

# Setting up a Health Care Associated Infection (HAI) Surveillance System

Ricardo Mexia  
MD, EPIET Fellow  
Nasjonalt folkehelseinstitutt

## Why do we do surveillance?

- Monitor trends (by time, place, person)
- Detect outbreaks
- Provide estimates of morbidity and mortality
- Evaluate effects of control measures
- Guide planning of interventions
- Prioritize the allocation of resources
- Stimulate epidemiologic research

## Consequences of NOT doing surveillance

- “If you can’t measure it, you can’t manage it”  
Drucker, 1909
- Introduce or continue with inappropriate procedures
- Quality of treatment is unknown
- Missing opportunities for timely intervention  
(HIV, resistant bacteria)

## SENIC Study

- Study on the Efficacy of Nosocomial Infection Control (SENIC)
- United States, between 1975 – 85
- evaluated nosocomial infection prevention and control programs in hospitals
- carefully conducted retrospective chart review
- up to a third (32%) of HAIs are preventable

## The critical components of an effective program ( by SENIC)

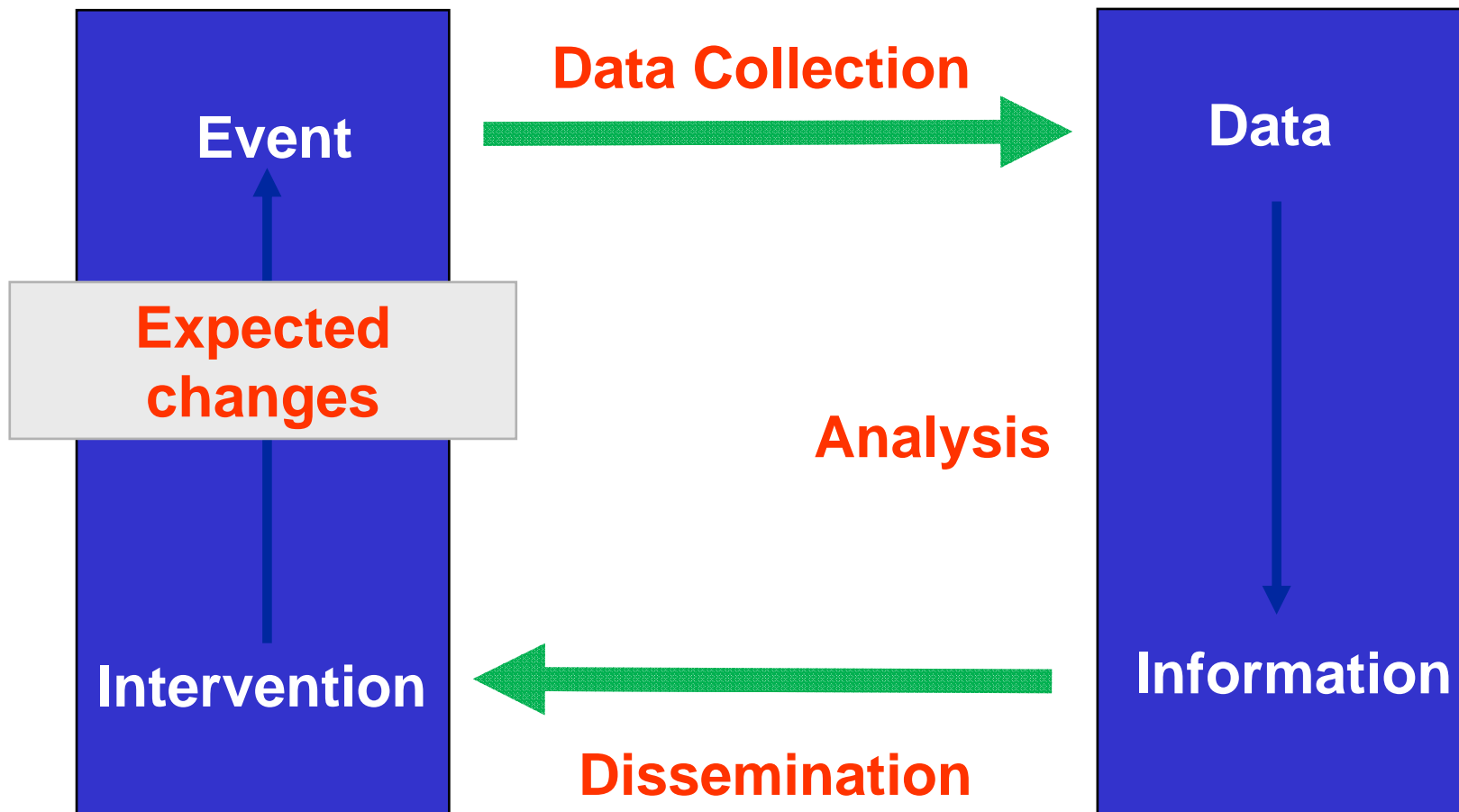
- balance between surveillance and control efforts
- one infection control nurse for every 250 beds
- a trained hospital epidemiologist (MD)
- feedback of surgical wound infection rates to practicing surgeons.
- timely analysis and dissemination of surveillance data
- continued training of infection control practitioners and physicians

