EpiSouth

Network for the Control of Public Health Threats
in the Mediterranean Region and South East Europe

Outbreak investigation

EpiSouth Outbreak investigation course
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Vinciane Sizaire
Based on the K. Deschrijver presentation for the EPIET introductory course, 2010

An outbreak: special situation !

- Unexpected event
- Requires a quick assessment
- Control measures are urgent
- Work on the field

What is an outbreak?

- Occurrence of more cases of disease than expected
  - In a given area
  - Over a particular period of time
  - Among a specific group of people
- Incident
  - Two or more people involved
  - Thought to have a common exposure
  - Experience a similar illness

Steps of outbreak investigation

1. Confirmation of outbreak & diagnosis
2. Organization of outbreak control team
3. On call actions and case finding
4. Case definition, identification of the population at risk, Study protocol with clear objectives
5. Identification, counting of cases, information collection

Control Measures

Steps of outbreak investigation

6. Descriptive analysis (time, place & person)
7. Generating & testing hypothesis: Analytical study
8. Further studies (environmental…)
9. Communication

Control Measures

(1) Confirmation of outbreak and diagnosis

Confirm outbreak

- Is this an outbreak?
  - More cases than expected?
    - → Surveillance data
    - → Survey: hospitals, labs, physicians
- Caution !
  - Seasonal variations
  - Notification artefact (new case definitions…)
  - Diagnostic errors (pseudo-outbreaks)
    - → **But act !**

Confirm diagnosis

- Laboratory confirmation: serology, isolates & typing, toxic agents, perspective on matching strains…
- Talk with clinicians
- Talk with patients and family
- Contact laboratories
- How many samples? Enough?

(2) Organisation & set-up of the outbreak control team

Oubreak control team

- Composition:
  - Epidemiologists, microbiologists, clinicians, veterinarians, engineers, administrative support, communication…
- Initial meeting to distribute roles and responsibilities, who is in lead?
- Define clear objectives
- Planning

(3) Call for actions

Actions

- Surveillance is action!
- Immediate control measures?
  - Focusing on population at risk (prophylaxis, exclusion, isolation, public warning, elimination of risk, are the patients in good hands?…
- Go and look for the cases → Case finding

(4) Case definition & study protocol

- Case finding
- Case definition
- Approach
- Design
- Statistical methods
- Microbiological methods

Case definition

- Criteria
  - Clinical and/or biological criteria?
  - Time (study period): When?
  - Place: Where?
  - Person: Who?
- Sensitive versus specific?
- Inclusion & exclusion criteria
- Quality (possible, probable, confirmed)
- Can be adjusted if new information becomes available

