General Competency Radiology
In-Training Test Questions
for Diagnostic Radiology Residents

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Commission on Education
Committee on Residency Training in Diagnostic Radiology
1. The presence of hematoma was studied as an indirect sign of injury. Results are shown in the Table. Which one of the following represents the sensitivity of this study?

<table>
<thead>
<tr>
<th></th>
<th>YES</th>
<th>NO</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Injury present</td>
<td>14</td>
<td>6</td>
<td>20</td>
</tr>
<tr>
<td>Injury absent</td>
<td>5</td>
<td>72</td>
<td>77</td>
</tr>
<tr>
<td>Totals</td>
<td>19</td>
<td>78</td>
<td>97</td>
</tr>
</tbody>
</table>

A. 14/19  
B. 14/20  
C. 19/78  
D. 19/97

Rationales:  
The sensitivity of a diagnostic test is the proportion of patients with the condition being tested who also have a positive test. In this case, 20 patients have injury and 14 of those patients also have hematoma. Sensitivity is defined as = #true positives/(#true positives + false negatives).
A. Incorrect.  
B. Correct.  
C. Incorrect.  
D. Incorrect.

2. You perform a needle biopsy on a patient and the pathology results show an entity with which you are unfamiliar. The referring physician is puzzled by the pathology report and asks your advice. Which is MOST appropriate?

A. You suggest the clinician formulate his/her own plan for the patient.  
B. You discuss the possibility of re-biopsy.  
C. You call the pathologist to review the findings.  
D. You suggest the patient have a short-term follow up.
Rationales:
Since you performed the needle biopsy, the best result would be for you to also understand the pathology findings. Adding to your knowledge would be preferable to passing the decision on to others (A). A short-term follow up might be dangerous to the patient. Rebiopsy will not help understand the pathology of the lesion.
A. Incorrect.
B. Incorrect.
C. Correct.
D. Incorrect.

3. Which one of the following is TRUE regarding the protection of human subjects participating in research?

A. Pregnant women can be included only if the baby's father also consents.
B. A court-appointed guardian can give consent if the patient is unable.
C. Any imaging that is part of the study must be provided free of charge.
D. A child's assent is assumed if he/she does not object.

Rationales:
If a patient that cannot give consent is included in the study, a court-appointed guardian may act on their behalf. A pregnant woman can consent alone, although agreement from the father is desirable (but not required). There is no provision that requires imaging to be provided free of charge. For example, a patient might have an imaging test as part of their routine care. If the results of that test then are reviewed as part of a research study, no change in the cost management would occur. The child's assent should be sought and it cannot be assumed simply because the child raises no objections.
A. Incorrect.
B. Correct.
C. Incorrect.
D. Incorrect.

Citations:
4. Concerning randomized controlled trials, which one is TRUE?

A. Randomized controlled trials are often performed to prove a hypothesis that one intervention is better than another.
B. Intention-to-treat analysis refers to analyzing groups of patients by the treatment they received.
C. Randomization reduces the risk of an imbalance in factors which could influence the clinical course of the patients.
D. Most randomized controlled trials in radiology are double-blinded to reduce bias.

Rationale:
Correct Answer: C
Option A is false because equipoise is an ethical prerequisite to a randomized trial. Equipoise refers to that state of knowledge in which no evidence exists that shows any intervention in the trial is better than another. B is false because intention to treat analysis refers to analyzing groups of patients by how they are randomized, regardless of whether or not they received treatment. D is false because most randomized trials in radiology are open (no blinding) because blinding is usually not feasible or ethical.

5. You obtain a complete list of ALL lower extremity venous ultrasounds done at your hospital over the past year. There were 200 that were positive for DVT. The results of D-Dimer blood tests done on these patients within 24 hours of the ultrasound are available for 100 patients. Of these, 90 were positive and 10 were negative. What is the sensitivity of the D-Dimer blood test for DVT as diagnosed by ultrasound?

A. 75% in all populations
B. 75% in the tested population
C. 90% in all populations
D. 90% in the tested population

Rationale:
Correct answer: D
The problem is that only half of the disease positive cases had the D-Dimer test results available. You have no way of knowing the test status of the other 100 disease positive cases; the other 100 cases might have been all negative or all positive on the D-Dimer test. Hence the estimate of D-Dimer test sensitivity can best be estimated in only in the tested population.
6. Summary receiver operating characteristic (SROC) curve analysis is the technique of choice for meta-analysis of diagnostic test accuracy studies when:

A. sensitivity and/or specificity are homogeneous.
B. sensitivity and/or specificity are heterogeneous.
C. sensitivity and specificity are negatively correlated.
D. sensitivity and specificity are positively correlated.

