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CHAPTER 5

Epidemiology Study Designs

Episode 5.2: 2) Case-control study

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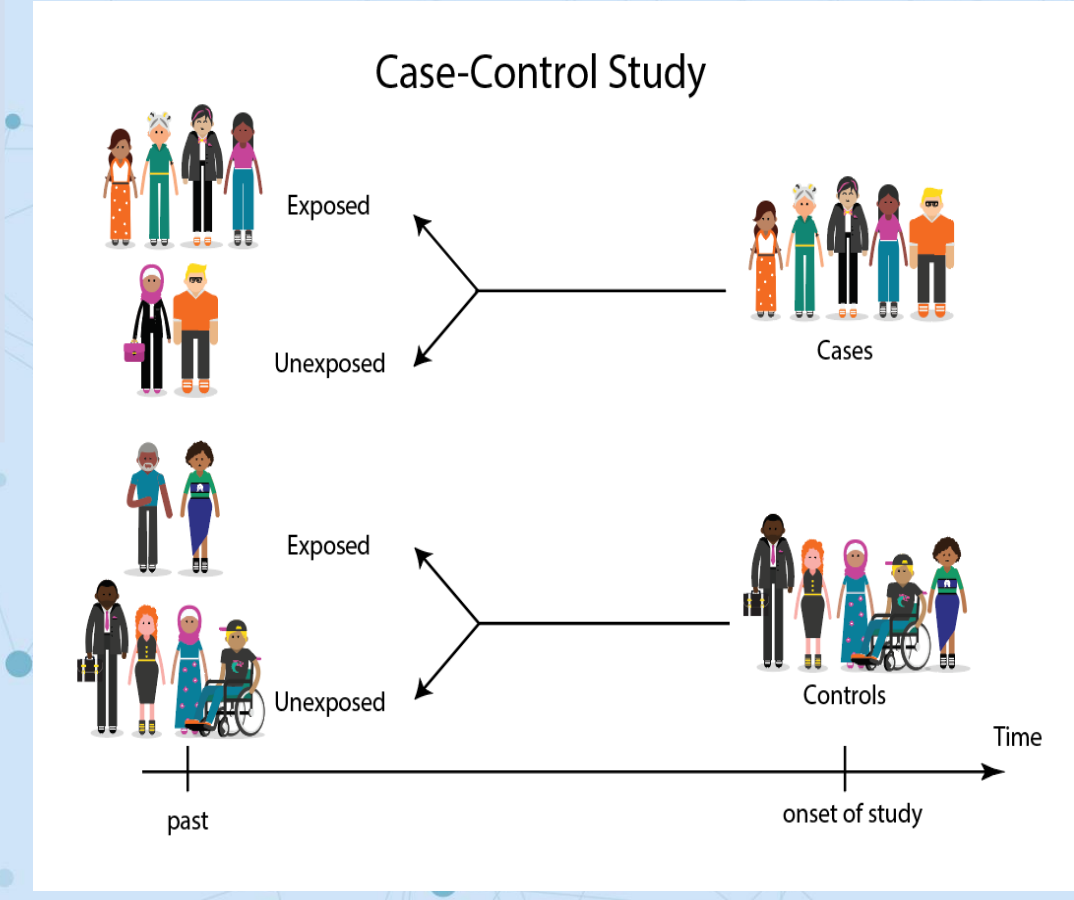
The nature of the case-control study

observation without manipulation

Case-control study

1. Start from the outcome retrospective to exposure (factor)

2. Initially, the diseased population was divided into 2 groups, namely the diseased group (case) and the group without the disease (control or non-case).