## WHO/ECDC/CDC

- Better **surveillance** at country level, provides better health information and thus better **opportunities** for countries to improve the health of their citizens.
- By **using surveillance** data, governments can formulate policies and programmes to **prevent disease** and to measure the progress, impact, and efficacy of preventive efforts already in operation.

Health Care Services

Public Health Authority



# Ideal surveillance system

h1

- Simple
- Useful
- Flexible
- Acceptable
- Good quality
  - High sensitivity and specificity
  - Positive predictive value
  - Representative
- Timely
- Stable

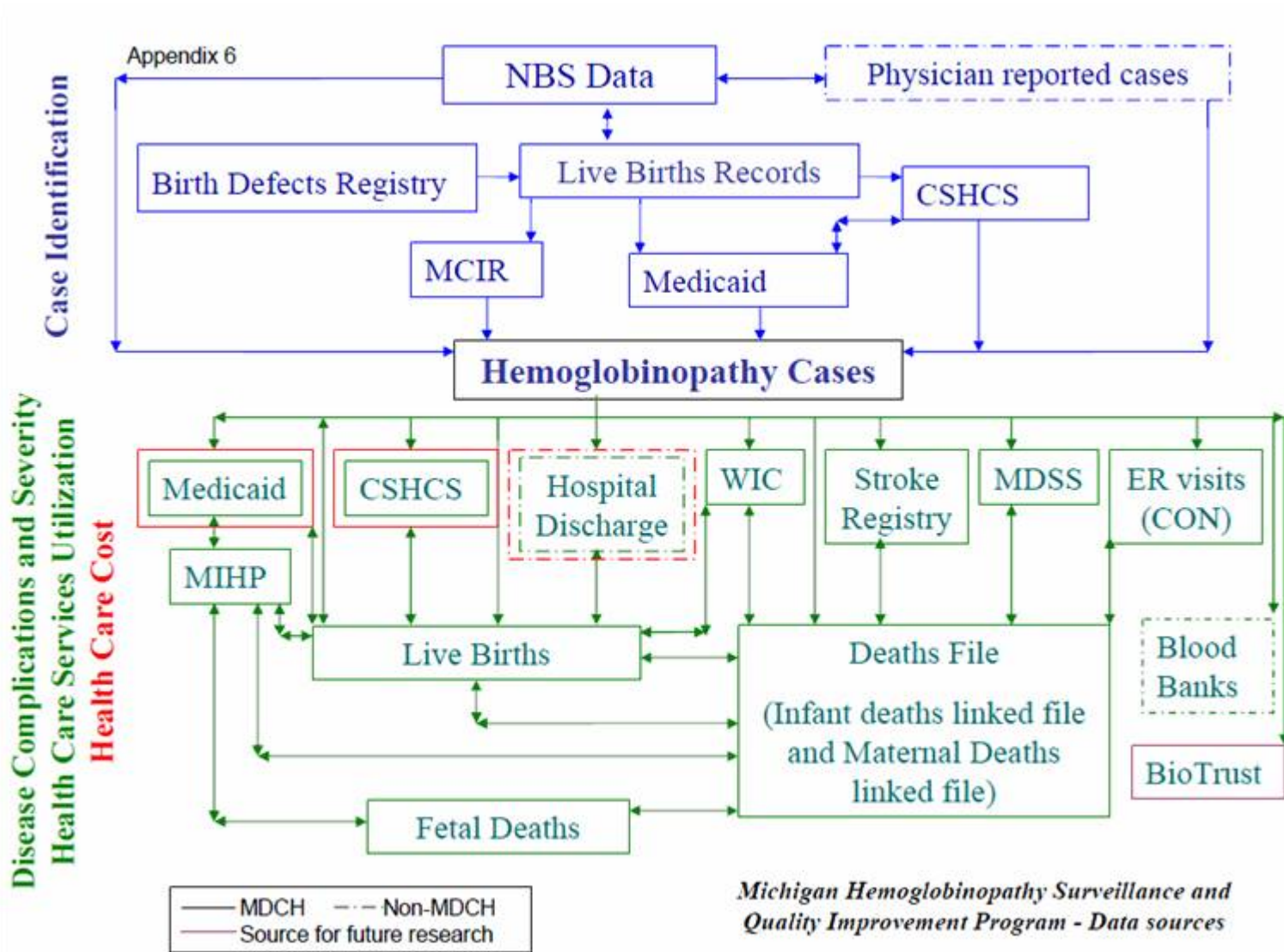


h1

bør gå inn på alle disse punktene.... enten i denne eller i andre om utarbeiding av overvå sys

hmer; 29.10.2010

# Simple?



## Simple

- The system should be as simple as possible to achieve the goal
  - Number of variables
  - Number of organizations involved
  - Integration with other systems
  - Data collection, availability and time

## Usefulness

- Prevent adverse health event
- Highlight health problems
- Evaluate the effectiveness of measures
- Stimulate research

## Flexible

- Adjustments to the monitoring system should be easy, if needed
  - New variables
  - New definitions

## Acceptable

- People and organisations willing to participate:
  - No work overload
  - No duplicity
  - No cost (cost effectiveness)
- Legal/ ethical acceptability
  - Patient registries
    - Health records can save lives (medical researchers).
    - A threat to privacy (law professors).

## Data quality

- Quality is measured by:
  - Percentage of "unknown" and "missing" values
  - Sensitivity
  - Positive predictive value
  - True data?
- Data quality affects the acceptance level and the representativeness

## Timely

- Information should be available in a time period that enables effective action
- Timeliness is affected by speed of:
  - physician's diagnosis or submission of lab test
  - lab reporting results to physician or public health authority
  - physician reporting event to the public health authority
- But, think of post discharge data



## Stable

- Ability to compare different periods
- Data collection and training of professionals

## How to setup the system?

- Data collection
- Analysis
- Dissemination

## Design options

- Sentinel vs. comprehensive
- Aggregated vs. individual data
- Active vs. passive
- Compulsory vs. voluntary
- Confidential vs. anonymous
- Basic vs enhanced
- Indicator based versus event based

## Prevalence

- A snapshot that describes the occurrence of one or more conditions or factors at a given time



