Standard summaries of 2×2 tables

Defined using cell counts

Write the 2 ×2 table as:

		True disease state +	True disease state −	
Test	+	X_{11}	X_{12}	$X_{1\cdot}$
	−	X_{21}	X_{22}	$X_{2\cdot}$
		$X_{\cdot 1}$	$X_{\cdot 2}$	$X_{\cdot\cdot}$

Prevalence = $X_{\cdot 1}$ / $X_{\cdot\cdot}$

Sensitivity = X_{11} / $X_{\cdot 1}$

Specificity = X_{22} / $X_{\cdot 2}$

+ predictive value = X_{11} / $X_{1\cdot}$

− predictive value = X_{22} / $X_{2\cdot}$

Odds ratio = $X_{11}\, X_{22}$ / $X_{12}\, X_{21}$

Relative risk = $\dfrac{X_{11} / X_{1\cdot}}{X_{21} / X_{2\cdot}}$

Risk difference = $X_{11} / X_{1\cdot} - X_{21} / X_{2\cdot}$

Defined using sensitivity, specificity, and prevalence

Define: π = prevalence
$R = (1 - \pi) / \pi \geq 0$ $\left\{ \begin{array}{l} \text{prev} \uparrow, \ R \downarrow \\ \text{prev} \downarrow, \ R \uparrow \end{array} \right.$
Ω = sensitivity
ß = specificity

The 2 ×2 table becomes:

		True disease state +	True disease state −
Test	+	$\pi\, \Omega\, X_{\cdot\cdot}$	$(1 - \pi)(1 - ß) X_{\cdot\cdot}$
	−	$\pi(1 - \Omega) X_{\cdot\cdot}$	$(1 - \pi) ß\, X_{\cdot\cdot}$
		$\pi\, X_{\cdot\cdot}$	$(1 - \pi) X_{\cdot\cdot}$

Prevalence = π

Sensitivity = Ω

Specificity = ß

+ predictive value = $\left\{1 + R\,\dfrac{1 - ß}{\Omega}\right\}^{-1}$

− predictive value = $\left\{1 + \dfrac{1}{R}\,\dfrac{1 - \Omega}{ß}\right\}^{-1}$

Odds ratio = $\dfrac{\Omega}{(1 - \Omega)}\ \dfrac{ß}{(1 - ß)}$

Relative risk =

$$\frac{\Omega}{(1 - \Omega)}\ \frac{1 - \Omega \quad + \quad R\, ß}{\Omega \ + \ R\ (1 - ß)}$$

≈ OR if R is large, i.e. prevalence is small

Risk difference = a mess