Rationale:
Correct answer: C
Options A, B and D are incorrect. When preparing data for analysis, correlation testing (Spearman or Pearson) must be performed for a threshold effect, which occurs if sensitivity and specificity are negatively correlated. In that situation, SROC analysis is performed to account for dependence of diagnostic accuracy on study-specific positivity thresholds. If SROC analysis is not tenable, homogeneity testing is performed after which homogeneous data are summarized by fixed-effect methods and heterogeneous data by random effects methods.


7. Regarding the Privacy Rule established by the Health Insurance Portability and Accountability Act (HIPAA), which one statement is TRUE?

A. Only primary care providers must give patients an understandable notice of the ways in which Protected Health Information will be used and disclosed.
B. The Privacy rule covers Protected Health Information for as long as the patient is alive.
C. The rule affects Protected Health Information in paper form.
D. Patient authorization is required when Protected Health Information is used and disclosed for research purposes.

Rationale:
Correct Answer: D
Option A is false because HIPAA covers all health care providers. Option B is false because the rule applies for as long as the covered entity (health care provider, health plan, or health care clearinghouse) retains the individual health information. Decedents' health information is protected by this rule. Option C is false because the rule affects protected Health Information in electronic, paper, or verbal form.
8. At 7:30 A.M., you interpret a CT scan of the abdomen done for abdominal pain, fevers, and diarrhea as being entirely negative. You phone the ER physician, and dictate a report that documents your conversation as well as the negative result. At lunch the same day, a surgical colleague tells you that she removed an inflamed appendix from the patient at 9:00 A.M. Upon returning from lunch, you look at the CT scan again, and now see a subtle 7-mm tubular structure parallel to the terminal ileum. What is the LEAST appropriate action to take when you later electronically edit and sign your report of this case?

A. Correct any spelling / grammar errors, leave the original content alone, and sign
B. Modify the report to include your new observation and sign
C. Add a paragraph to the report detailing your retrospective review, describing the new finding, and documenting your conversation with the surgeon
D. Sign the original report, and generate a separate addendum detailing your retrospective review, the new finding, and the conversation with the surgeon

Rationales:
Correct answer: B
Options A, C, and D are all supportable depending on your personal philosophy and local policy about handling errors of interpretation. All departments should have a mechanism for recording and reviewing such ‘problem cases’ and submission to this process would be reasonable in this situation. Option B is wrong on several levels, not the least of which, is that it is intellectually dishonest. Modifying a dictated report to fit subsequent clinical findings is especially problematic when a substantially different interpretation was verbally communicated and acted upon by the referring physician.

9. Concerning full disclosure after a medical error occurs, which of the following is CORRECT?

A. It may avoid further harm through appropriate treatment.
B. It often harms patient-doctor trust and weakens the patient-doctor relationship.
C. Honest communication often increases legal liability.
D. It is inappropriate for patients who do not desire this information.

Rationales:
A. Correct. This is an important reason for full disclosure
B. Incorrect. May maintain patient-doctor trust and strengthen patient-doctor relationship
C. Incorrect. Honest communication often decreases legal liability
D. Incorrect. Truth telling respects patient autonomy
10. The accuracy of interpretation of pre-operative chest radiographs in a Radiology Department is 98%. Which of the following statements is TRUE?

A. The interpretive skills of the department radiologists are of high quality.
B. The departmental imaging protocols are of high quality.
C. The diagnostic training of residents in the department is of high quality.
D. No meaningful inference can be made from the above statement.

RATIONALES:
D. Correct. Accuracy is defined as the total number of examinations with true positive and true negative test results, out of the entire number of examinations performed, and is influenced by both sensitivity and specificity. Without knowing the sensitivity and specificity of the diagnostic test, no meaningful inference can be made about the accuracy of the test.

For example, if you had 100 chest x-rays, two of which demonstrated a lung cancer, but all 100 were read as negative, the sensitivity would be 0% (0 of 2), the specificity would be 100% (98 of 98), and the accuracy would be 98%

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\text{Accuracy} = \frac{\text{TP} + \text{TN}}{\text{TP} + \text{FN} + \text{TN} + \text{FP}} = \frac{0 + 98}{0 + 2 + 98 + 0} = 98%
\]