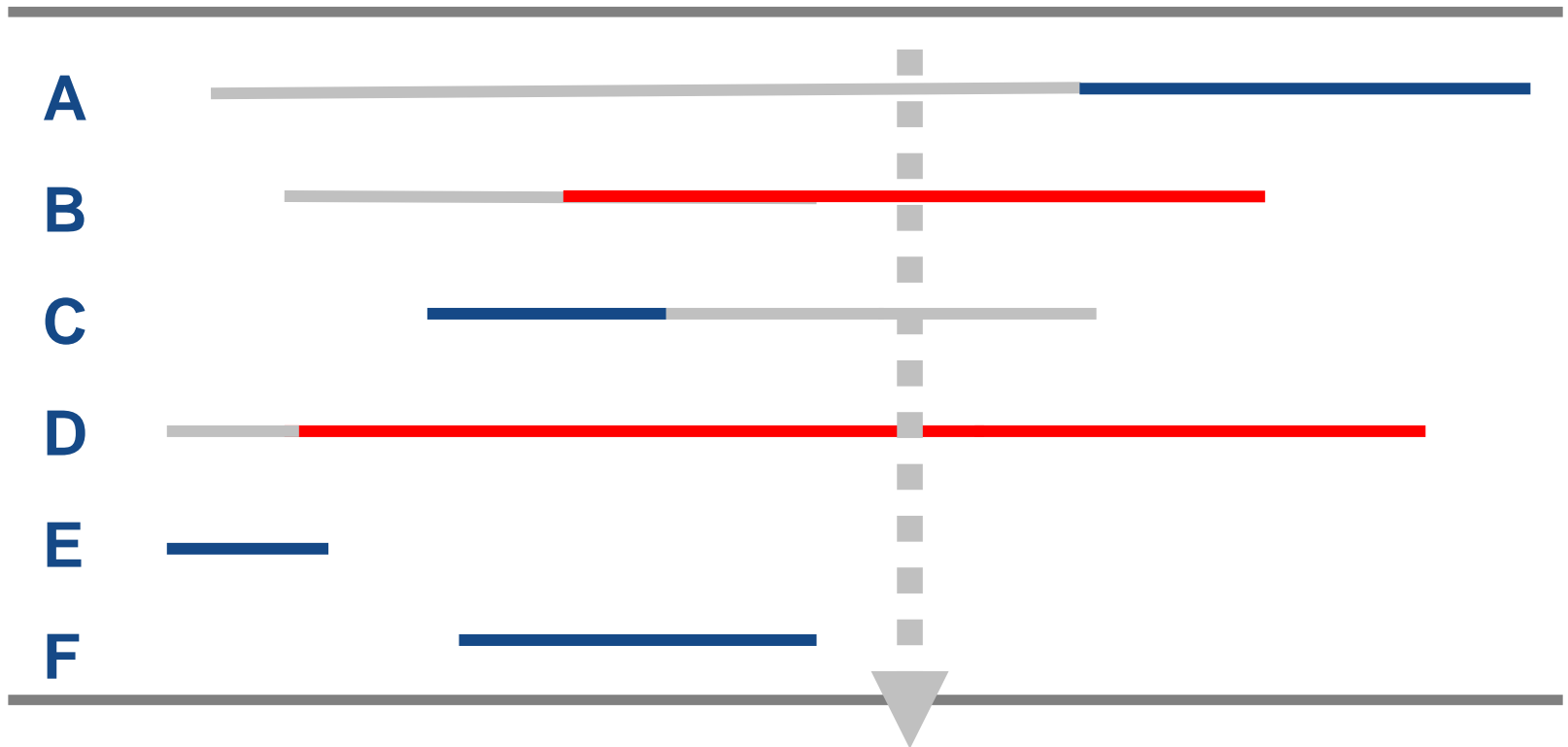
## Incidence

A “movie” with the number of “new” cases of a disease in a population within a defined time period



