COMM311_TUTORIAL 4: SCREENING

Objectives:

1. Definition of screening tests
2. Validity of screening test and its calculations:
    1) Sensitivity
    2) Specificity
    3) Positive predictive value
    4) Negative predictive value
    5) False positive rate
    6) False negative rate

Plan of the tutorial:

At the beginning of the tutorial, a quick *review* of the validity of screening test and its calculations will be given (10 minutes). Then the students will be grouped into *3 small groups*. There are *3 small case scenarios* including few screening questions. Each group will be given a case scenario to discuss it and solve the related questions. Each tutor will be facilitating the discussion and answering questions asked by the students.

Tutor:

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1. **Definition of screening tests**
   - Screening tests are often used in clinical practice to assess the likelihood that a person has a particular medical condition.
   - Some common screening tests:
     1. Cholesterol measurements
     2. Fecal occult blood test
     3. Pap (Cervical Cancer) smears
     4. Mammography
2. **Validity of screening test and its calculations**
   1) **Sensitivity:** Percentage of patients who have a disease that test positive on the test.
      Sensitivity= A/(A+C) × 100

   2) **Specificity:** Percentage of patients who do not have the disease who test negative on the test.
      Specificity= D/(D+B) × 100

   3) **Positive Predictive Value:** Percentage of the time that a positive test correctly identifies people who have the disease.
      Positive Predictive Value= A/(A+B) × 100

   4) **Negative Predictive Value:** Percentage of time that a negative test correctly identifies people without the disease.
      Negative Predictive Value= D/(D+C) × 100

   5) **False Positive Rate:** Percentage of patients who have a positive test result but do not have the disease.
      False Positive Rate= B / (B+D) × 100

   6) **False Negative Rate:** Percentage of patients who have negative test results but have the disease.
      False Negative Rate= C / (A+C) × 100

Table1. 2×2 Screening table.

		Truth		
		Disease **(number)**	Non-Disease **(number)**	Total **(number)**
Test Result	Positive **(number)**	**A** (True Positive)	**B** (False Positive)	$T_{\text{Test Positive}}$
	Negative **(number)**	**C** (False Negative)	**D** (True Negative)	$T_{\text{Test Negative}}$
		T_{Disease}	$T_{\text{Non-Disease}}$	**Total**

Exercises:

1. A 46-year-old woman who presents to your office for a well-woman examination. She informs you that her 51-year-old friend was diagnosed with breast cancer one month ago and that she is worried about getting breast cancer. On further inquiry, you learn that she delivered her only child when she was 32 years of age and has no family history for breast cancer. She does not perform breast self-examinations and has never had a mammogram. She asks for your advice on breast cancer screening.

Q. Calculate the sensitivity, specificity, and positive and negative predictive values for mammography screening test.

	Has Disease	Does not have disease	
Abnormal (Positive) Test	84	17	101
Normal (Negative) Test	12	110	122
	96	127	

- **Sensitivity =**
- **Specificity =**
- **Positive Predictive Value =**
- **Negative Predictive Value =**

2. A 42 years old man requests that you, as his primary care physician, to take a Prostate Cancer Screening (PSA) test. His father was diagnosed with prostate cancer at age 67.

Q. What is the sensitivity and specificity of a PSA for detecting prostatic cancer? Is this test good at ruling out pathology? why or why not?

PSA	Pathology		
	Abnormal (+)	**Normal (-)**	**Total**
Abnormal (+) Test	231	32	263
Normal (-) Test	27	54	81
Total	258	86	344

1. Evaluate the following measures:

Sensitivity =

Specificity =

2. Is the test good at ruling out pathology? Why or why not?

3. You have been visited by a 39-year-old pregnant woman (about 11 weeks pregnant). She is concerned about her age and conceiving with a baby with Dawn Syndrome. You booked her for an appointment for first trimester fetal nuchal translucency scan.

Q. Is this screening scan for Down Syndrome useful? What is your interpretation?

Screening Test	Affected Fetus	Unaffected Fetus	Total
Abnormal (+) Test	9	351	360
Normal (-) Test	1	4,449	4,450
Total	10	4,800	4,810

1. Evaluate the following measures:

Sensitivity =

Specificity =

False positive rate=

False negative rate=

2. Interpretations: