Epidemiologic Evidence to Inform Screening Guidelines

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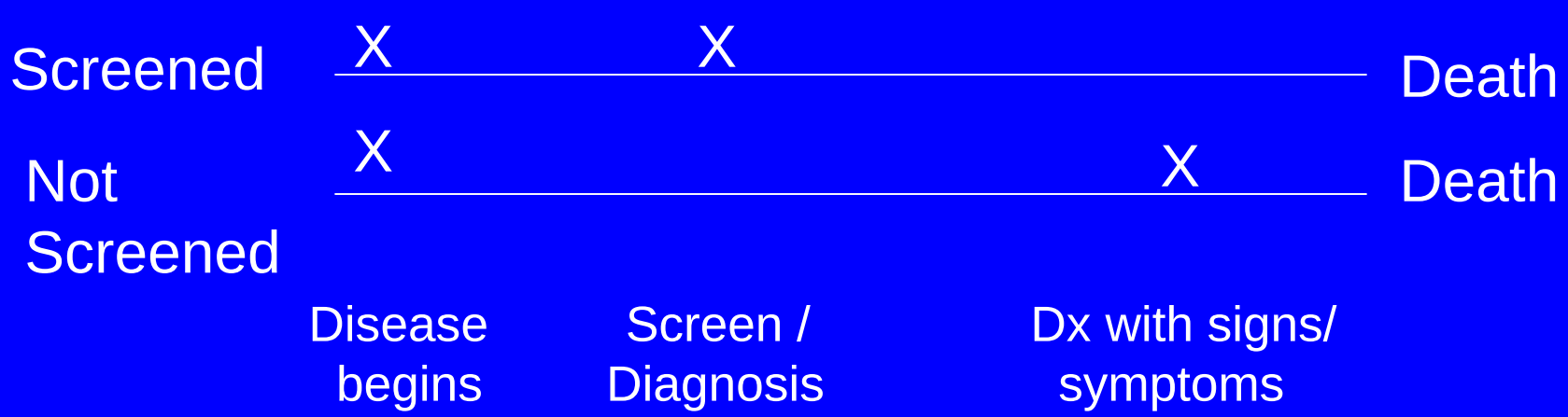
Clinical Screening

the assessment of pre-clinical disease in individual patients by a clinician using special tests or standardized examinations in order to identify individuals needing special intervention.

