Relative risk and Confounding (Solutions)

Solution to Practical exercise.1

Bed sores   ⟹   Death

(Risk factor A)   (Disease B)

Medical severity

(X is a confounder here)
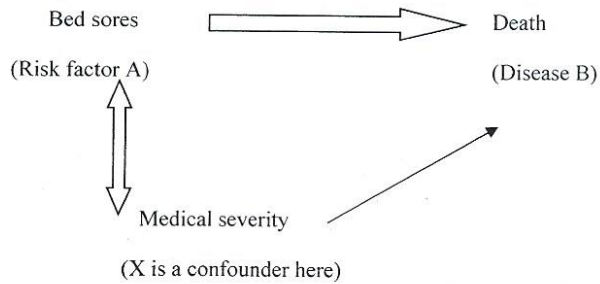
This study was carried out in 9400 patients among people aged 60 and above.

	Died Yes	Died No	
Bed sores Yes	79	745	824
Bed sores No	286	8290	8576
	365	9035	9400

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

(79/824)/286/8576 = 2.9

Thus the probability of death was 2.9 times high in people with bedsores

than in people without bedsores. So can we conclude that bedsores causes death or is it due to confounding. Let's stratify and study the relationship between medical severity and bedsores.

Risk of bed sores and death in high medical severity group

	Died Yes	Died No	Total
Bed sores Yes	55	51	106
Bed sores No	5	5	10
	60	56	116

RR = Relative risk = A/ (A+B)/C/(C+D). = (55/106)/5/10 = 1.04

Bedsores and death in low medical severity group

	Died Yes	Died No	Total
Bed sores Yes	24	694	718
Bed sores No	281	8285	8566
	305	8979	9284

RR = Relative risk = A/ (A+B)/C/(C+D) = (24/718)/ (281/8566) = 1.02

This means that the relative risk of death comparing those with and without bedsores, across the two strata of medical severity (high & low) is about 1. And the original relative risk we found was 2.9.

Thus, if the effect seen in the overall table is reduced or gets eliminated when we stratify then the change in effect. Hence we conclude that (medical severity) is a confounding variable.

Scenario 2:

Let us consider another hypothetical example of confounder in a case control study. The variable - age is a universal confounder and its effect shall be discussed subsequently.

Discussion is between diabetes, CHD and age.

So we obtain the diagram as under;

Diabetes   →   CHD

(Risk factor A)   (Disease B)

        ↕

        AGE

    (X is a confounder here)
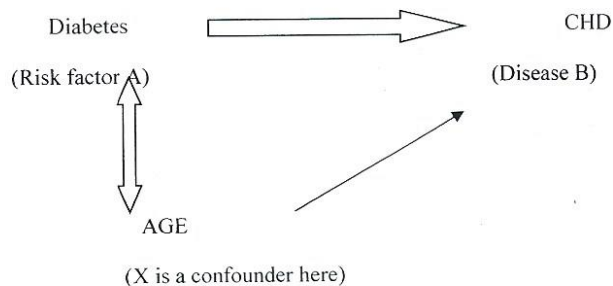
With the given data, determine the effect of confounder.

Diabetes	CHD Yes	CHD No
Yes	30	18
No	70	82
	100	100

OR = 30* 82/70 *18 = 1.95

Which means, people with diabetes have 1.95 times higher risk of CHD than people without diabetes.

Now considering the factor age, the population can be stratified as below and above 40 years and analyzed for the risk.

Age	Exposed	Cases Yes	Cases No	OR
< 40	Yes	5	8	1.00
	No	45	72	
>40				1.00
	Yes	25	10	
	No	25	10	

The effect from the overall table has been nullified on stratification. This change in effect is due to confounding. Hence age is a confounder.