PRIME:
Promoting Radiology Integration through Medical Education

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Radiology is an increasingly important aspect of patient care across all specialties
- Both generalists and specialists should have basic radiology understanding
- Appropriateness criteria: ordering of imaging studies & cost

Radiology education in medical schools is variable
- Often limited to gross anatomy courses in M1
- Usually taught by non-radiologists
- M3 Clerkships not mandatory
• Created and integrated basic radiology content, in the form of (1) videos and (2) Quick Hits, into the systems-based M2 curriculum.

• **Phase 1** of Project: Selected content for each course but not comprehensive coverage.
  • Pulmonary module created and implemented.
  • Cardiovascular module **NOT** implemented in 2022-2023.

• Content from modules **NOT** tested on assessments.

• Students surveyed using SurveyMonkey.com survey.
Implementation

SYST 9200 - Cardio and Pulmonary Systems Class of 2025

** Radiology Topics - Pulmonary **

- Pulmonary Radiology - Dr. Simone Montoya (2 documents)
  - 1) View PowerPoint in "Slide Show" or "Reading View" mode to hear the narration by Dr. Montoya - OR - 2) View MP4 file ...
  - 02A - Radiology Topics - Pulmonary Imaging.pptx
  - 02B - Radiology Topics - Pulmonary Imaging.mp4

Distribution in Elentra
Pulmonary Imaging

Simone Montoya, MD
Director of Radiology Education

Patterns of Pulmonary Opacities

*Opacification = decreased air-to-tissue ratio*

- **Airspace:** less gas in alveoli
- **Atelectasis**
- **Consolidation**
- **Ground-glass**
- **Linear:** thickened interstitium
- **Nodular:** discrete lesions
  - Micronodule <3-4 mm
  - Mass >3 cm
- **Reticulonodular**
Implementation

MP4 Player Version
# Quick Hits: Concept Reinforcement / Radiology-Pathology Correlations

## Quick Hits

### Rudimentary Radiology Patterns

#### Something’s Blocking X-Rays

- **Consolidation Pattern**: Opacities, +/- Ill-Defined: Pathologic process that fills the alveoli with fluid, pus, blood, cells (including tumor cells) or other substances resulting in lobar, diffuse or multifocal ill-defined opacities
  - **Ground Glass to Complete Opacification**

- **Interstitial Pattern**: Fine or coarse reticular opacities without or with small nodules = reticular-nodular: thickening of the septal, intralobular, and interlobular infrastructure.

- **Nodule or Mass Pattern**: Lesion occupying space, well-defined or not, solitary or multiple

- **Atelectasis**: Less Air in Alveoli
  - AteLessasis per Mr. Z. Elliot
  - Collapse of a part of the lung
  - ↑ Density

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## COVID-19

### Problem

- **Ground Glass / Fluffy Infiltrates**
- **Something is in Airspace**
- **Here: Hyaline Membranes**
- **Pneumonia similar**

**Range:**

- Ground Glass → Consolidation

**Possible Content**

- **Hyaline Membranes**
- **Transudate: Edema**
- **Exudate: Fibrinopurulent**
- **Blood**

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<table>
<thead>
<tr>
<th>Finding</th>
<th>Diagnosis</th>
<th>Where?</th>
<th>Most Likely Etiology</th>
<th>Hyperexpanded Airways</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulla: &gt;1 cm</td>
<td>- Emphysema</td>
<td>- Upper Lobes Worst: Likely Cigarette Smoking-Related</td>
<td>- Cigarette Smoking</td>
<td>Diffuse: Lower Lobe Prominence</td>
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<tr>
<td>Acquired Disease</td>
<td></td>
<td></td>
<td>- Coal Worker: Can be similar</td>
<td>(Husain AH, 2012)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>- Usually with other changes</td>
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<td></td>
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<td>- Macules &amp; Nodules</td>
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Survey Data

- Survey Response: 78 / 81 M2 Students (96%)
- Likert scale scores of 4 (agree) and 5 (strongly agree) were combined
  - There is sufficient radiology instruction in M1 & M2 Years currently 12/78 (15%)
  - Introduction of radiology teaching modules in Block 4 welcomed 56/78 (72%)
  - Focus on high-yield topics is sufficient for version 1 of modules 61/78 (78%)
  - Quick Hits files effective educational tool to highlight key concepts 67/78 (86%)
  - Quick Hits files should be compiled for Step 1 study 64/78 (82%)
Survey Comments

• **Positives**
  • I really love the radiology portion of pathology. SO thankful for Dr. Montoya for being so generous with her time and expertise.
  • Helpful to have commentary about how to understand the image.
  • I really enjoyed them and it added to my learning.
  • Supplements our education well.
  • Very nice tie-in to our pathology content we had learned in class .... good clinical relevance ....
  • ... make me feel more comfortable and confident going into M3.
  • Good way to practice.
  • Radiology in anatomy during flipped classrooms was chaotic because the environment was not suitable for those exercises.

• **Negatives / Opportunities for Improvement**
  • Should not be incorporated into formal assessments.
  • I would like it to be integrated into our curriculum.
  • We’re already very pressed for time with everything else.
  • Time. Never enough time.
  • I truly can’t accurately evaluate the utility of these presentations because I truly don’t know what I’m expected to know about radiology in the clinic.
• Proof of concept validated.
• Only 15% of students felt that there was sufficient radiology already present in the curriculum.
• Greater than 70% of students welcomed the modules and felt that incorporation of high-yield topics within modules was an effective teaching mechanism.
• Greater than 80% of students felt that Quick Hits effectively supplemented module concepts.
• Caution was expressed regarding already very busy Block 4 Schedule.
Next Steps

• Recommendations for Block 4, 2023-2024 Academic Year:
  • Add modules and quick hits for areas not covered in Phase 1 of project.
    • Example: Cardiovascular imaging
  • Add 1 question per examination based on radiology module content regarding specific pathologic process as highlighted and reinforced by Quick Hits.

• Unanswered / Further Evaluation Needed:
  • Optimal integration with pathology content.

• Risk
  • Adding too much currently untested content and overwhelming and frustrating students.