



Epidemiological Studies

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Components of Epidemiology

- Measure disease frequency
 - Quantify disease
- Assess distribution of disease
 - Who is getting disease?
 - Where is disease occurring?
 - When is disease occurring?
 - ➔ Formulation of hypotheses concerning causal and preventive factors
- Identify determinants of disease
 - Hypotheses are tested using epidemiologic studies

Types Of Epidemiological studies

Observational epidemiology

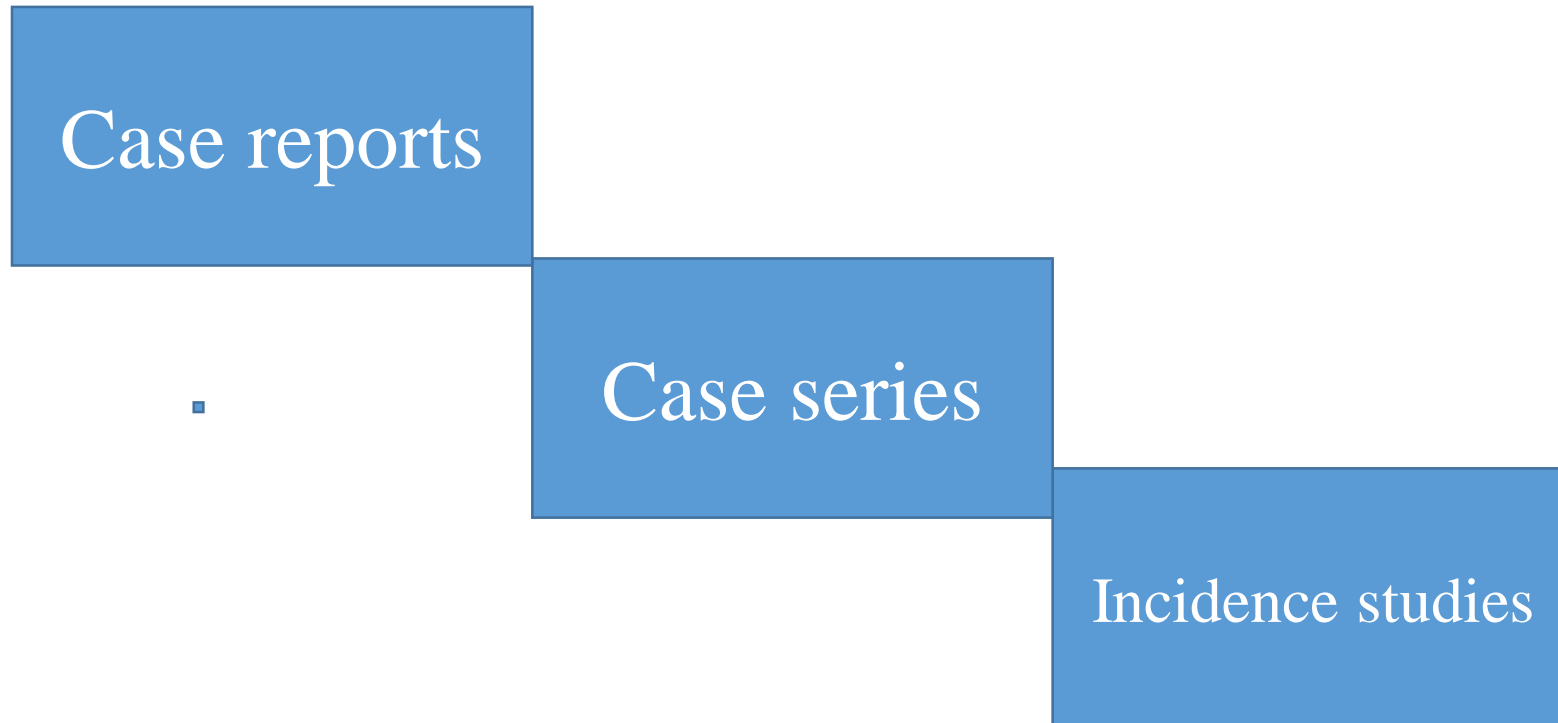
Descriptive study  **a. Case- report ,**
 **b. Case series, and Incidence**