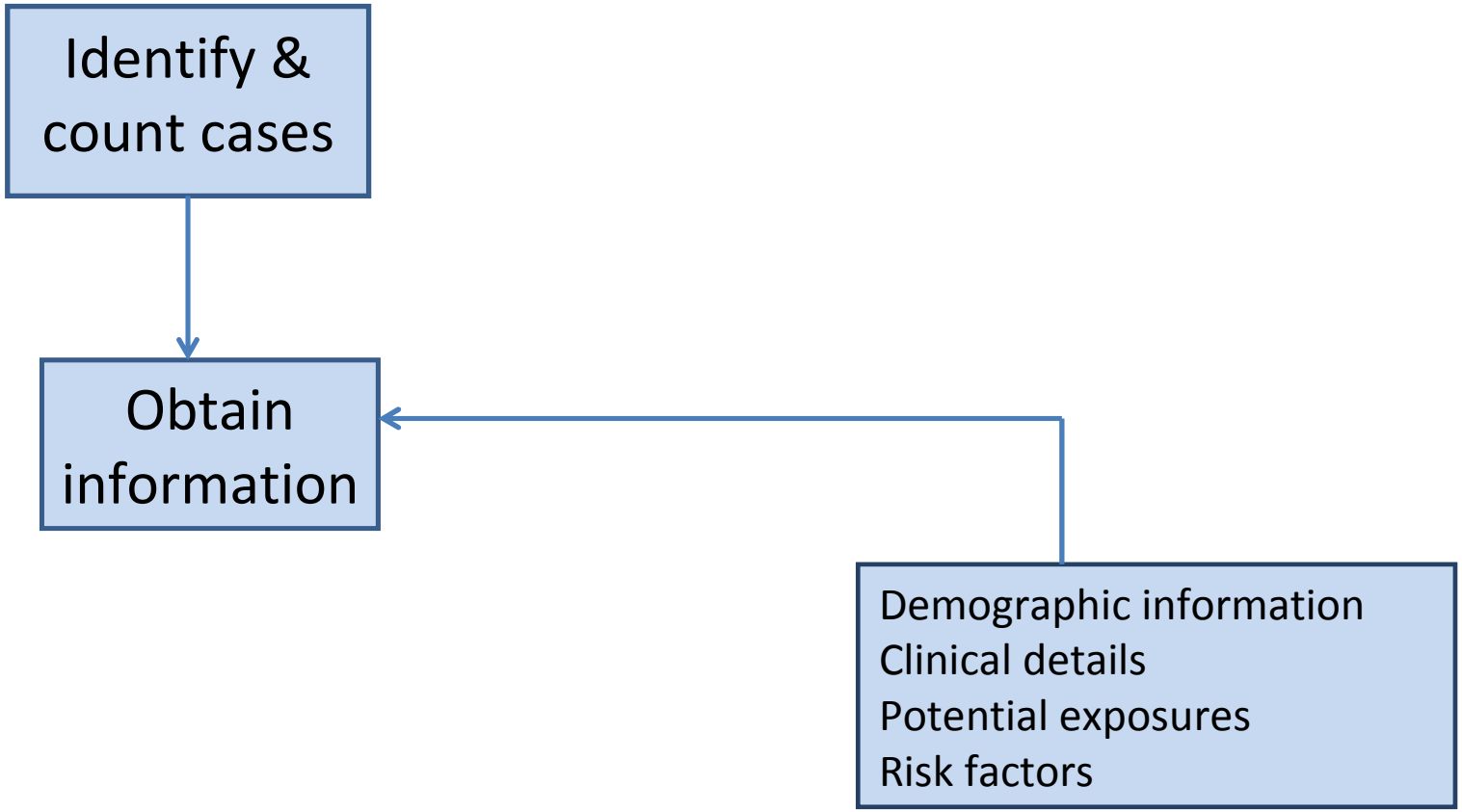
Design

- Descriptive study (What? Who? Where? When?)
- Analytical study (cohort study, case-control study, …) (Why?)
- Microbiological study

Which design according to objectives

- Describe the epidemic → Case finding and descriptive study
- Identify the pathogen → microbiological study
- Identify mode of transmission → analytical study
- Identify source → environmental study
- Identify risk factors → analytical epidemiological study

(5) Identification, counting cases, collect information


Identify & count cases
Obtain information
Demographic information
Clinical details
Potential exposures
Risk factors

Organize information: Line list

- Identification
- Date of birth
- Address
- Date of onset of symptoms
- Complications
- Hospital stay
- Lab results
- …

(6) Descriptive analysis: Time, place & person

Time: epidemic curve

- Distribution of cases by time of onset of symptoms, diagnosis or identification → Histogramme = Epidemic curve
- Describe:
  - Start, end, duration
  - Peak
  - Importance
  - Atypical cases
- Helps to develop hypotheses:
  - Incubation period
  - Etiological agent
  - Type of source
  - Type of transmission
  - Time of exposure

Place

- Place of residence
- Place of possible exposure
  - Work
  - Meals
  - Travel routes
  - Day-care
  - Leisure activities
- Maps
  - Identify area at risk
  - Identify cases on map

Person

- Distribution of cases, according to:
  - Age
  - Gender
  - Place of living
  - Occupation
- Distribution of symptoms
- Attack rates, ratios, means, %

