

# How to measure the quality of antibiotic treatment and prophylaxis

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# Outline

- Definition of AUDIT
- Algorithm of quality evaluation
- Applications:
  - audit and feedback intervention studies
  - repeated prevalence studies
- Definition of QUALITY INDICATOR
- Applications: SWAB guideline development

# What is an Audit ?

Definition:

analysis of appropriateness  
of individual prescriptions

Gould IM et al. Hospital antibiotic control measures in the UK.  
J Antimicrob Chemother 1994; 34:21-42.

or

**« Utilization review »**

**« Quality of use study »...**

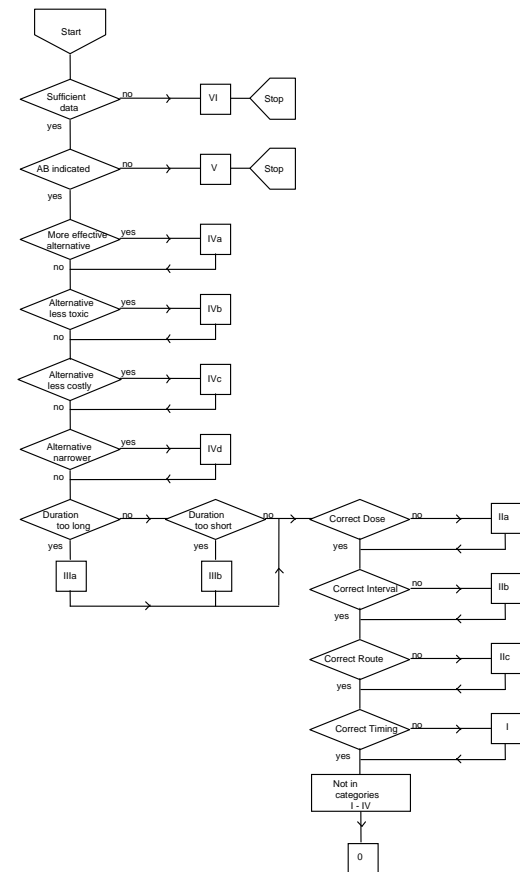
# Audit: What it is not:

- **Surveillance** of prescriptions at population level, ward, hospital...
- An **inquiry** of practices;  
'Do not believe what they say, observe what they do'

# “Process outcome”

## Criteria for review of Antibiotic Prescriptions

- Indication
- Choice of antibiotic
  - antimicrobial activity
  - toxicity
  - width of spectrum
  - cost
- The antibiotic regimen
  - The dose
  - The interval
  - The way of administration
- The duration
- The timing



# Multisite intervention on Surgical Prophylaxis in the Netherlands

## The “CHIPS” study 2000 - 2003

13 Dutch hospitals

- Audit
- EDUCATIONAL INTERVENTION
  - feedback of audit
  - implementation of national guidelines
- patient outcome data:  
surgical wound infections SSI