Study Designs - Analytic Epidemiology

- **Experimental Studies**
 - Randomized controlled clinical trials
 - Community trials
- **Observational Studies**
 - Group data
 - **Ecologic**
 - Individual data
 - **Cross-sectional** :studies examine a point in time
 - **Cohort**
 - **Case-control**
 - **Case-crossover: are** the newest form of epidemiologic design

Descriptive study

- This type of study considered the first phase of any epidemiological investigation. Descriptive study designs include:



Case Reports

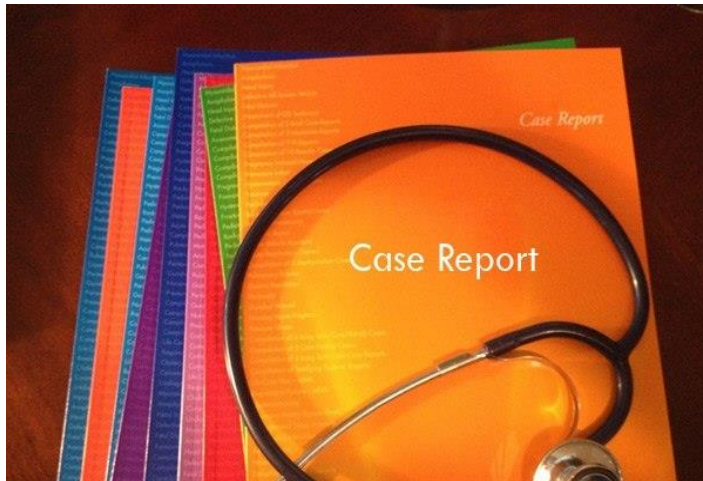
- It generally describes an injury or injuries to one or two individuals that have been identified in a medical situation. **Detailed presentation of a single case or handful of cases**

Generally report a new or unique finding.

- e.g. **previous undescribed disease.**

e.g. **unexpected link between diseases.**

e.g. **unpredicted new therapeutic effect.**



Case Series

In a case series, several events are described.
These events usually have been observed over
a set period of time (such as one year)
and are identified from one reporting source (e.g. a hospital)
Case series also provide suggestive evidence many times leading to
more extensive testing



- **Experience of a group of patients with a similar diagnosis.**
- **Assesses prevalent disease.**
- **Cases may be identified from a single or multiple sources.**
- Generally report on new condition

- **Advantages**

- Useful for hypothesis generation
- Informative for very rare disease with few established risk factors
- Characterizes averages for disorder

