

Chapter 13 Exercises

1. Table 1 below shows results obtained in a new screening test for diabetes. 10,000 people were screened. The cut-off level employed was 180mg of blood glucose per 100 ml. Everyone scoring above this level was classified as positive for diabetes. Everyone scoring below this level was classified as negative for diabetes. These results were compared to a “gold standard” test for diabetes that is considered to be completely valid. Compute and interpret the sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of the new screening test.

Table 1.

Screening	"Gold-Standard" Test		Total
	Disease	No Disease	
Positive	125	25	150
Negative	375	9475	9850
Total	500	9500	10000

Sensitivity =

Specificity =

PPV =

NPV =

2. The screening cut-off point was lowered to 130mg of blood glucose per 100ml. Using this cut-off point, 230 people tested positive on the screening test. Of these, 66 people tested negative on the diagnostic test (that is, they did not have diabetes). This yields Table 2. Compute the sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of the new screening test using the lower cut-off point.

Screening	"Gold-Standard" Test		Total
	Disease	No Disease	
Positive	164	66	230
Negative	336	9434	9770
Total	500	9500	10000

Sensitivity =

Specificity =

PPV =

NPV =

3. How does lowering the screening cut-off point affect sensitivity, specificity, PPV and NPV of the test? Why?

4. How does lowering the screening cut-off point affect the number of false positives and false negatives? What are the respective "costs" associated with false positives and false negatives?

5. How would you expect raising the cut-off point to 220mg of blood glucose per 100ml to affect the specificity, sensitivity, PPV and NPV of the test?

6. The screening was repeated using the 130mg of blood glucose per 100ml cut-off point in a population with an 8% prevalence of diabetes, as contrasted to the 5% prevalence in question 2, above. Calculate the sensitivity, specificity, PPV, and NPV. How do the sensitivity and specificity compare to what they were in the 5% diabetic population in question 2? How does the increased prevalence of diabetes affect the PPV?

Screening	"Gold-Standard" Test		Total
	Disease	No Disease	
Positive	263	64	327
Negative	537	9136	9673
Total	800	9200	10000

Sensitivity =

Specificity =

PPV =

NPV =

7. Think of hypothetical screening programs for diseases of interest to you; find one example of a disease where high sensitivity would be more important and one example where high specificity would be more important.

8. You have probably had the experience of being screened many times (e.g., cholesterol test, glucose level test, blood pressure measurement). What is more important information from a PATIENT's point of view (PPV/NPV vs. Sensitivity/Specificity), and what is more important information from a PHYSICIAN's point of view (PPV/NPV vs. Sensitivity/Specificity)?