# **Performing the audit of prophylaxis**

1. Indication
2. Choice of drug
3. Duration
4. Timing

# Data set for Prophylaxis Audit

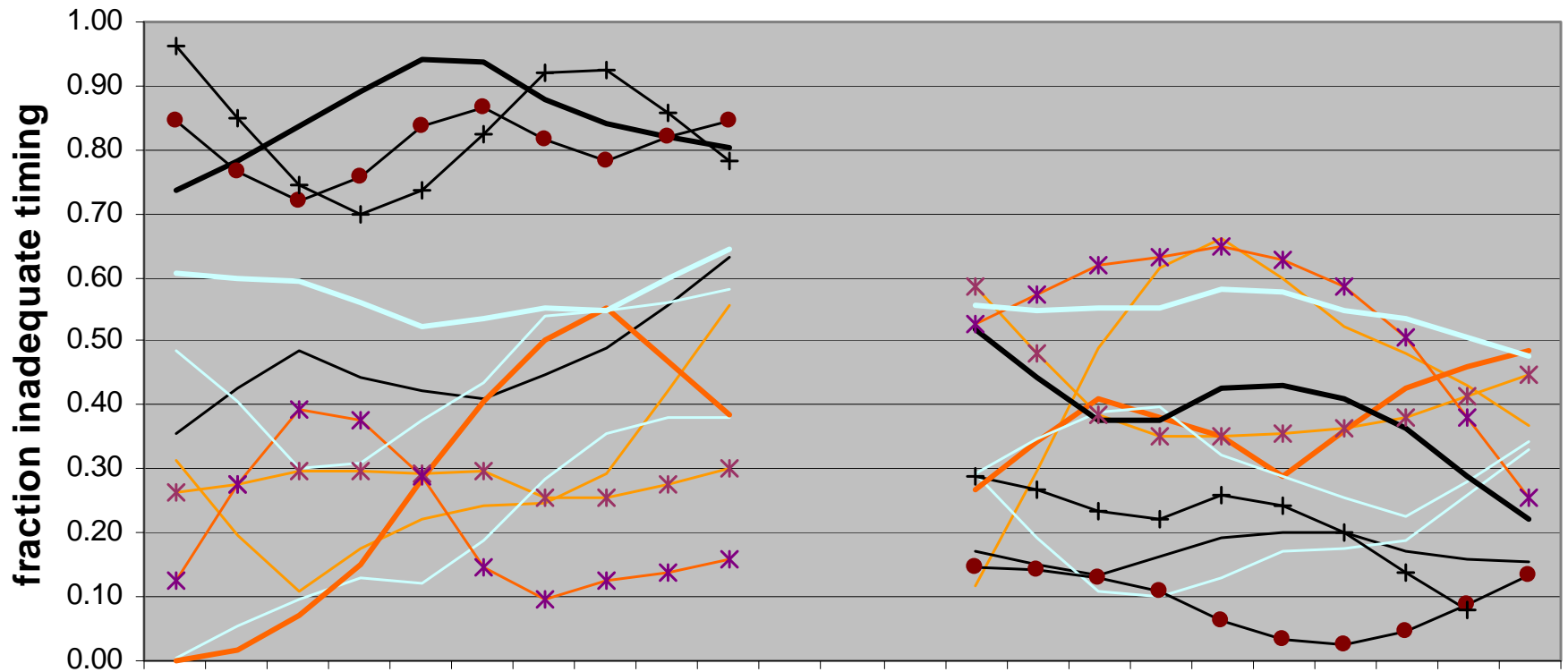
- Patient ID (coded)
- Ward
- Patient gender, age, weight, ASA, diagnosis (indication), underlying illness
- History of allergies
- Procedure
- Date of procedure
- Time of tourniquet placement (if applicable)
- Time of incision
- Time of closure of the wound
- Name of surgeon (coded)
- Name of anaesthetist
- Name of administered antibiotic(s)
- Way of administration
- Unit dose
- Number of doses
- Time of administration of first dose
- Time of administration of repeat doses during surgery
- Time of last dose
- Postoperative diagnoses
- Antibiotics for therapy?
- SSI yes / no
- Date of occurrence SSI
- Details on SSI
- Date of discharge



# Data sources

- Hospital information system for demographic data
- Medical record (electronic?)
- Medication chart
- Nursing record
- Anesthesia record
- Laboratory data