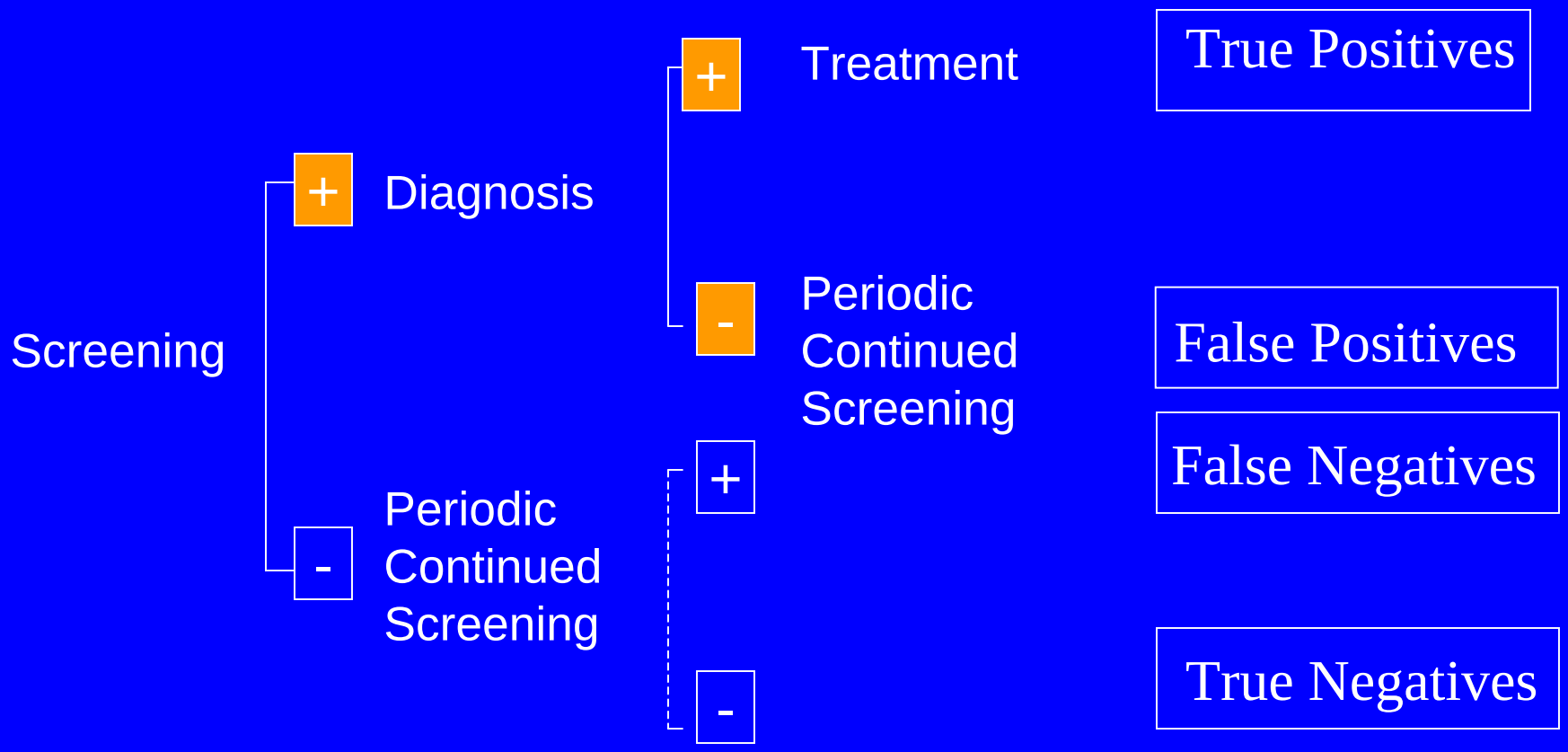
Population Screening…

the presumptive identification of unrecognized disease or defect by the application of tests, examinations, or other procedures which can be applied rapidly to sort out apparently well persons who probably have a disease from those who probably do not.

Natural History of Disease



Screening Process



A Good Screening Test…

- **Valid**: provides a good preliminary indication of which individuals actually have the disease and those who do not.
  - Sensitivity: the ability of the test to identify correctly those who have the disease
  - Specificity: the ability of the test to identify correctly those who do not have the disease

A Good Screening Test…

- **Reliable**: gives consistent results when the test is performed more than once on the same individual under the same conditions.
- **Sufficient yield**: amount of previously unrecognized disease which is diagnosed and brought to treatment as a result of the screening.