- **Disadvantages**

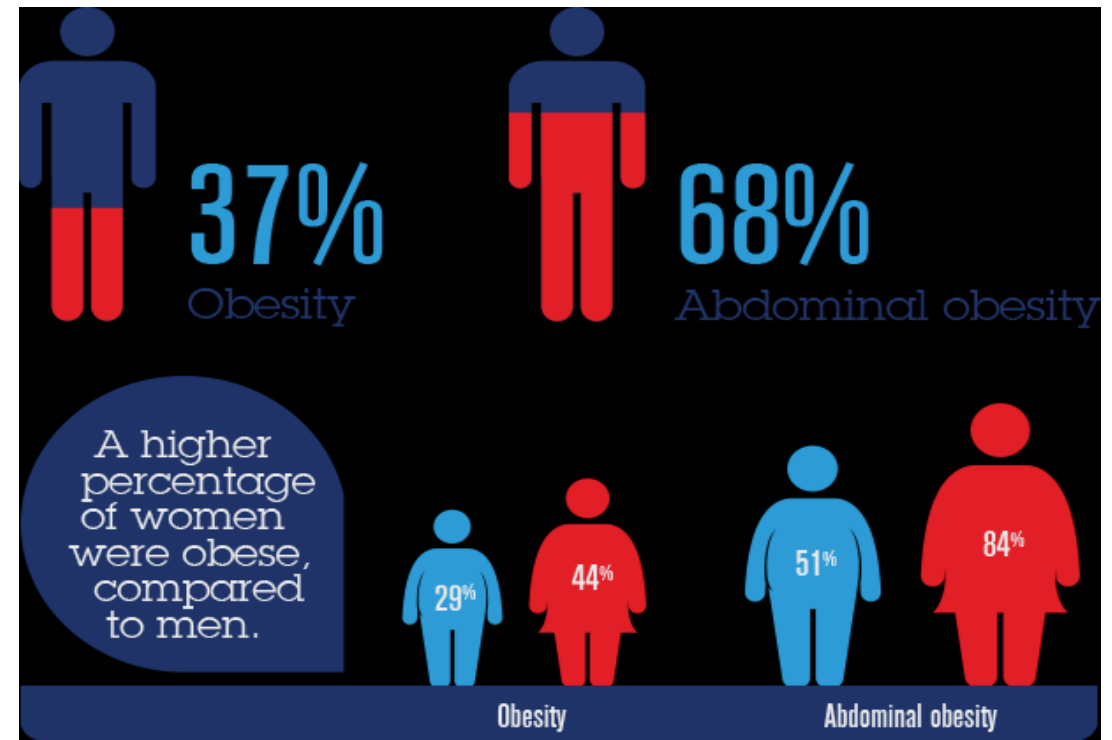
- Cannot study cause and effect relationships
- Cannot assess disease frequency

From Wikipedia, the free encyclopedia
http://en.wikipedia.org/wiki/Case_series

Prevalence or Incidence study

- Prevalence or Incidence study

This type of studies commonly used for comparison between two or more or between the same population



Analytical studies

- It is most often used to determine the etiology of the disease

Case –
control study

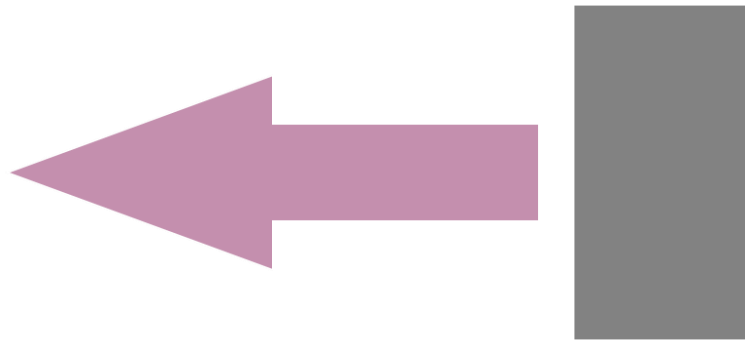
Cohort study

Cross-sectional
studies

Case-
crossover

- Case-Control studies represent one form of analytic study that provides information on the relationship between causal factors and injuries