# CHIPS: Timing of prophylaxis (13 hospitals) orthopedic procedures

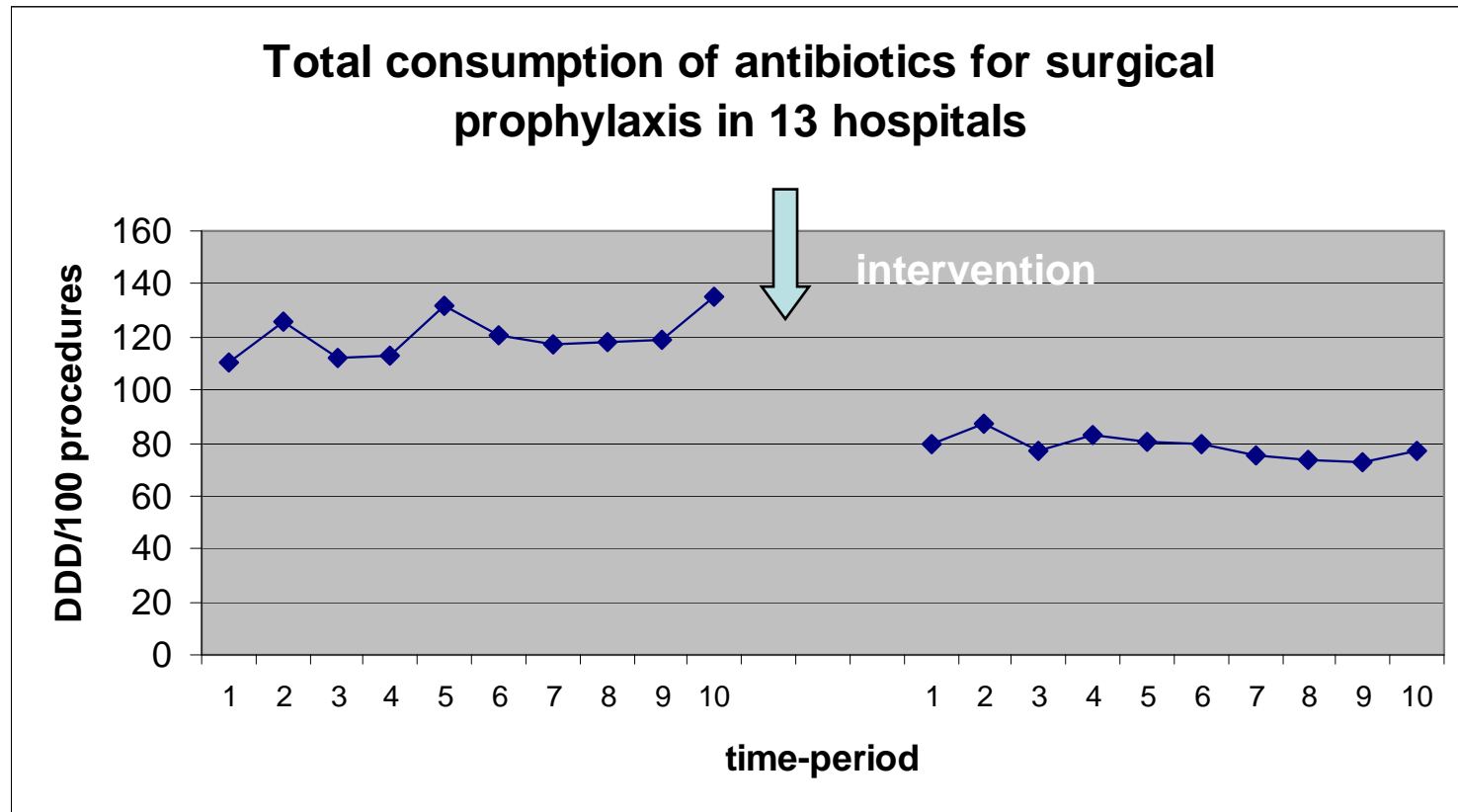


# Quality improvement of surgical prophylaxis in Dutch hospitals: evaluation of a multi-site intervention by time series analysis

Marjo E. van Kasteren, Judith Mannien, Bart-Jan Kullberg et al.

*J Antimicrob Chemother* 2005;56:1094-1102

**Cost savings!**



## Appropriateness of Antimicrobial Therapy Measured by Repeated Prevalence Surveys<sup>▽</sup>

Ina Willemsen,<sup>1</sup> Anneke Groenhuijzen,<sup>2</sup> Diana Bogaers,<sup>1</sup> Arie Stuurman,<sup>3</sup>  
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**Prudent use of antibiotics is mandatory to control antibiotic resistance. The objective of this study was to determine if prevalence surveys are useful tools to determine the appropriateness of antimicrobial therapy (AMT) and determinants of inappropriate AMT. The study was performed in a 1,350-bed teaching hospital including all medical specialities. Six consecutive 1-day prevalence surveys of in-patients were performed twice yearly from 2001 to 2004. Data on the demographics, infections, and AMT were gathered. The appropriateness of AMT was assessed**

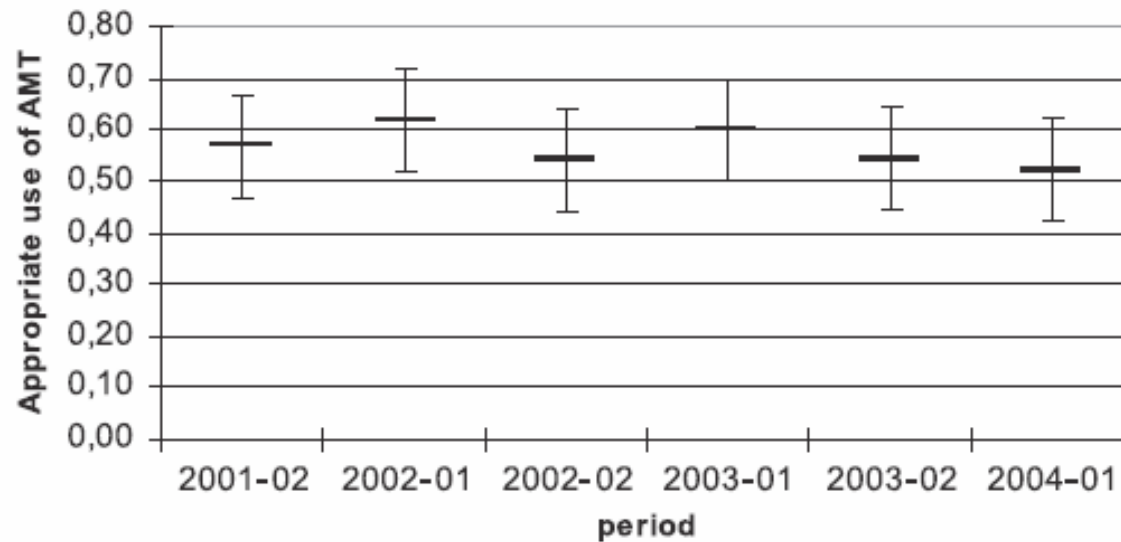


FIG. 2. Appropriateness of use of AMT (95% confidence interval) in six surveys between 2001 and 2004.