Attributes of a Good Screening Test

- Simple
- Rapid
- Inexpensive
- Safe
- Acceptable

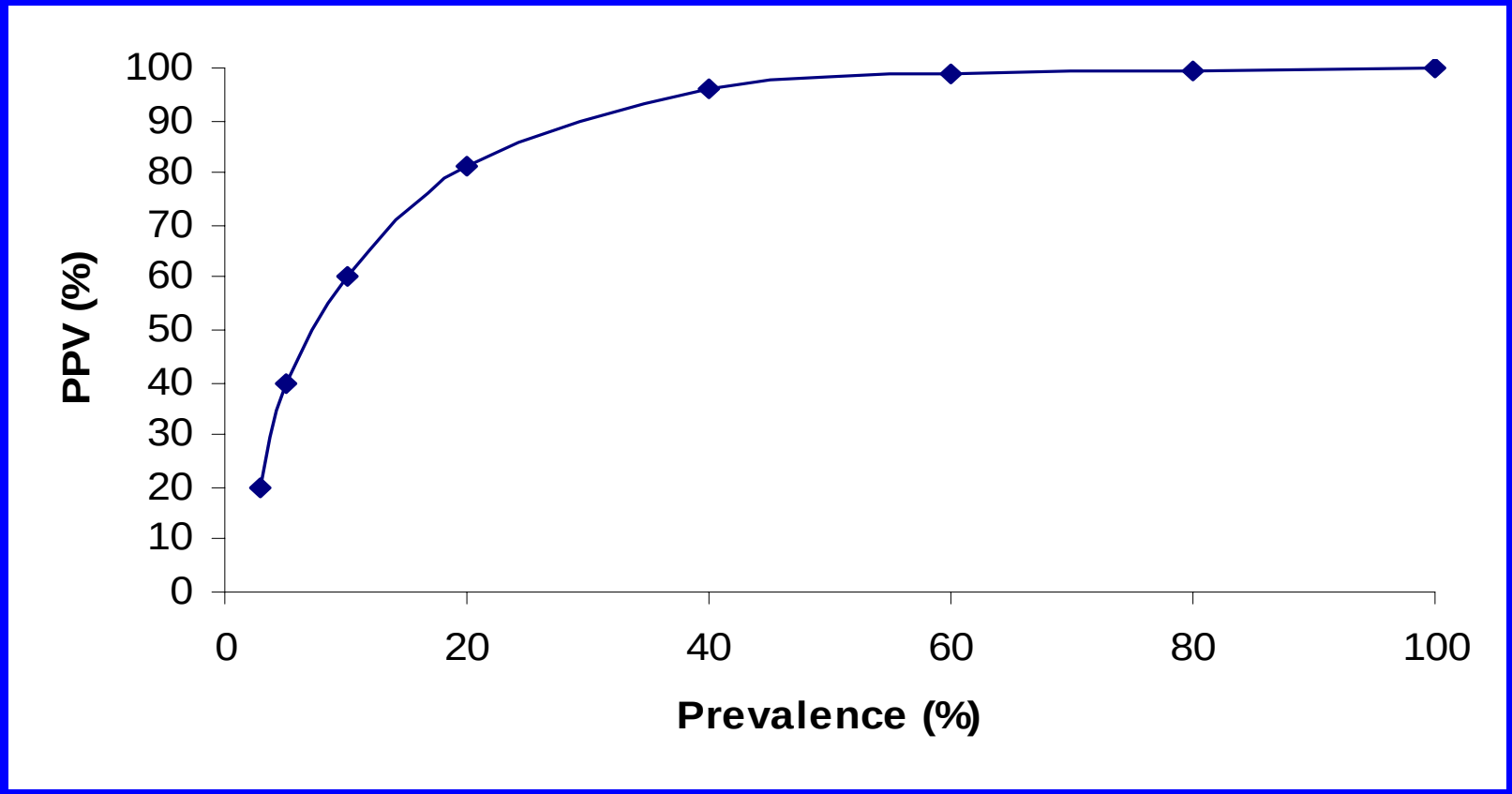
Screen Tools for Diabetes

- Questionnaires
- Casual plasma glucose
- Fasting plasma glucose (FPG)
- Oral glucose tolerance test (OGTT)

Predictive Value of a Test

- Positive predictive value
  - The probability of a person who tests positive actually has the disease (clinician)
  - The proportion of persons who test positive actually have the disease (public health)
    - A low predictive value: a high proportion of the costs are being wasted on the detection and diagnosis of false positives

Relationship between positive predictive value (PPV) and disease prevalence



A test with 95% sensitivity and 95% specificity

Practical Implications

- A screening program is most productive and efficient if it is directed to a high risk target population.
- Physicians should interpret the same test results differently depending on whether the subjects come from a pool of high-risk or low risk population.
- Different screening guidelines should be developed for different populations (e.g. adults, children, pregnant women).

WHO Screening Criteria (1)

- The condition must be an important health problem.
- The natural history of the disease should be understood.
- There should be a recognizable latent or early symptomatic stage.