Source: https://deakin.libguides.com/quantitative-study-designs/casecontrol

The nature of the case-control study: study plan

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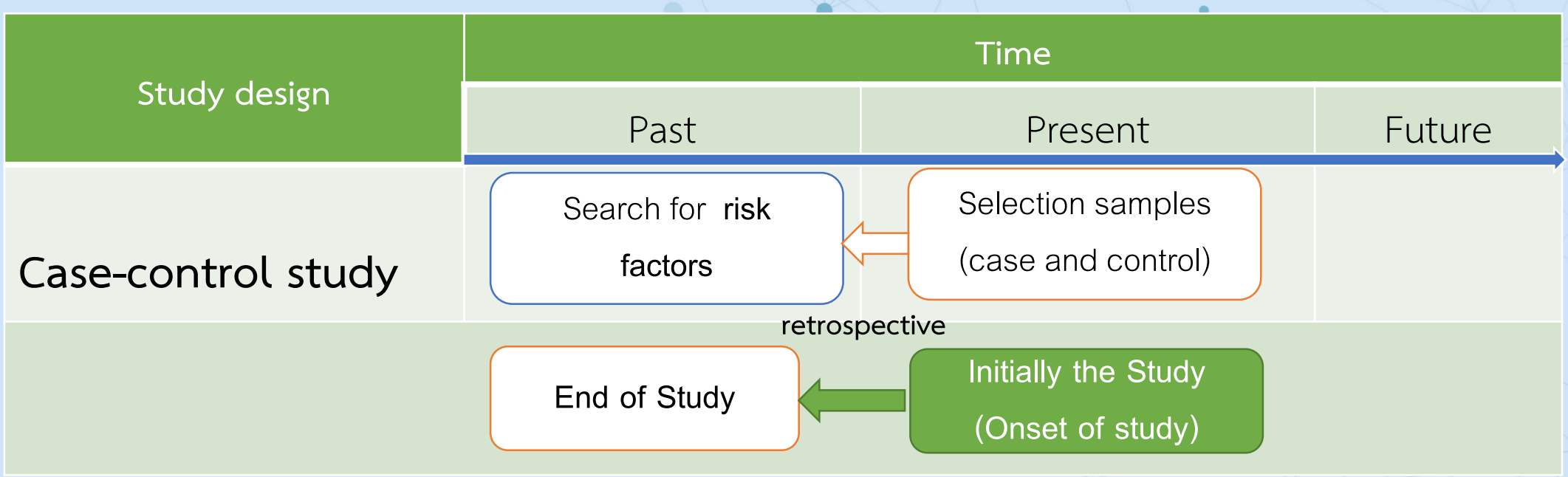

The nature of the case-control study

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observation without manipulation

Exposed (+)

Non-exposured (-)

retrospective

Case (diseased) (+)

Case Population

Exposed (+)

Non-exposured (-)

retrospective

control (non-diseased) (-)

Non Case Population

retrospective

End of Study

Initially the Study (Onset of study)

Steps for conducting a case-control study (retrospective study)

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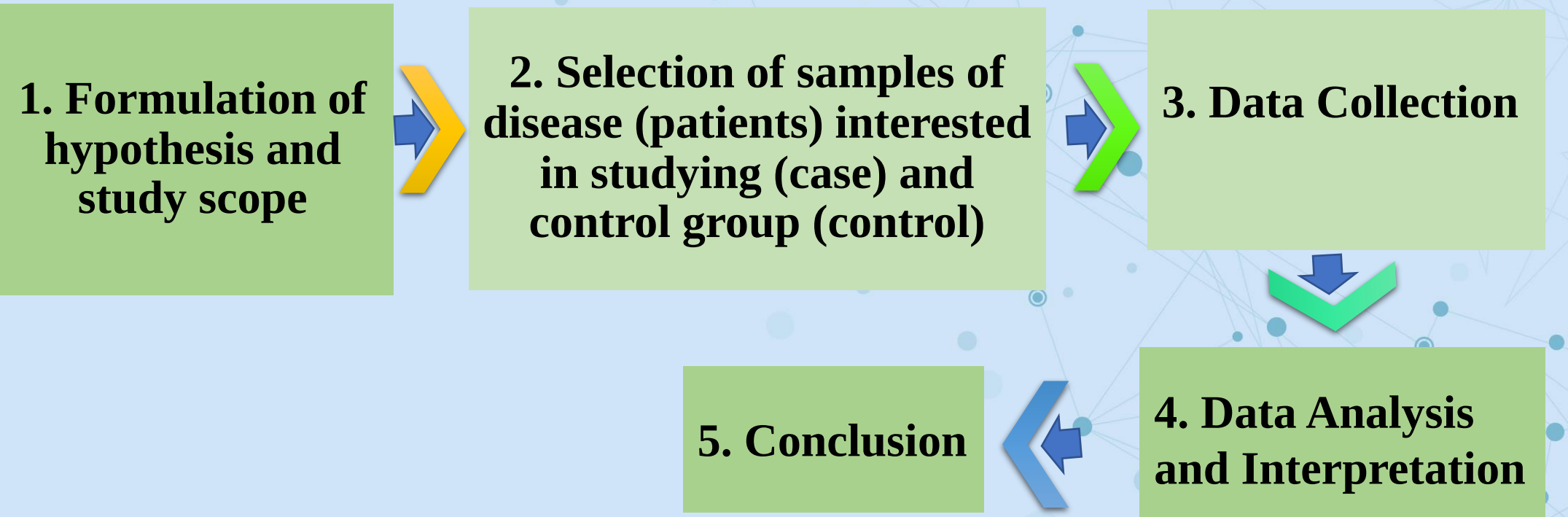