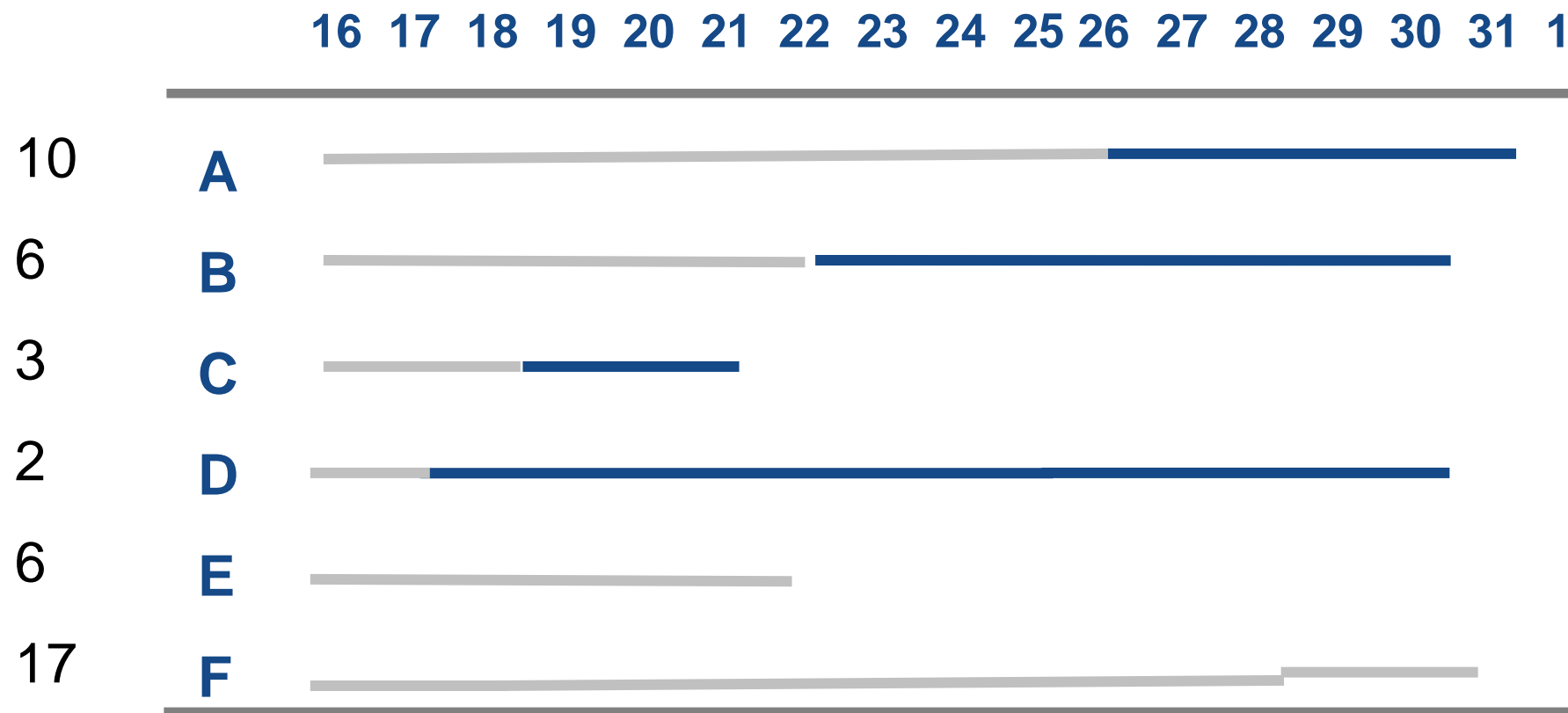
# Calculating prevalence

16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 1



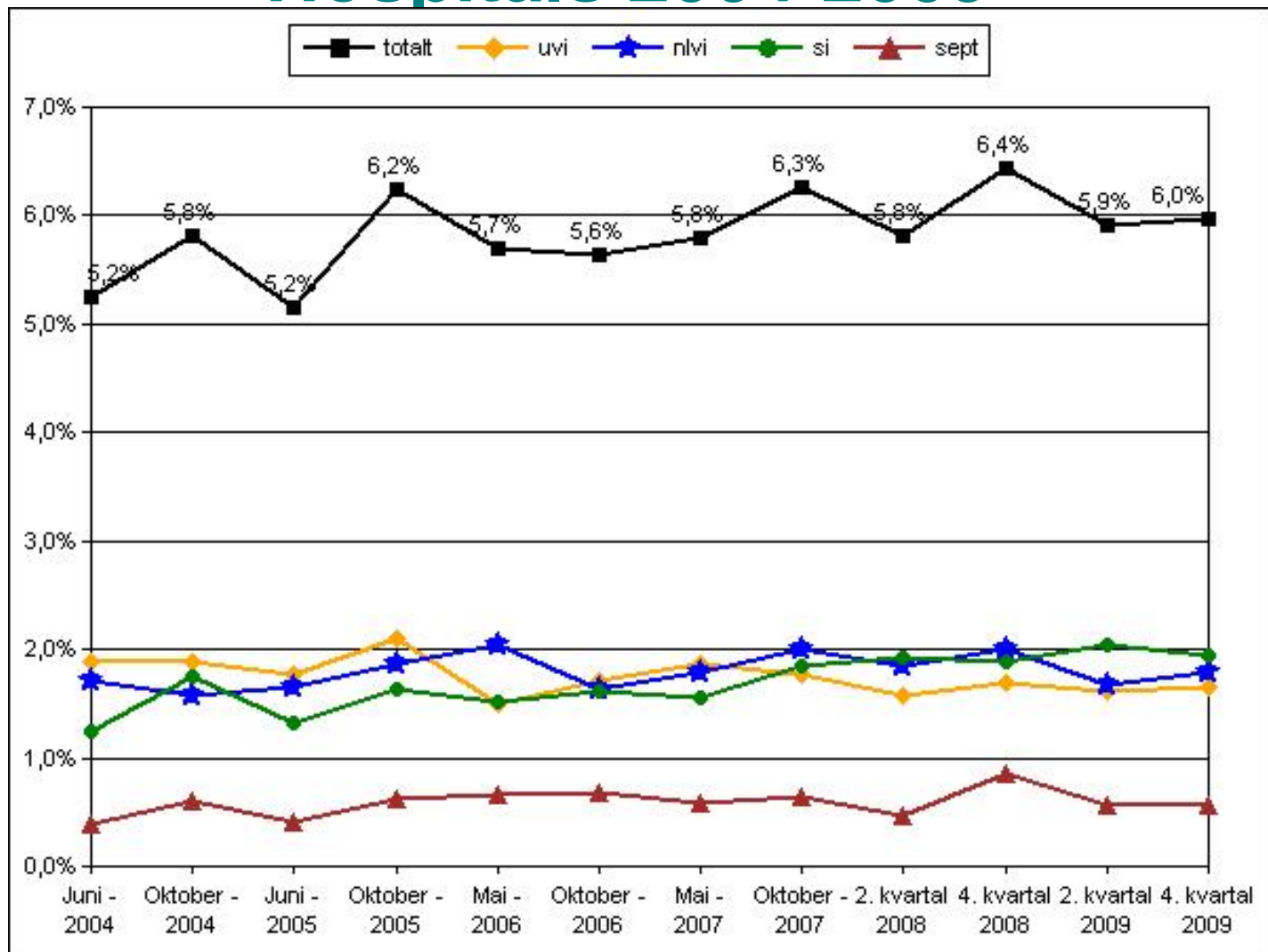
$$P = 2 / 4 = 0,5 = 50\%$$

## Calculating incidence rates



$4 / 44 = 0,090 = 9$  infections per 100 patient-days

# Prevalence of HAI in Norwegian Hospitals 2004-2009





## Over time, the use of prevalence studies allows:

- Showing trends and patterns
- Provides insight into the distribution of disease
- Increasing attention on an area
- Quality Indicator
- Feasible at the national level, allowing for health planning

## Benefits of prevalence studies

- Quick response
- "quick and dirty"
- The method can be easily standardized
- No non-compliance
- Little missing data (missing)
- Cost Effective Survey
- Focus on what is monitored

## Disadvantages of prevalence studies

- May overestimate the risk of disease with long duration and underestimate those with short duration
- Data from few Health Care Units may be too small to give significant results
- Can not provide information about:
  - Causes
  - Disease Duration
  - Disease progression
- "Quick and dirty"