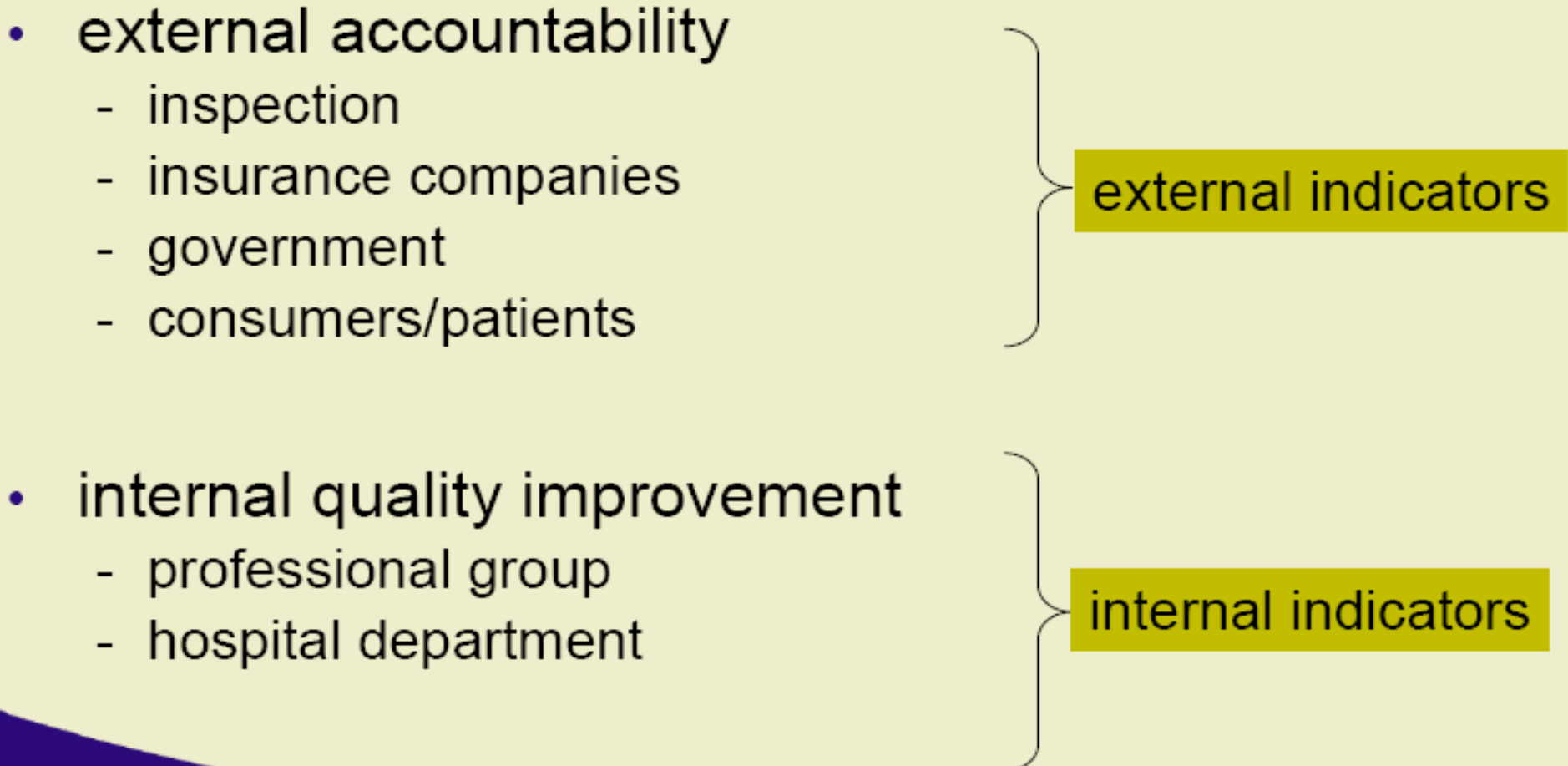
# Definition Quality Indicator

*A measurable aspect of care provided for which there is evidence or consensus that it represents quality on the grounds of scientific research or consensus among experts...*

