Survival Statistics
Diagnostic Testing: Cheat Sheet

Definitions and the 2x2 table

	"Gold Standard" Result			
	Condition Present	Condition Absent		
Positive Test	**a** True Positive	**b** False Positive	a+b	**PPV*** = a/(a+b) portion of (+) test results that are correct
Negative Test	**c** False Negative	**d** True Negative	c+d	**NPV *=** d/(c+d) portion of (-) test results that are correct
	a+c	**b+d**	a+b+c+d	**Prevalence** = (a+c)/(a+b+c+d)

Sensitivity =
a/(a+c)
portion of people with disease who correctly test (+)

Specificity =
d/(b+d)
portion of people without disease who correctly test (-)

Accuracy =
(a+d)/(a+b+c+d)

(*denotes test is affected by disease prevalence)

Sensitivity
PID positivity in disease for sensitivity
test low sensitivity-> miss cases (false negative results)
SnN(-)OUT- negative rules out disease

Specificity
NIH negativity in health for specificity
test low specificity-> incorrectly labels healthy people as having condition (false positives)
SpP(+)IN- positive rules in disease

2X2 table example:
Population size = 100,000
Sensitivity =90%
Specificity =90%

disease prevalence = 1%

	(+) disease	(-) disease	
(+) test	900	9,900	PPV= 8.3%
(-) test	100	89,100	
	1,000	99,000	100,000

11 false (+) for every true (+)

disease prevalence = 0.1%

	(+) disease	(-) disease	
(+) test	90	9,990	PPV= 0.9%
(-) test	10	89,910	
	100	99,900	100,000

111 false (+) for every true (+)

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Likelihood ratios
combine sensitivity and specificity into one measure

Conceptual framework: in people with disease and without disease and we are trying to determine the discriminating ability of the test

Definitions of likelihood ratio (e.g. LR+ =10):

- odds of disease given a test result
- if the test is positive than the odds of disease is increased 10-fold
- a ratio that is a coefficient that modifies your pretest probability to generate post-test probability
- likelihood ratio of 10 means that that result is ten times more likely to occur in patients with disease than without
- a LR is a ratio which compares the likelihood of a particular test result for patients with disease to the likelihood of that same result to patients without
- a likelihood ratio is a ratio of likelihoods

test	disease (+)	Likelihood 1	disease (-)	Likelihood 2	Likelihood Ratio (L1/L2)
(+)	a	(a/a+c)	b	(b/b+d)	(a/a+c)/(b/b+d)
(-)	c	(c/a+c)	d	(d/b+d)	(c/a+c)/(d/b+d)

Relating LR to Sensitivity and Specificity: sometimes you will want to convert sensitivity and specificity directly into LR(+) or LR (-).

positive likelihood ratio (a/a+c)/(b/b+d)= sensitivity/(1-specificity)
negative likelihood ratio (c/a+c)/(d/b+d)= (1-sensitivity)/ specificity