Cases: Disease
Controls: No disease



Case-Control Study

Strengths

- Less expensive and time consuming
- Efficient for studying rare diseases

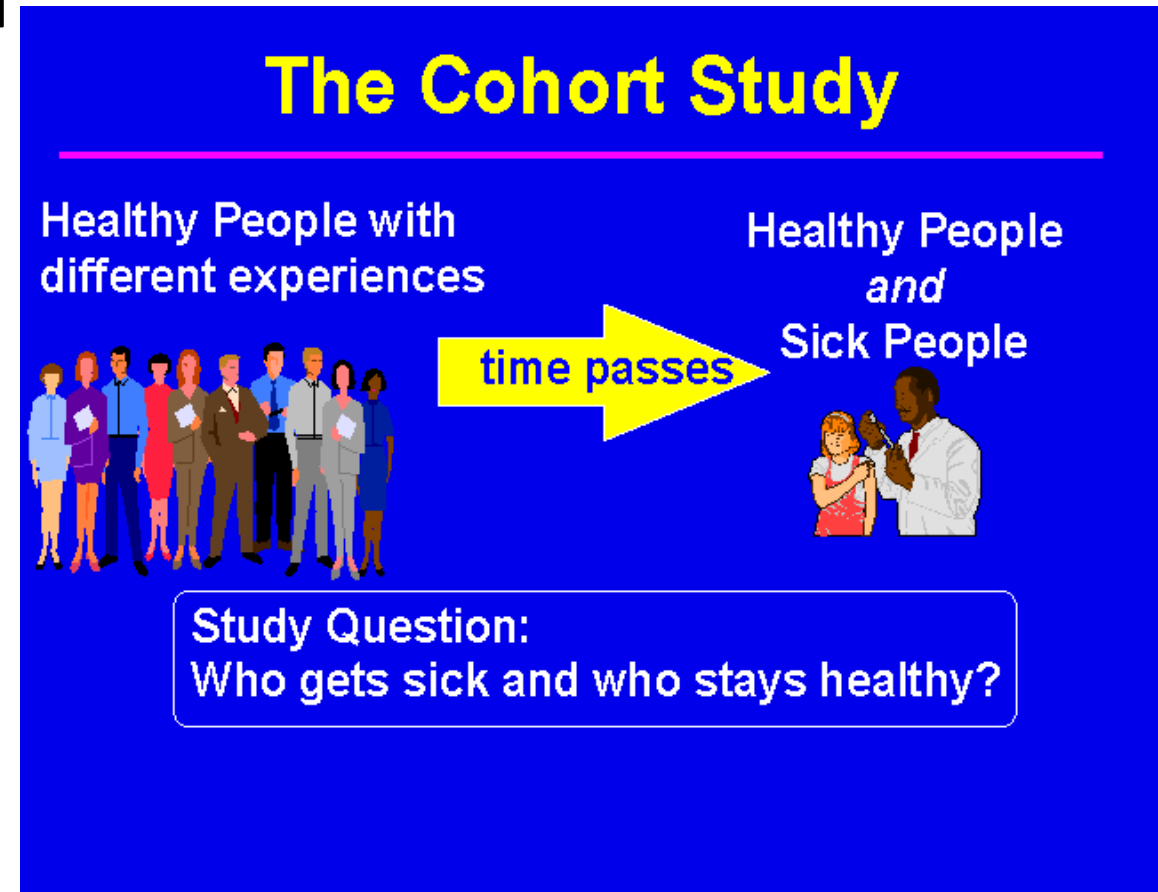
Limitations

- Inappropriate when disease outcome for a specific exposure is not known at start of study
- Exposure measurements taken after disease occurrence
- Disease status can influence selection of subjects