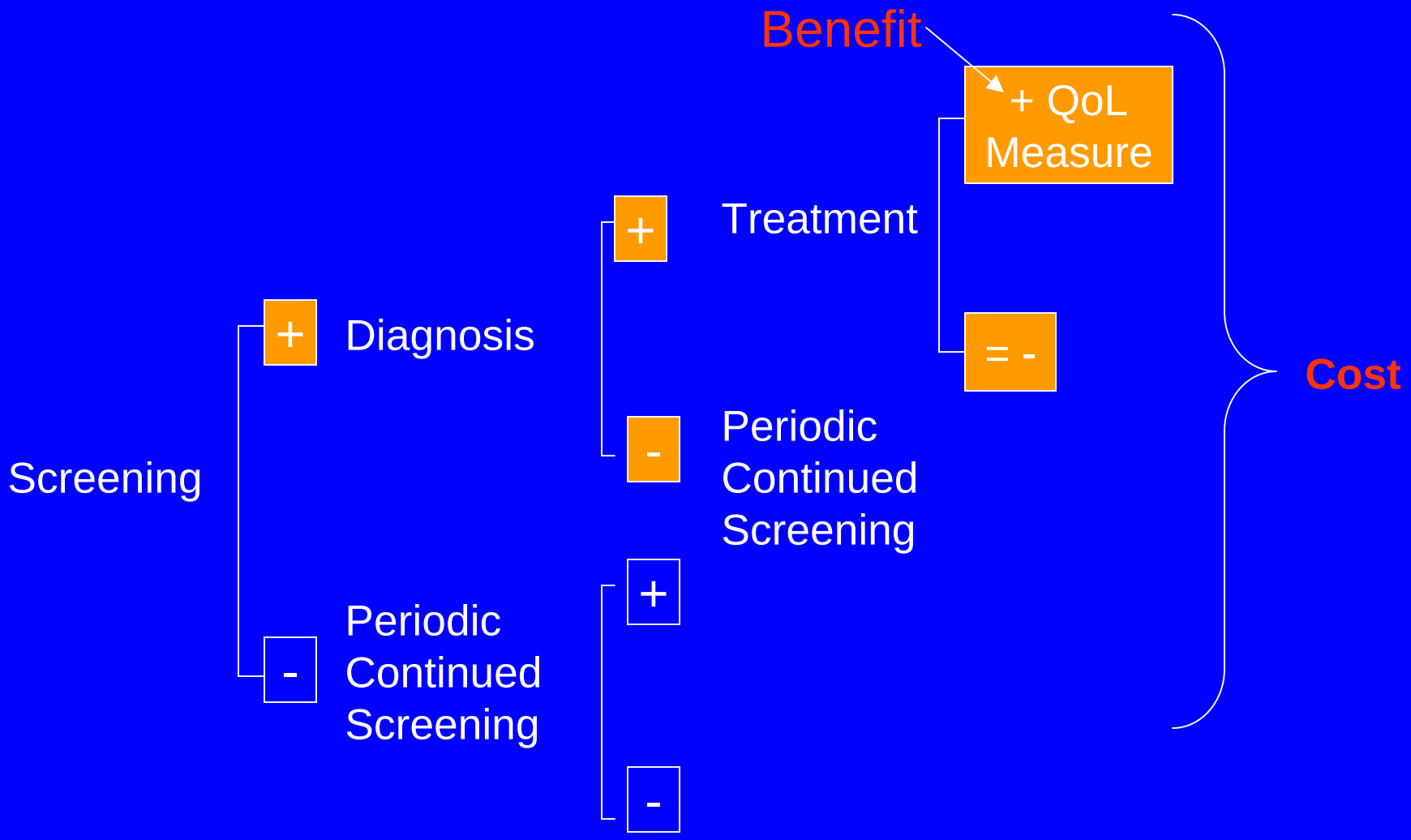
WHO Screening Criteria (2)

- There should be an accepted treatment.
- There should be an agreed upon policy about who to treat.
- Facilities for diagnosis and treatment should be available.
- There should be a suitable test or examination.

WHO Screening Criteria (3)

- The test should be acceptable to the population.
- The cost of screening/case finding should be economically balanced in relation to other medical expenditures.
- Case finding should be a continuing process.

Cost-Benefit of Screening



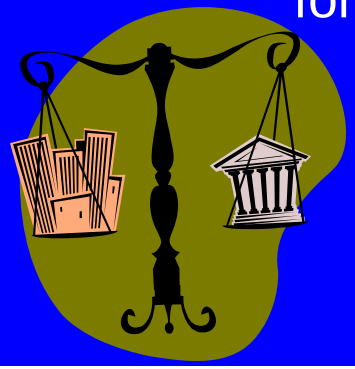
Diabetes Screening at Community Settings

No

- Low insurance coverage
- Lack of follow-up diagnosis and care
- Low compliance with treatment recommendations
- May not reach high risk population
- High cost

Yes?

- Low insurance coverage
- High risk groups
- Screening for pre-diabetes
- Progression from pre-diabetes to diabetes preventable
- Life style changes important for prevention and early care



Diabetes Screening at Community Settings

- Define the conditions (e.g. appropriate follow-ups).
- Define the high risk communities (e.g. Communities with high uninsured/underinsured population).

Pre-diabetes (PD)

- Blood glucose levels: normal < PD < Type 2 diabetes
  - Impaired fasting glucose (IFG)
    - Fasting plasma glucose: 100 to 125 mg/dl.
  - Impaired glucose tolerance (IGT)
    - Glucose level: 140 to 199 mg/dL, 2 hours after 75g of glucose.

Pre-diabetes (PD)

- Persons with PD are at increased risk for the development of
  - Diabetes
  - Other adverse health outcomes, such as heart diseases and stroke
- Progression to diabetes can be prevented or delayed by
  - Increasing physical activity
  - Losing weight
  - Taking medication