# Definition Quality Indicator

- external vs internal indicators
- structure, process and outcome indicators

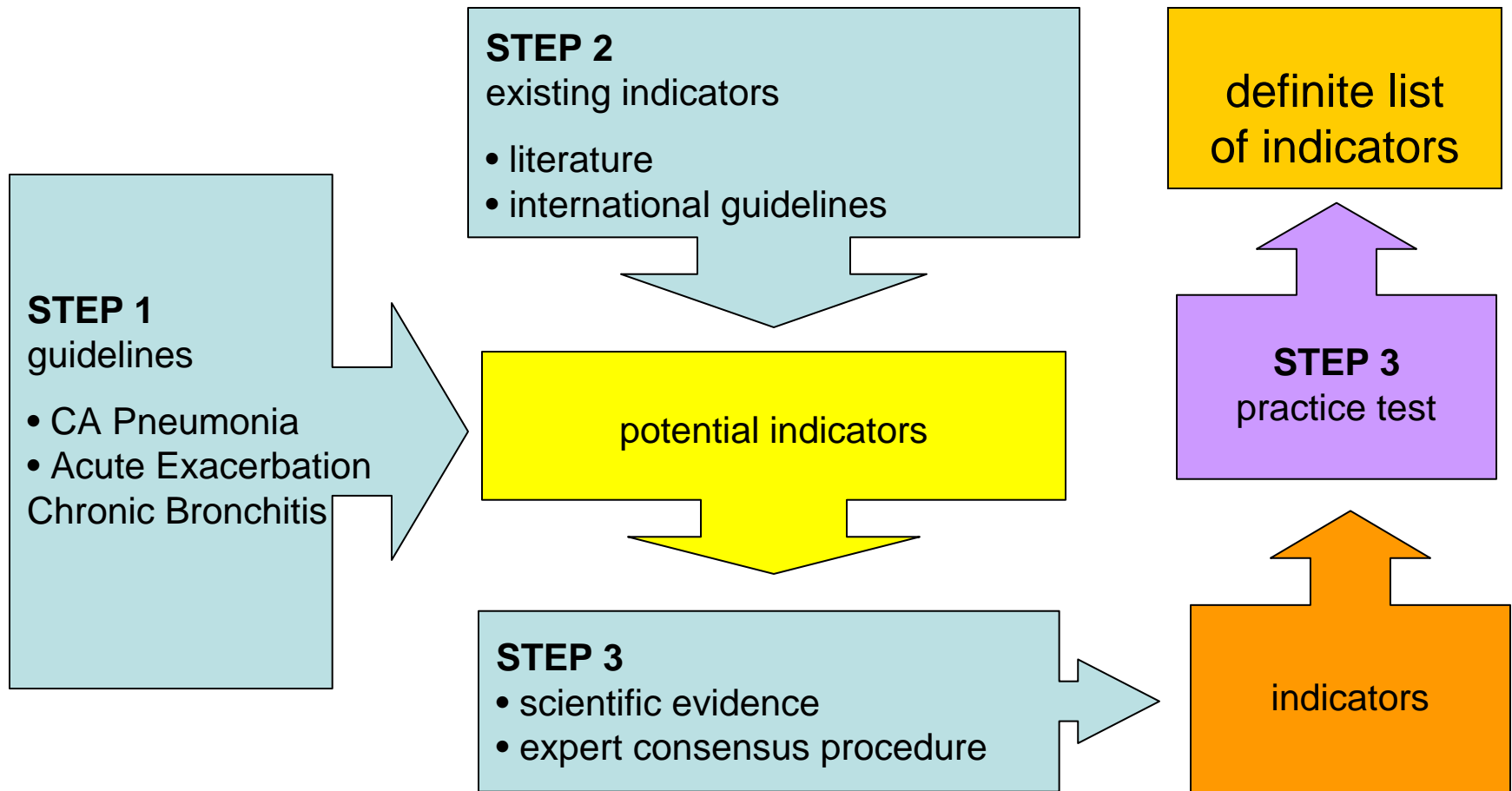
# What can we measure?



