

HW #2 Solutions

Saturday, January 29, 2005
1:20 AM

2.1 $P(-|C) = 1/4$
 $P(+|\bar{C}) = 2/3$
 sensitivity = $P(+|C) = 1 - P(-|C) = 3/4$
 specificity = $P(-|\bar{C}) = 1 - P(+|\bar{C}) = 1/3$

2.2 $P(+|C) = P(-|\bar{C}) = .8$

			+	-
			π_{11}	π_{12}
			or $\pi_{+ C}$	$\pi_{- C}$
			π_{21}	π_{22}
			or	$.8$ $.2$
				$.2$ $.8$

$\theta = \frac{\pi_{+|C} \pi_{-|\bar{C}}}{\pi_{-|C} \pi_{+|C}} = \frac{.8 \times .8}{.2 \times .2} = 16$

2.3 response: Injury
 difference of proportions
 $\hat{\pi}_1 - \hat{\pi}_2 = \left(\frac{510}{412,368} \right) - \left(\frac{160}{162,527} \right) = .00861$

relative risk
 $\hat{\pi}_1 / \hat{\pi}_2 = .00985 / .00124 = 7.96$

odds ratio
 $\hat{\theta} = \frac{\hat{\pi}_{11} \hat{\pi}_{22}}{\hat{\pi}_{12} \hat{\pi}_{21}} = 7.96$

$\hat{\pi}_1 / \hat{\pi}_2 \approx \hat{\theta}$ since both $\hat{\pi}_1, \hat{\pi}_2 \approx 0$

2.4 a. Relative risk
 b. $\pi_{drug} = .55 \pi_{placebo}$

(i) $\frac{\pi_{drug}}{\pi_{placebo}} = .55$

(ii) $\frac{\pi_{placebo}}{\pi_{drug}} = \frac{1}{.55} = 1.818$

2.8 $\theta = \frac{\pi_f / (1 - \pi_f)}{\pi_m / (1 - \pi_m)} = 11.4$

a. The interpretation asserts that $\pi_f = 11.4 \pi_m$
 "the odds of survival for females was 11.4 times that for males"

The interpretation is correct if $\pi_m, \pi_f \approx 0$

b. $\pi_f / (1 - \pi_f) = 2.9$

$(\pi_m / (1 - \pi_m)) = 2.9 / 11.4 = .254$

Solve $\pi_f = 2.9 - 2.9 \pi_f$ for π_f

$\Rightarrow \pi_f = \frac{2.9}{(1 + 2.9)} = .744 = 74.4\%$

Solve $\pi_f = 2.9 - 2.9\pi_f$ for π_f
 $\Rightarrow \pi_f = \frac{2.9}{(1+2.9)} = .744 = 74.4\%$

Similarly, $\pi_m = \frac{.254}{1+.254} = .202 = 20.2\%$