Does the Inclusion of Patient Photos in Image Review Impact Viewing Time & Search Strategies

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Rationale

- IOM report Quality of Health Care in America ~ 98,000 people die each year from medical errors
- One study showed 30.1% error events in single year resulted in serious patient harm due to wrong-patient errors
- Potential source: radiograph incorrectly filed wrong folder PACS
- Joint Commission National Patient Safety Goals: 1 requires include min 2 patient identifiers when provide healthcare services
Rationale – Tridandapani et al.

- Device simultaneously & automatically acquire photo & x-ray ICU in-patient
- 2 studies assess detection rates simulated errors with & without photos
- With photos detected wrong-patient errors significantly more than without
- No associated increase in interpretation time with photo!

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Without Photos</th>
<th>With Photos</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiologists unexposed to wrong-patient error (n = 31)</td>
<td>0/16 (0)</td>
<td>0/15 (0)</td>
</tr>
<tr>
<td>Radiologists exposed to wrong-patient error (n = 59)</td>
<td>9/29 (31)</td>
<td>23/30 (77)</td>
</tr>
</tbody>
</table>

Data are presented as ratio of errors detected to number of observers in each category and percent in parentheses.
Rationale

• Follow up on these 2 studies & determine why were no differences in viewing times
• Present study used eye-tracking technology to investigate impact presence of patient photo presented simultaneously with radiograph on visual search
• Surveyed after study to further explore impressions of photos
Methods

• Approved by IRBs Emory University & University Arizona
• Photos 21 patients from previous studies used after obtaining additional consent
• 10 radiologists participated:
  • 6 males & 4 females
  • Board-certified attending radiologists or radiology residents at AZ
  • Average age = 43.00 years (sd = 12.45, range 33-76)
  • Average years Board-certified 9.70 (sd = 12.12, range = 0-41) with 2 in-training (residents)
  • Practice areas = 1 general, 2 abdominal, 4 cardiothoracic, 1 pediatric
Methods

- Viewed 21 portable chest radiographs without & subsequently with photos
- Visual search recorded
- Task = note placement tubes & lines
- No correct or incorrect answers as not diagnostic accuracy study
- 3 MP medical-grade color LCD display (Eizo RadiForce RX340; Eizo Corporation; Ishikawa, Japan) calibrated DICOM GSDF
- Ambient lights 40 lux
- Viewing distance averaged 35 cm
- Tobii Pro X2-60 Eye Tracker
Results - Survey

• “On scale 0-10 how much would you prefer to have patient’s photograph available at the time of interpretation?”
  • Mean = 6.10 (sd = 2.77, median = 6.00, IQR = 4.00, range = 2-10)
  • No sig correlation rating & age (r = -0.316, z = -0.866)
  • No sig correlation rating & years Board-certification (r = -0.274, z = -0.744)
  • No sig diff as function gender (t = 1.623, p = 0.1432)
  • No sig diff cardiothoracic vs non-cardiothoracic (t = 0.355, p = 0.7320)
<table>
<thead>
<tr>
<th>Question</th>
<th>Sig Less</th>
<th>Slight Less</th>
<th>No Diff</th>
<th>Slight More</th>
<th>Sig More</th>
<th>X²</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PRE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Call referring critical result*** (p 0.0006)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>10</td>
<td>40.00</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Call referring important finding ** (p = 0.055)</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>7</td>
<td>17.00</td>
<td>&lt; 0.001</td>
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<tr>
<td>Look up patient info (NS)</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>9</td>
<td>31.00</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td><strong>POST</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accurate interpretation images</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>2</td>
<td>7.00</td>
<td>NS</td>
</tr>
<tr>
<td>Accurate interpretation lines &amp; tubes</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>5</td>
<td>11.00</td>
<td>&lt; 0.05</td>
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<tr>
<td>Accurate ID mislabeled patients</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>7</td>
<td>2</td>
<td>17.00</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Accurate eval health status</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>9.00</td>
<td>NS</td>
</tr>
<tr>
<td>Spend time interpretation</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>2</td>
<td>7.00</td>
<td>NS</td>
</tr>
<tr>
<td>Comfortable photo present</td>
<td>0</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>5.00</td>
<td>NS</td>
</tr>
<tr>
<td>Distracted photo present</td>
<td>1</td>
<td>0</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>11.00</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Call referring critical with photo</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>2</td>
<td>1</td>
<td>17.00</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Call referring important with photo</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>3</td>
<td>1</td>
<td>13.00</td>
<td>&lt; 0.02</td>
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<tr>
<td>Look up patient info with photo</td>
<td>0</td>
<td>2</td>
<td>6</td>
<td>1</td>
<td>1</td>
<td>11.00</td>
<td>&lt; 0.05</td>
</tr>
</tbody>
</table>
### Results - Search

<table>
<thead>
<tr>
<th>Eye-Tracking Parameter</th>
<th>Image Alone (1)</th>
<th>Image With Photo (2)</th>
<th>Photo (3)</th>
<th>F-value</th>
<th>p-value</th>
<th>PLSD</th>
</tr>
</thead>
<tbody>
<tr>
<td># fixations</td>
<td>98.68 (68.43)</td>
<td>80.81 (53.99)</td>
<td>10.59 (9.59)</td>
<td>198.93</td>
<td>&lt; 0.0001</td>
<td>1 vs 3, 1 vs 3, 2 vs 3</td>
</tr>
<tr>
<td>Mean Fixation Duration</td>
<td>0.31 (0.04)</td>
<td>0.30 (0.04)</td>
<td>0.37 (0.14)</td>
<td>40.19</td>
<td>&lt; 0.0001</td>
<td>1 vs 3, 2 vs 3</td>
</tr>
<tr>
<td>Total Dwell</td>
<td>30.84 (21.07)</td>
<td>25.68 (28.24)</td>
<td>3.93 (3.81)</td>
<td>90.82</td>
<td>&lt; 0.0001</td>
<td>1 vs 2, 1 vs 3, 2 vs 3</td>
</tr>
<tr>
<td>Dwell First Fixation</td>
<td>0.23 (0.13)</td>
<td>0.22 (0.13)</td>
<td>0.30 (0.19)</td>
<td>11.69</td>
<td>&lt; 0.0001</td>
<td>1 vs 3, 2 vs 3</td>
</tr>
<tr>
<td># Visits to Image</td>
<td>1.77 (2.16)</td>
<td>4.70 (3.31)</td>
<td>3.15 (2.85)</td>
<td>104.70</td>
<td>&lt; 0.0001</td>
<td>1 vs 2, 1 vs 3, 2 vs 3</td>
</tr>
</tbody>
</table>
Results - Search

- Mean # Visits
  - Image Alone
  - Image-Photo
  - Photo

- Males
- Females
Results - Search

The bar chart illustrates the mean number of visits for different categories:

- **Image Alone**
- **Image-Photo**
- **Photo**

The chart compares visits for Cardiothoracic and Not Cardiothoracic cases.
Conclusions

• Overall time viewing cases did not differ as time not spent on radiograph was spent on photo
• On average readers scanned to photos ~ 4 times during search
• Men & non-cardiothoracic radiologists spent significantly more time looking at all images including photos
• Average preference for having photos was 6.10 on 0-10 scale & neck and chest were preferred as areas to include
• Photos may help with certain image interpretation tasks & personalize reading experience
• More research is needed!
Thank you!
Questions?

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