Steps for conducting a case-control study (retrospective study)

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Selection samples (case and control)

Case group (diseased)

The primary study base is the *selection* of cases from the community by selecting cases or randomly selecting (sampling) cases from all existing patients in the community of interest.

The secondary study base, also known as the case-defined study base, is the selection of cases from patients who come to health care facilities. or hospital.

Control group (non-diseased)

- Representative of the population at risk of becoming a case.
- Have no health problems as interested (outcome)
- Patients with characteristics most similar to the studied patients.

Steps for conducting a case-control study (retrospective study)

Data Collection

3.1 Study data from medical records about past illnesses/ treatments that have been recorded.	**3.2 Study data** from other records related to past illness/ treatment.	**3.3 Observing**, questioning, interviewing or surveying information **about the family environment**	**3.4 Observing**, questioning, interviewing or surveying information about **psychosocial factors**	**3.5 Observing**, questioning, interviewing or exploring other risks	**3.6 Observing**, questioning, interviewing or surveying about **health behaviors**

Data Analysis and Interpretation

Exposure (Risk factor)	Outcomes		Total	Prevalence
	Diseased	Non-diseased		
Exposed	a	b	**a + b**	a / (a + c)
Non-exposed	c	d	**c + d**	c / (a + c)
Total	a + c	b + d	**a + b + c + d**	-

The probability of exposed risk factor in case (P ex) = a / (a + c)

The probability of non-exposed risk factor in case (P non) = c / (a + c)

Odds Ratio = $\frac{\boldsymbol{a}}{\boldsymbol{c}} = \frac{a\ /\ (a + c)}{c\ /\ (a + c)}$

Odds Ratio (OR) Interpretation

- **A Odds Ratio** of 1.0 indicates identical risk among the two groups.
- **A Odds Ratio** greater than 1.0 indicates an increased risk for the group in the numerator, usually the exposed group.
- **A Odds Ratio** less than 1.0 indicates a decreased risk for the exposed group, indicating that perhaps exposure actually protects against disease occurrence.

Conclusion

- The results obtained are only odds ratios.

- A true relationship or relative risk cannot be concluded because this type of study was unable to determine the incidence rate of the exposed group and the non-exposed group.

The bias of a case-control study (retrospective study)

1. Recall bias

- Some factors may have been forgotten
- Incomplete medical records
- The difference in the number of factors between case and control
- **Unclear Information on past exposures**

2. Selection bias

Often caused by the improper selection of the control group and the lack of cooperation from the control group in providing information.

Advantages & Disadvantages

Advantages

- Cheaper
- Quicker / easier to conduct
- Good for diseases with long latency periods
- Can assess multiple exposures
- Good for rare diseases

Disadvantages

- Retrospective / more prone to bias
- Can only assess one outcome/disease
- Cannot establish risk
- Cannot establish the incidence

Summary

- Case-control study is a retrospective design.
- Case-control studies must clearly define two groups at the start (one with the outcome/disease and one without the outcome/disease)
- This design focused on looking back to assess whether there is a statistically significant difference in the rates of exposure to a defined risk factor between the groups.

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Thank You for Your Attention

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to be continued