

Summary:

Case – Control Studies

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NEW ZEALAND
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Schedule

Workshop Contents

- **W1**: Cross-sectional
- **W2**: Questionnaire design
- **W3**: **Case-control**
- **W4**: Scenario 1: case-control
- **W5**: Scenario 2: X-sectional

Facilitators

- Cord Heuer, Arata Hidano
- Naomi Cogger
- **Cord Heuer, Ashish Sutar**
- Cord Heuer, Art Subharat
- Cord Heuer, Art Subharat

Date

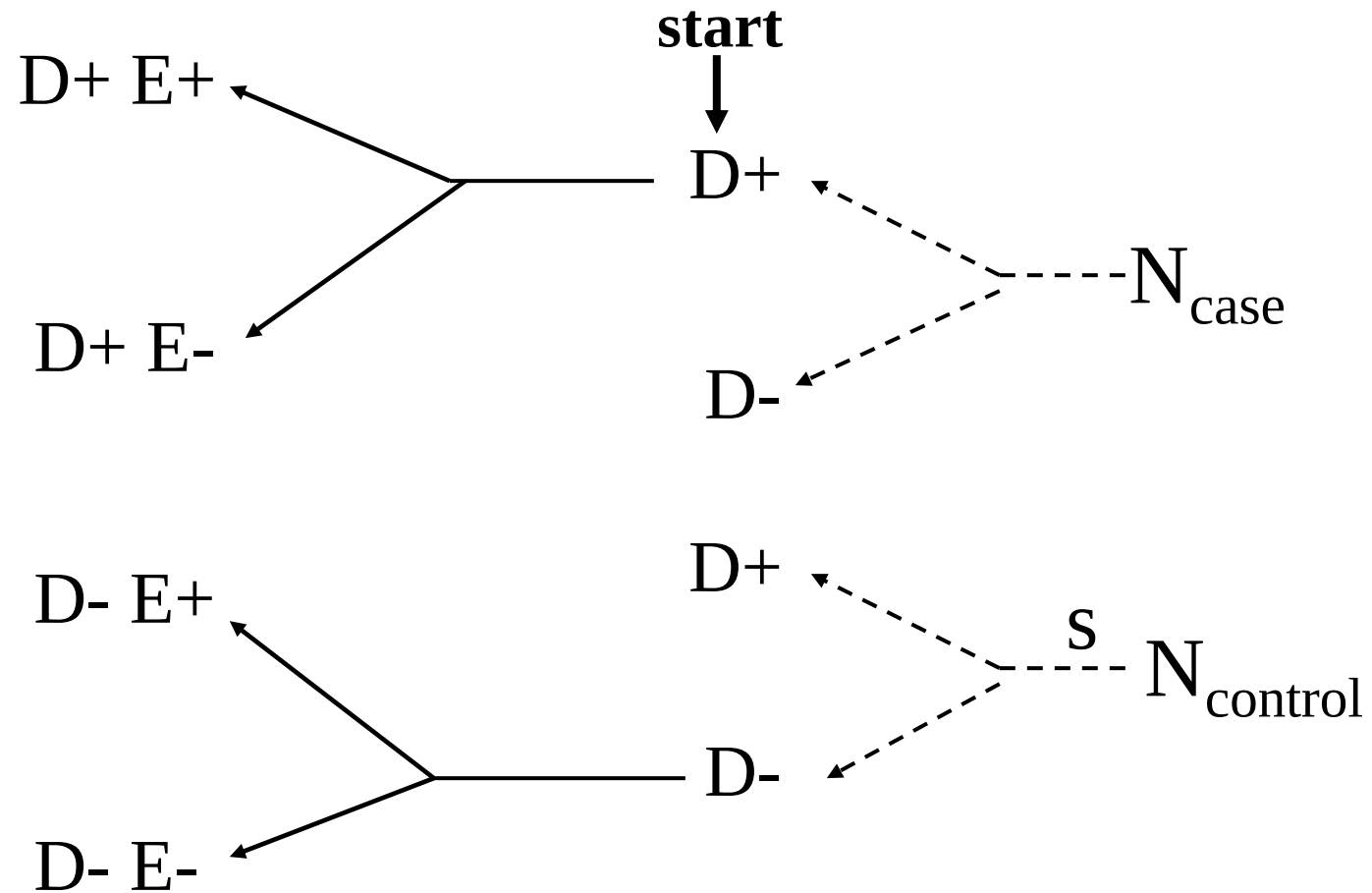
- 11 Nov'21
- 18 Nov'21
- **25 Nov'21**
- 19 Sep'21
- 03 Dec'21



Objectives and Expected Outcomes

- Objective
 - Enable participants to design and conduct case control studies
- Expected outcomes
 - Participants understand the merits and principle of the cc-design
 - Participants are aware of the challenges, esp. when selecting controls
 - Participants are aware of common types of bias (selection, recall)
 - Participants understand remedies for preventing or adjusting for bias
 - Participants are able to estimate the study size

Principle: case – control study



Q: What has happened?