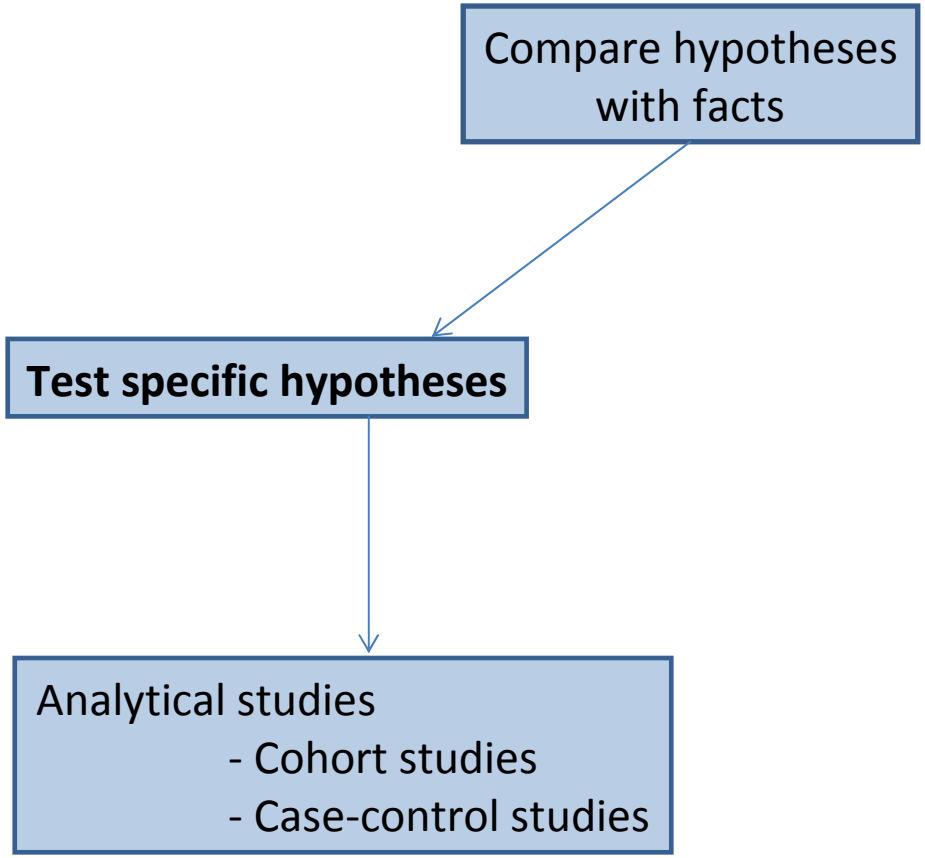
(7) Generating & testing hypotheses by analytical study

Sources of hypotheses

- Your descriptive data
- The epidemic curve
- Patients ideas
- Visits to the field
- Literature
- Common sense

Develop hypotheses

- What could be a risk factor to become ill?
- What could be the source and the vehicle?
- What could be the mode of transmission?


Compare hypotheses with facts
Test specific hypotheses
Analytical studies
- Cohort studies
- Case-control studies

(8) Further studies

Additional investigation to verify hypotheses

- Microbiological investigation of food samples
- Specific environmental investigation
- Veterinarian investigation
- Molecular typing
- Trace back investigation (origin of foods)
- Meteorological data
- Entomological investigations

(9) Control measures & prevention

Control measures

- Depending of:
  - the nature of the agent
  - The source of the agent
  - The way of transmission
- Actions:
  - prophylaxis,
  - exclusion, isolation,
  - public warning,
  - elimination of risk, …