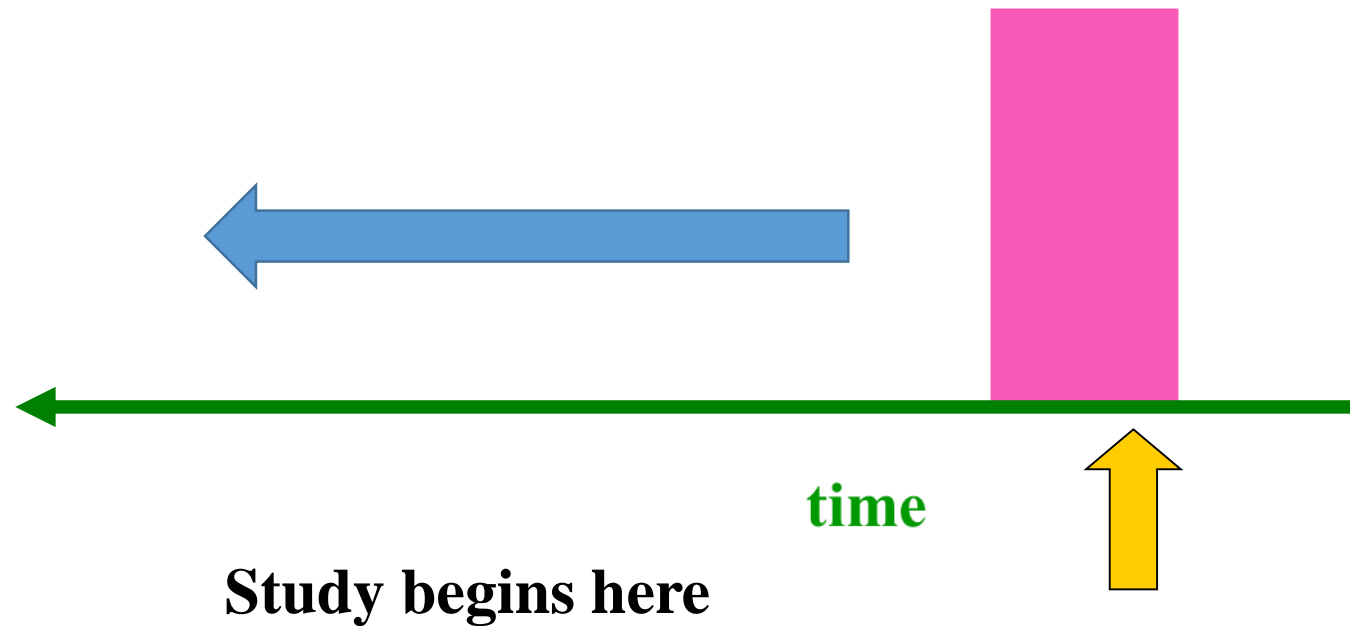
- **Cohort study.** This study is conducted on general population that is followed through time to see which members develop the disease .

The sequence of cause and effect may be clearly seen in prospective study



Time frame of Studies

- **Retrospective Study** - “to look back”, looks back in time to study events that have previously happened



