VET 415: Breaking Down Sensitivity and Specificity

Sensitivity: How well a test correctly identifies individuals with a disease

- Identifying "true positives"
- A test with high sensitivity means that it is good at detecting the disease and minimizes false negatives
- Refers to the test's ability to correctly identify those who truly have the disease
- Calculated: (true positives) / (True positives + False Negatives)
- Used for screening

When a test with high sensitivity is negative, it is good for ruling **OUT** a disease (since sensitivity is the ability of a test to detect the true positives

SnOut: Sensitive test a Negative Rules Out!

Specificity: How well a test correctly identifies individuals without a disease

- Identifying "true negatives"
- A test with high specificity means that it is good at identifying those without the disease and minimizing false positives
- Refers to the test's ability to correctly identify those who truly do NOT have the disease
- Calculated: (True Negatives) / (True Negatives + False Positives)
- Used to make the definitive diagnosis

When a test with high specificity is positive, it is good for ruling IN a disease (since specificity is the ability of a test to identify the true negatives)

SpIN: Specific Test a Positive Rules In!

Sensitivity and specificity are inherent properties of a diagnostic test and are not directly affected by prevalence, the prevalence of a disease influences the positive and negative predictive values of the tests which are used to interpret the results in a specific population

Prevalence: The proportion of individuals in a population who have a particular disease at a given time

Positive Predictive Value: The probability that a positive test result correctly indicates the prevalence of disease

- The positive predictive value depends on diagnostic specificity and prevalence

Negative Predictive Value: The probability that a negative test result correctly indicates the absence of the disease

- The negative predictive value depends on sensitivity and prevalence

How does prevalence affect predictive values?

- Low Prevalence: In populations with low disease prevalence, even a test with high sensitivity and specificity may have a low PPV because there are fewer true positives compared to false positives
- High Prevalence: In populations with high disease prevalence, the PPV will be higher because there will be a greater number of true positives compared to false positives

- Negative Predictive Value: The NPV is inversely related to prevalence, as prevalence decreases the negative predictive value increases and as prevalence increase, the negative predictive value decreases

Highly specific test: want to correctively classify negative animals

- Highly sensitive test: capture all disease and some healthy animals

Odds = Risk / (1-risk)

Approximates risk better when small