Knowledge of Appropriate Use of Diagnostic Imaging: A Survey of Trainees at a Large Academic Medical Center
Authors

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Introduction

BACKGROUND:

- Choosing appropriate diagnostic imaging is imperative for policy and patient care
- Trainees often placing orders for imaging services
- Trainees should possess a working knowledge of appropriate use of diagnostic imaging

AIM:

- To study awareness of postgraduate physician trainees across a variety of specialties regarding the appropriate use of diagnostic imaging
Materials & Methods

Study population:
- Interns, residents, and fellows in ACGME accredited programs at Emory University as of July 2017

Incentive:
- Option for raffle of one of ten $50 gift cards

Survey Instrument:
- Produced on SurveyMonkey® and distributed to Emory University Graduate Medical Education listserv
- Questions pertained to prior education about appropriate use of diagnostic imaging
Materials & Methods

Survey Instrument (cont’d):

- Four common clinical scenarios
  - Chronic headache without neurologic deficit
  - Acute ankle injury
  - Trauma in a pregnant patient
  - Neck and back pain after motor vehicle collision

- Asked participants to describe familiarity with and use of ACR Appropriateness Criteria®
Data Analysis:

- Statistical analysis was performed using PSPP, Microsoft Excel (2016), and Social Science Statistics “Spearman’s rho calculator”
- Categorical variables were summarized by frequencies
- Survey responses to clinical vignettes combined into respondent appropriate imaging score
- Independent T-test used to compare mean scores
- ANOVA for correlation between PGY and imaging score
- Pearson Correlation Coefficient, $r$, for correlation between exams ordered per week and imaging score
- Spearman’s Correlation Coefficient, $\rho$, for correlation between ACR Appropriateness Criteria® use as well as trainee perception of knowledge versus imaging score
## Results

Table 1: Response Rates and Appropriate Imaging Scores by Group

<table>
<thead>
<tr>
<th>Survey Response Categories</th>
<th>Total, n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total survey recipients</td>
<td>1266</td>
</tr>
<tr>
<td>Returned surveys</td>
<td>254 (20.1%)</td>
</tr>
<tr>
<td>Incomplete surveys</td>
<td>12 (0.9%)</td>
</tr>
<tr>
<td>Completed surveys</td>
<td>242 (19.1%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level of Training</th>
<th>Number of Responses, n (%)</th>
<th>Score, % ± Stdev</th>
</tr>
</thead>
<tbody>
<tr>
<td>PGY 1</td>
<td>54 (22.3%)</td>
<td>71 ± 24</td>
</tr>
<tr>
<td>PGY 2</td>
<td>45 (18.6%)</td>
<td>67 ± 21</td>
</tr>
<tr>
<td>PGY 3</td>
<td>40 (16.5%)</td>
<td>66 ± 26</td>
</tr>
<tr>
<td>PGY 4</td>
<td>43 (17.8%)</td>
<td>69 ± 23</td>
</tr>
<tr>
<td>PGY 5</td>
<td>39 (16.1%)</td>
<td>62 ± 24</td>
</tr>
<tr>
<td>PGY 6</td>
<td>19 (7.9%)</td>
<td>79 ± 17</td>
</tr>
<tr>
<td>PGY 7</td>
<td>1 (0.4%)</td>
<td>75</td>
</tr>
<tr>
<td>PGY 8</td>
<td>1 (0.4%)</td>
<td>75</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Medical School and Residency Education</th>
<th>Number of Respondents, n (%)</th>
<th>Score, % ± Stdev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preclinical training</td>
<td>99 (40.9%)</td>
<td>65 ± 24</td>
</tr>
<tr>
<td>Clinical training</td>
<td>173 (71.5%)</td>
<td>68 ± 23</td>
</tr>
<tr>
<td>Radiology elective</td>
<td>131 (54.1%)</td>
<td>70 ± 24</td>
</tr>
<tr>
<td>Postgraduate training</td>
<td>90 (37.2%)</td>
<td>71 ± 20</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of examinations ordered per week</th>
<th>Number of Respondents, n (%)</th>
<th>Score, % ± Stdev</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>63 (26.0%)</td>
<td>70 ± 24</td>
</tr>
<tr>
<td>1-5</td>
<td>79 (32.6%)</td>
<td>63 ± 23</td>
</tr>
<tr>
<td>6-10</td>
<td>37 (15.3%)</td>
<td>70 ± 22</td>
</tr>
<tr>
<td>&gt;11</td>
<td>49 (20.2%)</td>
<td>73 ± 24</td>
</tr>
<tr>
<td>No response</td>
<td>14 (5.8%)</td>
<td>68 ± 17</td>
</tr>
</tbody>
</table>
**Results**

Figure 1: Appropriate Imaging Score by Specialty
Results

- Response rate: 19% (242/1,266)
- Only 21% (51/242) chose appropriate imaging in all 4 clinical scenarios
- Only 37% (90/242) chose appropriate imaging in pregnant patient with blunt trauma
- 48% (115/242) had not heard of ACR Appropriateness Criteria®, and only 9% report regular use
Results

- PGY not correlated with appropriate imaging \((r = 0.01)\)

- Appropriate imaging score weakly associated with number of examinations requested per week \((r = 0.15)\)

- No difference in appropriate imaging score between
  - Radiology elective participants vs no elective
    \[70\% \pm 24\% \text{ vs } 66\% \pm 22\% \ (p =0.145)\]
  - Trainees reporting prior education during medical school or residency versus no prior education
    \[68\% \pm 23\% \text{ vs } 70\% \pm 23\% \ (p =0.635)\]
Results

- Radiology trainees did not demonstrate a significantly higher rate of appropriate imaging than non-radiology trainees
  $76 \pm 24\%$ (n=17) vs $67 \pm 23\%$ (n=225), ($p = 0.153$)

- 52% (127/242) of respondents considered their knowledge of appropriate use adequate

- Trainee perception of knowledge adequacy correlates weakly to imaging appropriately

- Majority of respondents (77%; 186/242) desire more education about imaging appropriately
Limitations

- Single site survey
- Limited to physician trainees
- Potential for non-responder bias (completed response rate 19%)
- Limited clinical scenarios may not reflect trainee knowledge of exams pertaining to individual specialty practice
Conclusions

- Post graduate physician trainees demonstrate widely variable knowledge of appropriate use of diagnostic imaging, particularly in pregnant patients.

- Trainee perception of knowledge correlates weakly to appropriate imaging knowledge.

- Recent medical school education practices may not prepare trainees to appropriately use diagnostic imaging.

- Integration of appropriate use of diagnostic imaging into clinical decision support tools could help address this knowledge gap.
References


References