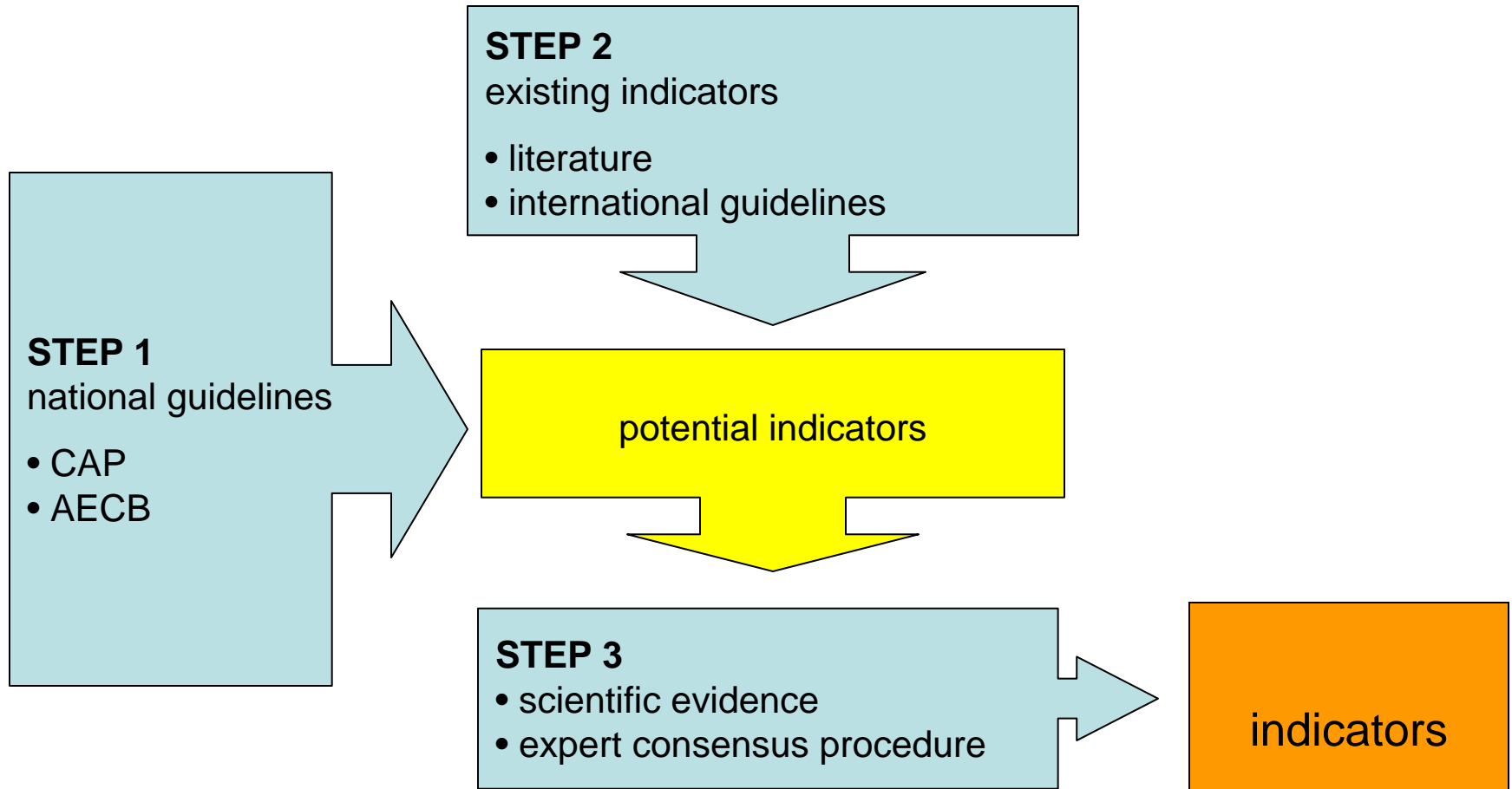


# Development of Quality Indicators

## Example: SWAB guideline CA-Pneumonia



# Development of Quality Indicators



# Development of Quality Indicators

## Step 3. Assessment of scientific evidence

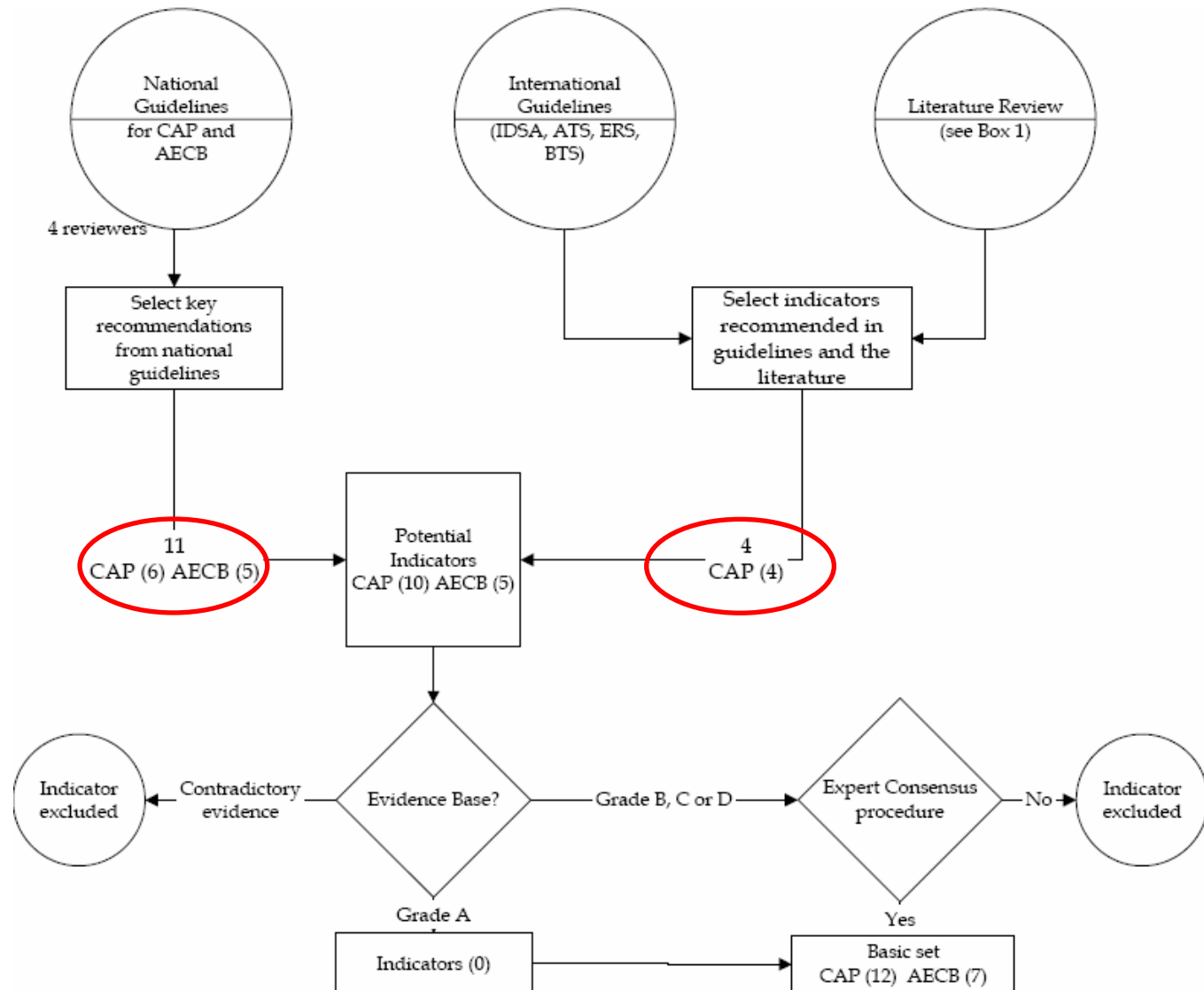
- Select indicators that have scientific base
  - literature search
  - *proven* relation of indicator performance with relevant outcome
    - patient outcome (mortality, clinical cure)
    - cost-effectiveness
    - reduction of antimicrobial resistance
  - grade A-D evidence

# Development of Quality Indicators

## Step 3. Consensus procedure (if no grade A evidence)

- RAND - modified Delphi methodology
  - expertpanel: 10 experts (IDP, microbiologist, pulmonologist, clinical pharmacist)
  - written procedure, 2 rounds
  - *assumed* relation of indicator with outcome
    - patient outcome (mortality, clinical cure)
    - cost-effectiveness
    - reduction of antimicrobial resistance
  - assessment on a 5 point Likert scale: “completely disagree – completely agree”
  - discuss and add indicators for second round