Prospective Study - looks forward, looks to the future, examines future events, follows a condition, concern or disease into the future.



- **Strengths**

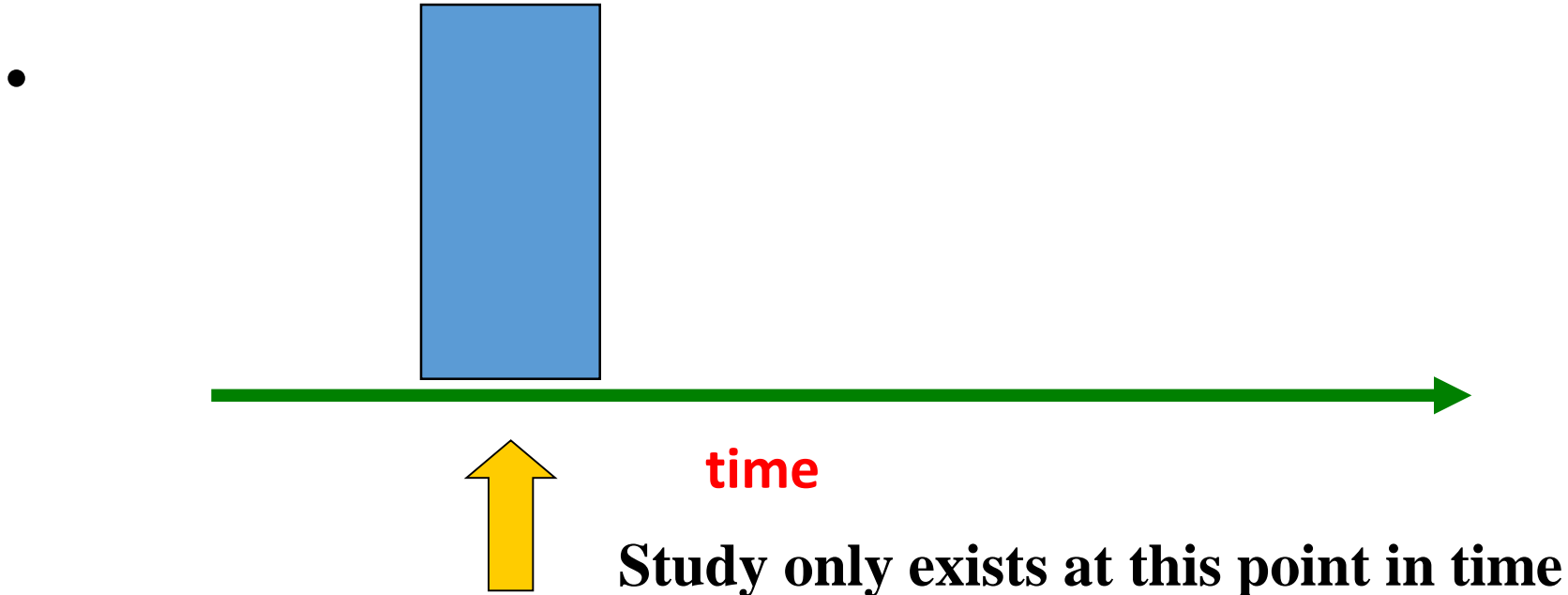
- Exposure status determined before disease detection
- Subjects selected before disease detection
- Can study several outcomes for each exposure