Background: case control

- We discussed that a case control design provided these significant advantages:
 - It is the method of choice when disease is very rare and we cannot possibly include the entire population
 - Low cost and short duration
 - We would include as many cases as are accessible and a selection of 1-5 comparable controls from the '*population that gave rise to the cases*'
 - The evaluation of many risk factors at the same time (screening, outbreaks)
 - The option of controlling bias at planning stage by matching and post-hoc in the analysis by multi-variable logistic regression.

Background: case control

- However, we also highlighted critical features:
 - A relatively high risk of selection bias when looking for suitable controls
 - The risk of overmatching
 - The relative unsuitability of this design for
 - drawing causal inferences
 - estimating the impact of exposure factors in the population

Background: case control

- Benzidine exposure and ERU

	ERU +	ERU -	Total
Benzidine +	60	188,940	189,000
Benzidine -	57	278,943	279,000
Total	117	467,883	468,000

$$R_E = \frac{60}{189,000} = 32 \text{ cases per } 100,000$$

$$R_O = \frac{57}{279,000} = 20 \text{ cases per } 100,000$$

$$RR = \frac{32}{20} = 1.5539$$

$$OR = \frac{60 * 278,943}{57 * 188,940} = 1.5541$$

Background: case control

- Benzidine exposure and ERU: equal numbers of cases and controls

	ERU +	ERU -	Total
Benzidine +	60	47	107
Benzidine -	57	70	127
Total	117	117	234

$$O_E = \frac{60}{47} = 1.28$$

$$O_O = \frac{57}{70} = 0.81$$

$$OR = \frac{60/57}{47/70} = \frac{60/47}{57/70} = 1.5541$$

Key questions of case – control studies

- *Let's discuss these issues by the example Dr Ashish Sutar's case study*
 - Practical issues about finding cases during/after outbreaks
 - Identifying and enrolling suitable controls
 - Bias when selecting controls and when measuring exposure
 - Matching vs over-matching

Discussion

- 4 groups – each discussing the same 3 topics (20min):
 - Finding cases and selecting controls
 - Potential bias
 - Preventing bias or adjusting for bias
- Same groups as in the last session
- All groups report back (5min): nominate one presenter
- Tutors will join and may be asked to provide clarity

Scenario 1

- Case – control study of Lumpy Skin Disease (LSD)

LSD



- Highly transmissible pox-virus causing skin nodules, fever, loss of appetite in cattle and water buffaloes to an unknown extent, not zoonotic
- No treatment available; virus hardy, survives 35 days in skin crusts
- High morbidity – low mortality, loss of condition, reduced milk, poor reproduction, abortion, 40-60% production loss
- Endemic in Africa, **since 2019** spreading widely in Asia
- Seasonal transmission by various insect species intra-dermally (mechanical), also by contaminated feed, water, semen, transplacental, cattle movements.
- Incubation period of 4-7 days up to 2-5 weeks, lifelong immunity

LSD



- Diagnosis
 - Clinical signs clearly visible (picture) but lasting only 1-3 weeks, only ~50% of infected show signs → stamping out not effective
 - PCR for virus, VNT or ELISA for antibody – cross-reaction with sheep/goat pox virus or antibody, antibody duration: ~ few years
- Differential diagnosis
 - pseudo lumpy skin disease (BHV-2), bovine papular stomatitis, *Pseudocowpox*, dermatophilosis, insect or tick bites, demodicosis, *Hypoderma bovis* infection, photosensitisation, cutaneous tuberculosis
- Vaccination
 - KS1 (sheep/goat pox vaccine), better and safer: Neethling strain (2 SA vaccs.)

Scenario 1

- Case – control study of Lumpy Skin Disease (LSD)
 - [details in a pdf file at the Stream website]
 - Neverland: 8m cattle in 1m HHs, typically 3-10 cattle/HH
 - Communal grazing after rice harvest
 - 2019: 3 outbreaks reported
 - 2020: 12 outbreaks reported
 - 2021: 28 outbreaks reported up to August, trend increasing
- Task for each country until next week's session:
 - Your Epi-Unit has 6 vets: investigate outbreaks
 - Budget: US\$30,000, assume cost for personnel, village visits, and testing
 - Design a case-control study to identify risk factors for transmission