**CMED 305 (2018-2019)**

**Relative risk and Confounding (Solutions)**

Solution to Practical exercise.1

Bed sores Pa 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

|  |  |  |  |
| --- | --- | --- | --- |
|  | DiedYes | DiedNo | 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

|  |  |  |  |
| --- | --- | --- | --- |
|  | DiedYes | DiedNo | 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 | CHDYes |  CHDNo |
| 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.