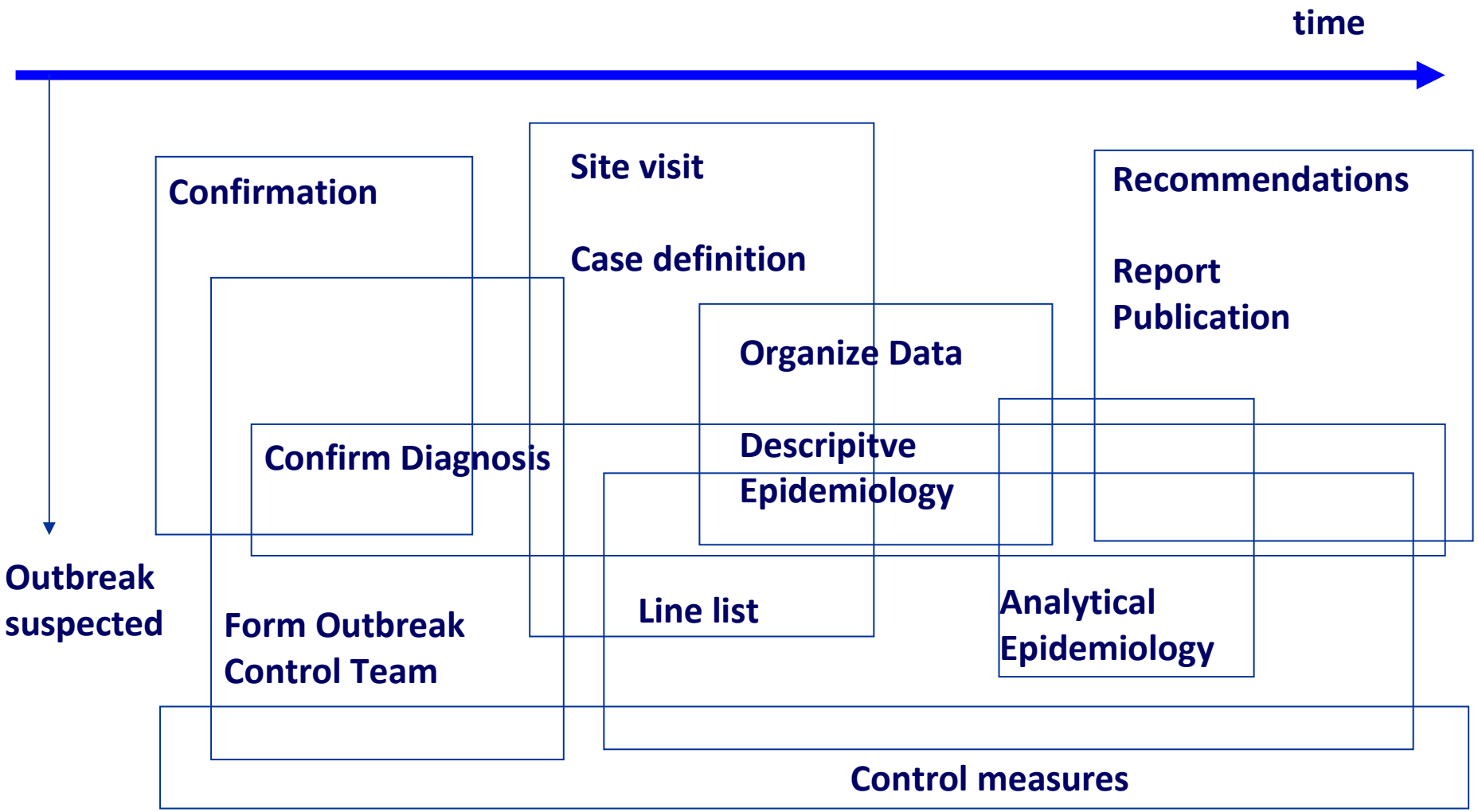
(10) Communication

Communication

- Forms:
  - Oral or written
- To whom?
  - Politics, population, scientific community
- Scientific format
  - Introduction, method, results, discussion, recommendations and summary

- Confirm!
- Control Team!
- Case finding!
- Case definition!
- Count cases!
- Check!
- Case definition!
- Calculate rates!
- Compare rates and ratio!
- Control!
- Communication!

The reality….


time
Confirmation
Site visit
Case definition
Recommendations
Report
Publication
Organize Data
Confirm Diagnosis
Descripitve
Epidemiology
Outbreak
suspected
Form Outbreak
Control Team
Line list
Analytical
Epidemiology
Control measures

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