imaging Sciences report quality workgroup including Leah Sillen, Karen Herczeg, and Constance White.

• **References:**
  
  