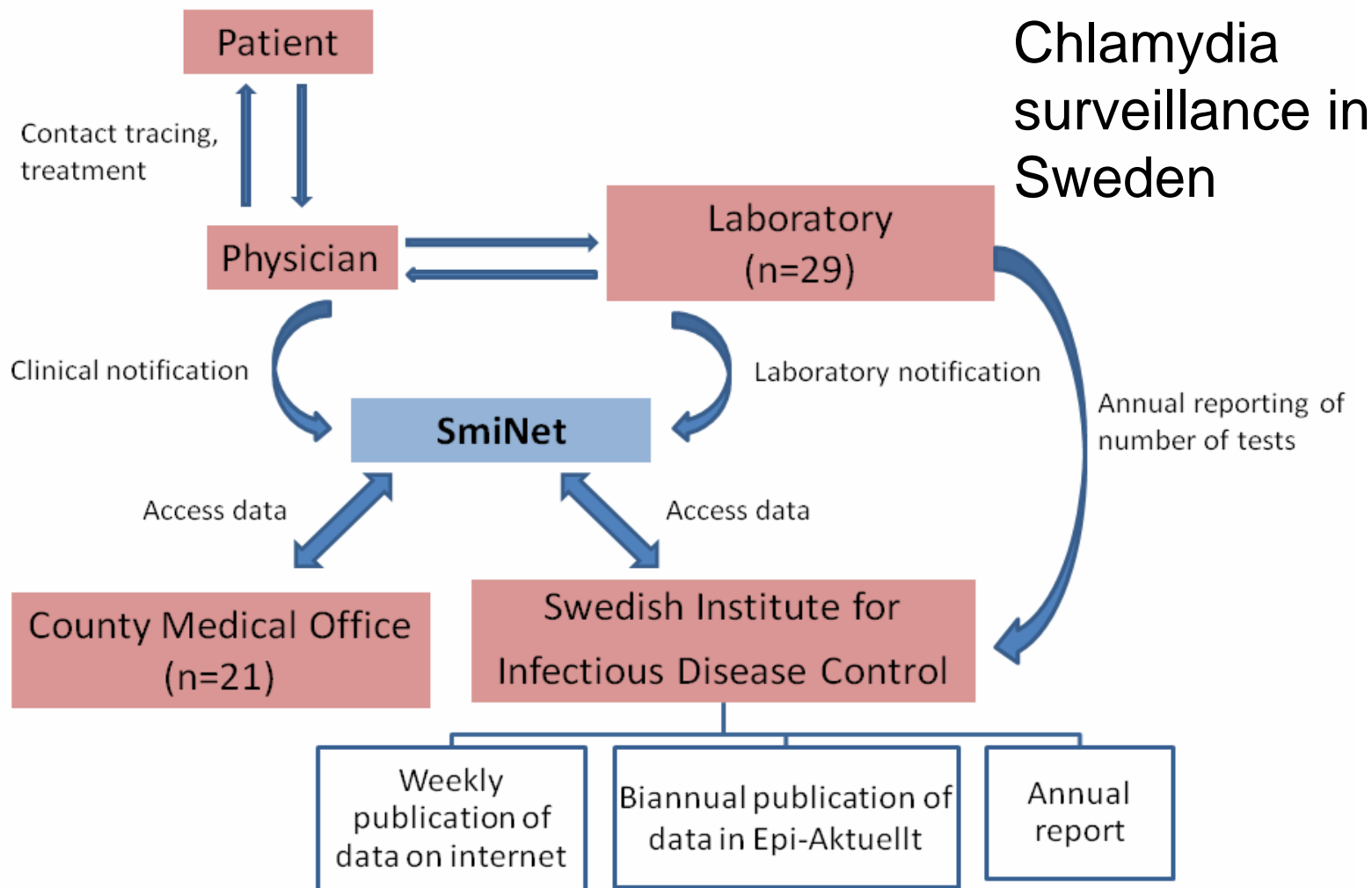
# Objectives

- Document them
  - Literature review and write them
- Are they SMART?
  - **Specific**
  - **Measurable**
  - **Action-oriented [information] in order to [action]**
  - **Realistic**
  - **Timeframe specified**

# Definitions

- Protocols are very important
  - Case definition
  - Inclusion/exclusion criteria
- Consistent and comparable with other sources

# Flowchart



# Components of system

- Population under surveillance
- Period of data collection
- Type of information collected
- Data source
- Data transfer
- Data management and storage

***Confidentiality,  
security***

- **Data Sources**
  - Patient journals
  - Clinical Wards
  - Lab
  - Self reporting by patients
  
- **Data Collection**
  - Electronic
  - web-based
  - paper
  - telephone



# Stakeholders

- Stakeholders are the "owners" and "customers"
- Users of surveillance system information
  - Public health workers
  - Government
  - Data providers
  - Clinicians
- Involve in early stages of the design
- Steering group?

## Resources for system operation

- Funding sources
- Personnel time (= €)
- Other costs
  - Training
  - Mail
  - Forms
  - Computers
  - ...

## Focus

- Severe conditions
- Available resources
- Focus on specific areas:
  - Surgical Site Infections
  - Ventilator associated
- Focus on specific procedures
  - CABG, Cholecistectomy, Apendectomy, etc.
- Focus on specific organisms
  - MRSA

# Data Analysis

- Tools
  - Excel
  - EPI Info
  - WHONET
  - HELICWin
  - Dedicated statistical packages

# Dissemination

- Websites
  - Internal access
  - Patient's free choice of hospital
- Reports
- International networks/collaboration
- Scientific communication

# Training

- Who?
  - Local Health Infection professionals
  - Senior National Experts
- Networking
  - others who have implemented surv. systems
  - work on a surveillance systems
- Multidisciplinary approach
- Continuous

# Evaluation

- **Obligation**
  - Does the system deliver?
  - Credibility of public health service
- **In reality**
  - Often neglected
  - Basis for improvements
- **Learning process**
  - ”Do not create one until you have evaluated one”

**Thank You**

ricardo.mexia@fhi.no