INTEGRATING PHYSICS INTO CLINICAL TEACHING IN THE ERA OF THE NEW ABR EXAM

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ABR Core Exam of the Future

- Core exam covers the entire field of radiology, case based, basic to intermediate experience level, random findings, some normals, image rich, practical, with physics included.
- Resident physics training should be clinically focused, with an emphasis on understanding image quality, artifacts, dose and patient safety for each modality/subspecialty.
- Incorporating physics educational content into the curriculum is more difficult because of time constraints and the need to tie the physics to the clinical.
- However, the physics has not changed!

Residency Rotations By Year

- **Year 1**
  - Clinical orientation – up to 1 full week
  - Physics orientation – up to 1 full week
  - Fundamentals of clinical radiology plus pre-call training
  - Physics Course: Basic Physics, Radiation Biology and Radiation Protection (12 months)
  - month 1 of 4 in clinical nuclear medicine

Residency Rotations By Year

- **Year 2**
  - Build clinical fund of knowledge
  - Significant call responsibilities (fatigue)
  - Advanced physics topics & Nuclear Medicine (12 months)
  - month 1 of 3 in breast imaging (or in 1st year, but it competes with the growth of fund of knowledge and pre-call training)
  - month 2 of 4 in clinical nuclear medicine
  - AIRP (AFIP) ? - Enough clinical experience to be useful this early in their training?
Residency Rotations By Year

- Year 3
  - Continue to build clinical fund of knowledge
  - Reduced call in second half of year
  - AIRP (AFIP) ?
  - Month 2 of 3 in breast imaging
  - Month 3 of 4 in clinical nuclear medicine
  - Advanced physics topics (MRI) (1st 6 months)
  - Clinical Board review course (2nd 6 months, hot seat plus clinical lectures)
  - Physics Board review course (2nd 6 months, off hours ?)
  - Attend a clinical and/or physics review course ?
  - Fellowship interviews ?
  - Take ABR Core Examination at end of year

- Year 4
  - Build clinical fund of knowledge
  - Mini-Fellowships (1-6 months each, if available)
  - Advanced physics topics (attendance depends on fellowship / rotation location)
  - Month 3 of 3 in breast imaging, interpreting 240+ mammograms (so they can qualify through MQSA to interpret mammograms in the 15 months before the ABR certifying exam – last 6 months ?)
  - Month 4 of 4 in clinical nuclear medicine
  - Job interviews
  - Take more call than in the past
  - Seniors will all take vacation in June
  - Have seniors mentor 1st year residents!

New Ideas for Physics: The Short Course

1. Incorporate physics into the existing AIRP course
2. Separate national physics course run like AIRP (use tag-team radiologist/physicist teaching?, how long?, when to take, sponsor?)
3. Dedicated physics rotation

Fits the “binge-and-purge” model loved by residents but ACGME says we must provide physics education throughout the residency

New Ideas for Physics: Integrated Physics Approach

1. Concurrent courses like the 4 year approach shown in the previous example
2. Create a single 12, 18 or 24 month physics course and repeat it every 1, 1.5 or 2 years
MetroHealth Approach for 2011

Independent study with directed 7:00 AM review sessions.

Year-Round Monthly Physics Conferences

- Once per month, frequently coordinated with a radiologist lecture on the next day
- More clinical focus: safety, quality, dose
- Examples:
  - Radioiodine Therapy Procedures
  - Breast MRI Physics
  - MDCT Benefits & Risks
  - Interventional Dose & Safety
  - Image Quality

Association of Program Directors in Radiology (APDR)
April 2011 Survey Results

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
<th>Percent</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>41. Are you planning to modify your residency physics curriculum for the new ABR core exam?</td>
<td>Yes</td>
<td>92.4%</td>
<td>96</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>7.6%</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>answered question</td>
<td>119</td>
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<tr>
<td></td>
<td>skipped question</td>
<td>21</td>
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APDR 2011 Survey Results

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<tr>
<td>41. Regarding the physics didactic curriculum, are you planning to:</td>
<td>Repeat the entire physics didactic curriculum annually</td>
<td>95.5%</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>Spread the entire physics didactic curriculum over three years (introduction, medium difficulty, advanced)</td>
<td>36.1%</td>
<td>40</td>
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<tr>
<td></td>
<td>Offer a &quot;novice&quot; physics board preparative during the months prior to the ABR exam only</td>
<td>7.1%</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Offer small group discussion sessions instead of a formal didactic curriculum</td>
<td>1.7%</td>
<td>2</td>
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<tr>
<td></td>
<td>Other (please specify)</td>
<td>19.3%</td>
<td>23</td>
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</table>
APDR 2011 Survey Results

44. How do you plan to integrate the RSBAAAPM on-line physics modules into the physics curriculum?

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<tr>
<td>Assign the modules to residents while on rotations (e.g. complete the U.S. module while on a U.S. rotation)</td>
<td>31.0%</td>
<td>36</td>
</tr>
<tr>
<td>Assign the modules to residents based on year of training</td>
<td>23.3%</td>
<td>27</td>
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<tr>
<td>Assign the modules to residents as part of the didactic curriculum</td>
<td>15.0%</td>
<td>19</td>
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<tr>
<td>Do not plan to integrate the modules into the physics curriculum</td>
<td>7.8%</td>
<td>9</td>
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<tr>
<td>Other (please specify)</td>
<td>16.1%</td>
<td>21</td>
</tr>
</tbody>
</table>

Questions?

- Copies of three recent articles on teaching physics
- Favorite book list
- Misc. useful links

Mark Rzeszotarski’s Homepage