Screening Tests – all in a table

Screening test result	True Status		Total
	Diseased	Not diseased	
Positive test	a True positives	b False positives	a+b
Negative test	c False negatives	d True negatives	c+d
Total	a+c	b+d	a+b+c+d

Concepts in screening tests

- False positives
- False negatives
- Sensitivity
- Specificity
- Positive predictive value
- Negative predictive value

USE THE TABLE TO CALCULATE VALUES

False Positive

- Non diseased individuals who have a positive test

False negatives

- People who have the disease, but are not detected by the disease

Definition of sensitivity

Sensitivity is the proportion of truly diseased persons who are correctly identified as diseased by the screening test.

It is a measure of the probability of correctly diagnosing a case.

Sensitivity = a ÷ a+c

(no. identified divided by the total that should have been identified)

Screening test result	True Status		Total
	Diseased	Not diseased	
Positive test	a	b	a+b
Negative test	c	d	c+d
Total	a+c	b+d	a+b+c+d

Definition of specificity

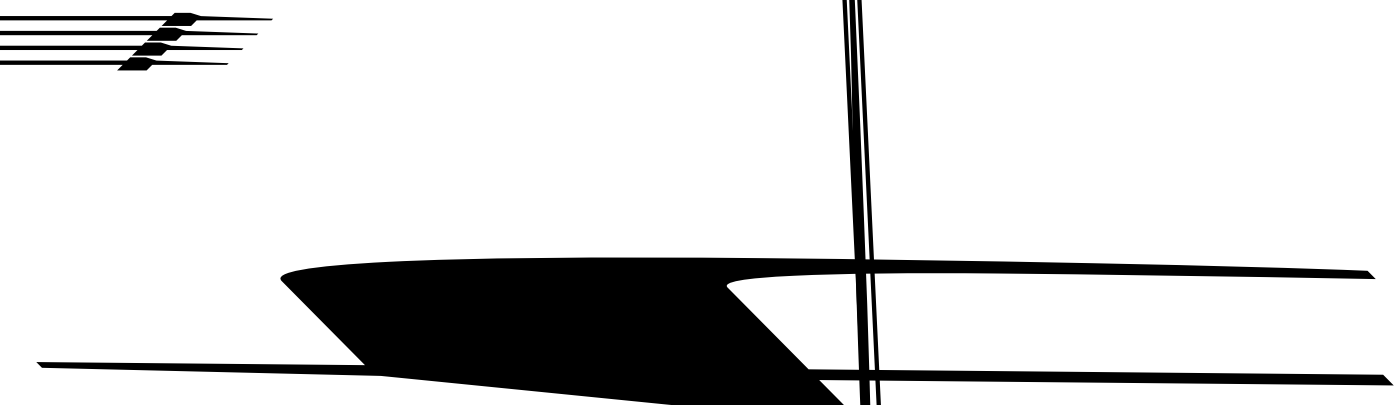
Specificity is the proportion of truly non-diseased people who are so identified correctly by the screening test.

It is a measure of the probability of correctly identifying a non-diseased individual.

Specificity = d ÷ b+d

(no. non-diseased persons identified divided by the total non-diseased people that should have been identified)

Screening test result	True Status	Total
	Disease	



Definition of positive predictive value

The predictive value of a positive screening test is the probability that a positive test is a true positive.

In other words, how many positive tests do you have to have before detecting a genuine case of the disease.

Positive predictive value
= a ÷ a+b

Screening test result	True Status		Total
	Diseased	Not diseased	
Positive test	a	b	a+b
Negative test	c	d	c+d
Total	a+c	b+d	a+b+c+d

Definition of negative predictive value

The probability that a person with a negative test does not have the disease.

In other words of all the people with negative tests, what proportion are really disease free.

Negative predictive value = d ÷ c+d

Screening test result	True Status		Total
	Diseased	Not diseased	
Positive test	a	b	a+b
Negative test	c	d	c+d
Total	a+c	b+d	a+b+c+d

Predictive values are dependent on

- Sensitivity
- Specificity
- Prevalence

With a rare disease it is likely that many test would have to be carried out to yield one true positive case.

Trade off between sensitivity, specificity & predictive value

- Lowering the threshold for the definition of a positive result would mean there would be fewer negative results, i.e. the test would be more *sensitive*.

Sensitivity = a ÷ a+c

Screening test result	True Status		Total
	Diseased	Not diseased	
Positive test	a	b	a+b
Negative test	c	d	c+d
Total	a+c	b+d	a+b+c+d

Trade off between sensitivity, specificity & predictive value

- But that would mean many more *false positives*, making the test less *specific*.

Specificity = d ÷ b+d

Screening test result	True Status		Total
	Diseased	Not diseased	
Positive test	a	b	a+b
Negative test	c	d	c+d
Total	a+c	b+d	a+b+c+d

Trade off between sensitivity, specificity & predictive value

- And that would lower the positive predictive value, i.e. more tests would have to be done to obtain one genuine case

Positive predictive value
= a ÷ a+b

Screening test result	True Status		Total
	Diseased	Not diseased	
Positive test	a	b	a+b
Negative test	c	d	c+d
Total	a+c	b+d	a+b+c+d

Summary – the important concepts

- False positives
- False negatives
- Sensitivity
- Specificity
- Positive predictive value
- Negative predictive value

All can be calculated from the one table