- **Limitations**

- Expensive and time-consuming
- Inefficient for rare diseases or diseases with long latency
- Loss to follow-up

Cross-sectional studies

- An “observational” design that surveys exposures and disease status at a single point in time (a cross-section of the population)



Cross-sectional Studies

- Often used to study conditions that are relatively frequent with long duration of expression (nonfatal, chronic conditions)
 - It measures prevalence, not incidence of disease
 - Example: community surveys
 - Not suitable for studying rare or highly fatal diseases or a disease with short duration of expression
-
- Cross-sectional studies involve point prevalence, not incidence

Experimental Studies

- Investigator can “control” the exposure similar to laboratory experiments except living populations are the subjects
- generally involves random assignment to groups



- the ultimate step in testing causal hypotheses
- clinical trials are the most well known experimental design

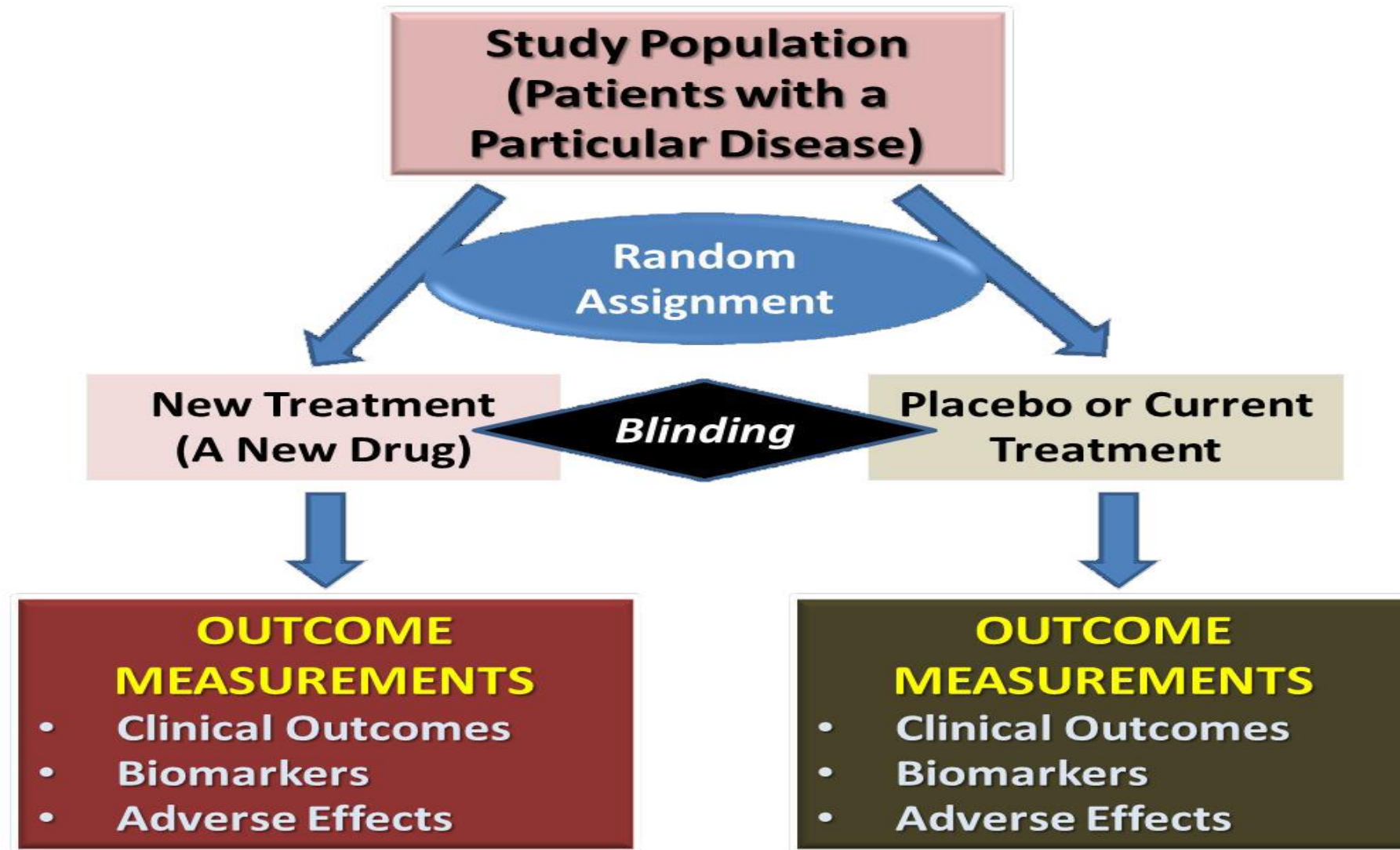


Experimental Studies

- Experimental studies are stronger in determining the etiology of disease than descriptive studies.
- Treatment and exposures occur in a “controlled” environment.
- planned research designs.
- Community trials use non random data .

- Randomized Controlled Trials (RCTs)

- A design with subjects randomly assigned to “treatment” and “comparison” groups
- Provides most convincing evidence of relationship between exposure and effect
- Not possible to use RCTs to test effects of exposures that are expected to be harmful, for ethical reasons



Randomized Controlled Trials (RCTs)

- the “gold standard” of research designs provides most convincing evidence of relationship between exposure and effect.

It is not unexpected to find that observational studies find different results than for clinical trials. For example there have been 100s of observational studies demonstrating that hormone replacement was protective for women. However, when this was put to a clinical trial, the surprising result was that hormone replacement was not protective



Randomized Controlled Trials

Disadvantages

- Very expensive
- Not appropriate to answer certain types of questions
 - it may be unethical, for example, to assign persons to certain treatment or comparison groups

Field Trails (randomized uncontrolled)

1. Preventive trials: It is used to estimate the effect of preventive techniques
2. Risk factor trials: It is used when specific risk factors are prevented in groups of populations, like dietary pattern.



Community trials(non-randomized controlled

Such studies are the only way in which a general intervention like fluoridation has to be tried out for reducing dental caries. Control communities in the neighborhood can be selected for comparison



Ethical issues

Basic Principles of ethics when practicing epidemiology .

1. All proposals for epidemiological studies should be submitted to institutional ethics committees before start working.
2. Epidemiologist must respect personal privacy and confidentiality at all times
3. Informed consent must be obtained from participants in studies and they must retain the right to withdraw at any time.