Solutions

Marking: **M1** a correct method, **A1** the correct answer, **B1** an independent mark.

Each answer shows the steps, then the **result**.

2.1

sensitivity: $80/100 =$ **80%**

specificity: $870/900 \approx$ **96.7%**

PPV: $80/110 \approx$ **73%**

2.2

$870 \div (20 + 870)$

$\approx$ **97.8%**

2.3

rule out a clot: **sensitivity**

confirm HIV: **specificity**

first screening test: **sensitivity**

2.4

sensitivity **rises**: more diseased people are above the cut-off

specificity **falls**: more healthy people are above it (more false positives)

3.1

(a) 200 ill: 180 true +, 20 false −; 800 well: 40 false +, 760 true −; PPV $= 180/220 \approx$ **82%**

(b) 100 ill: 90 true +; 9900 well: 495 false +; PPV $= 90/585 \approx$ **15%**

(c) when the disease is rare, most people tested are well, so even a small false-positive rate gives many more false positives than true positives

3.2

(a) it is highly sensitive, so few people with a clot test negative; a negative result rules a clot out (SnNout)

(b) its specificity is low, so many people without a clot test positive; a scan is needed to confirm

(c) $0.97 \div 0.60 \approx$ **1.6**

3.3

(a) **Q**

(b) **R**

(c) the test is no better than chance

(d) pre-test odds $= 0.2/0.8 = 0.25$; post-test odds $= 0.25 \times 10 = 2.5$; probability $= 2.5/3.5 \approx$ **71%**

(e) LRs come from sensitivity and specificity, which do not change with prevalence, so they can be applied to each hospital's own pre-test probability

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