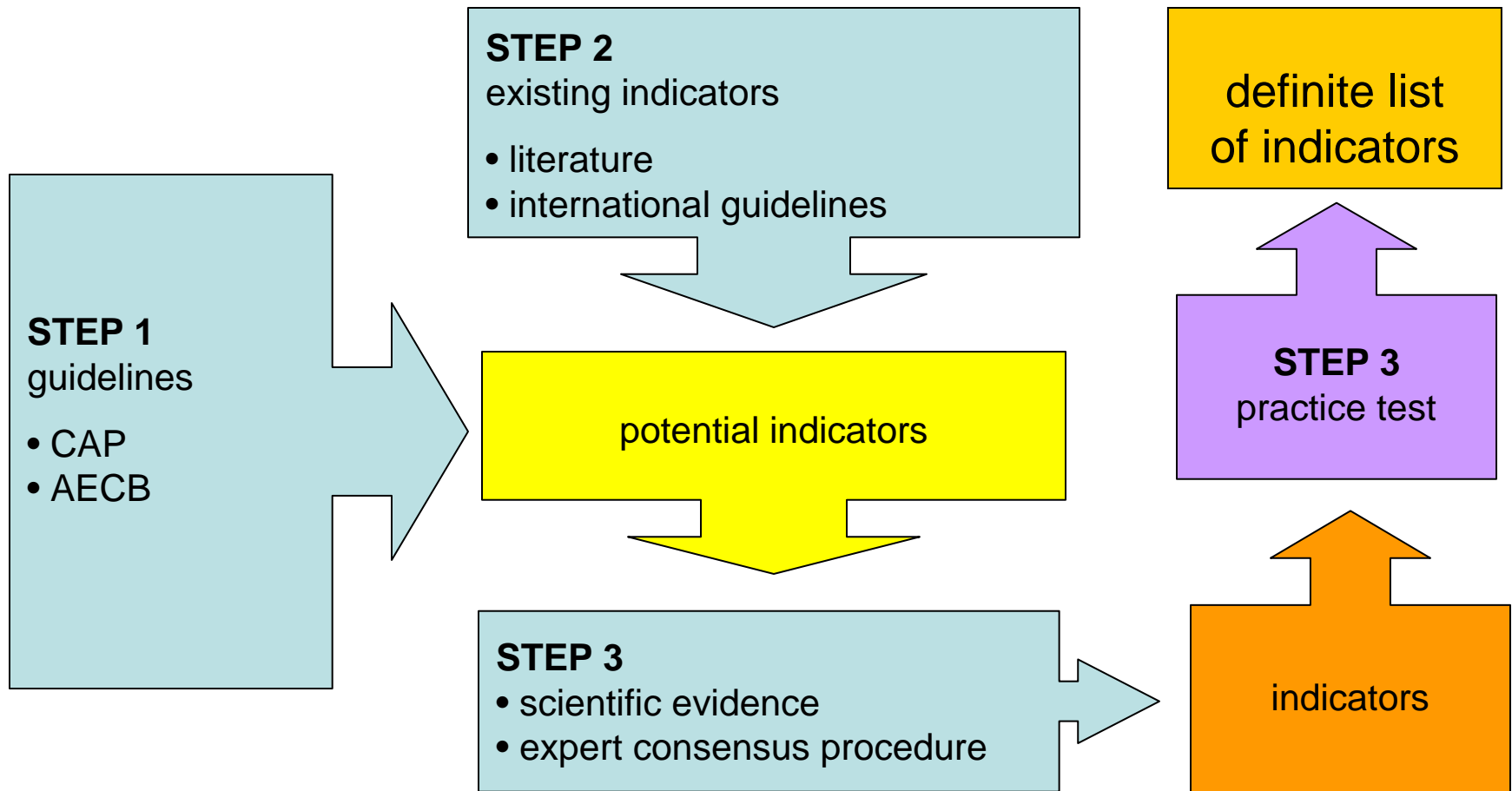
# Development of Quality Indicators



Disease, recommendation	Supporting evidence <sup>1</sup>	Selection round	
		1 <sup>st</sup> round	2 <sup>nd</sup> round
<u>Community-acquired pneumonia</u> ; number of recommendations selected		4	8
1. Initiate antibiotic therapy < 4 hours after presentation	B <sup>22,38</sup>	selected	
2. Include coverage of Legionella species in empirical antibiotic therapy for severe CAP	B <sup>44-49</sup>	added	rejected
3. Prescribe empirical antibiotic therapy in adherence with national guidelines	B <sup>27,30,39</sup>	selected	
4. Adapt dose and dose interval of antibiotics to renal function	D	added	selected
5. Switch from intravenous to oral antibiotic therapy according to existing criteria and clinical stability	B <sup>40,41</sup>	no decision	selected
6. Change broad-spectrum empirical to pathogen-directed therapy as soon as culture results become available	C <sup>3,6</sup>	selected	
7. Stop antibiotic therapy if no fever for three days	D	added	selected
8. Change antibiotic therapy if no clinical improvement within 72 hours of initiation	D	added	selected
9. Perform Gram stain and culture of a sputum sample	D <sup>3,6</sup>	selected	
10. Perform culture of 2 blood samples	B <sup>50,51</sup>	no decision	selected
11. Perform cultures < 24 hours after presentation	B <sup>22</sup>	changed to 12	
12. Perform blood cultures < 24 hours after presentation	B <sup>22</sup>	modified from 11	rejected
13. Perform cultures before empirical therapy	B <sup>22</sup>	changed to 14 and 15	
14. Perform 2 blood cultures before empirical therapy	B <sup>22</sup>	modified from 13	selected
15. Perform Gram stain and culture of sputum sample before empirical therapy	D <sup>6</sup>	modified from 13	selected
16. Perform serological tests for atypical micro-organisms on clinical suspicion	D <sup>3,6</sup>	no decision	rejected
17. Perform urine antigen testing against Legionella species on clinical suspicion	B <sup>52</sup>	added	selected

# Development of Quality Indicators

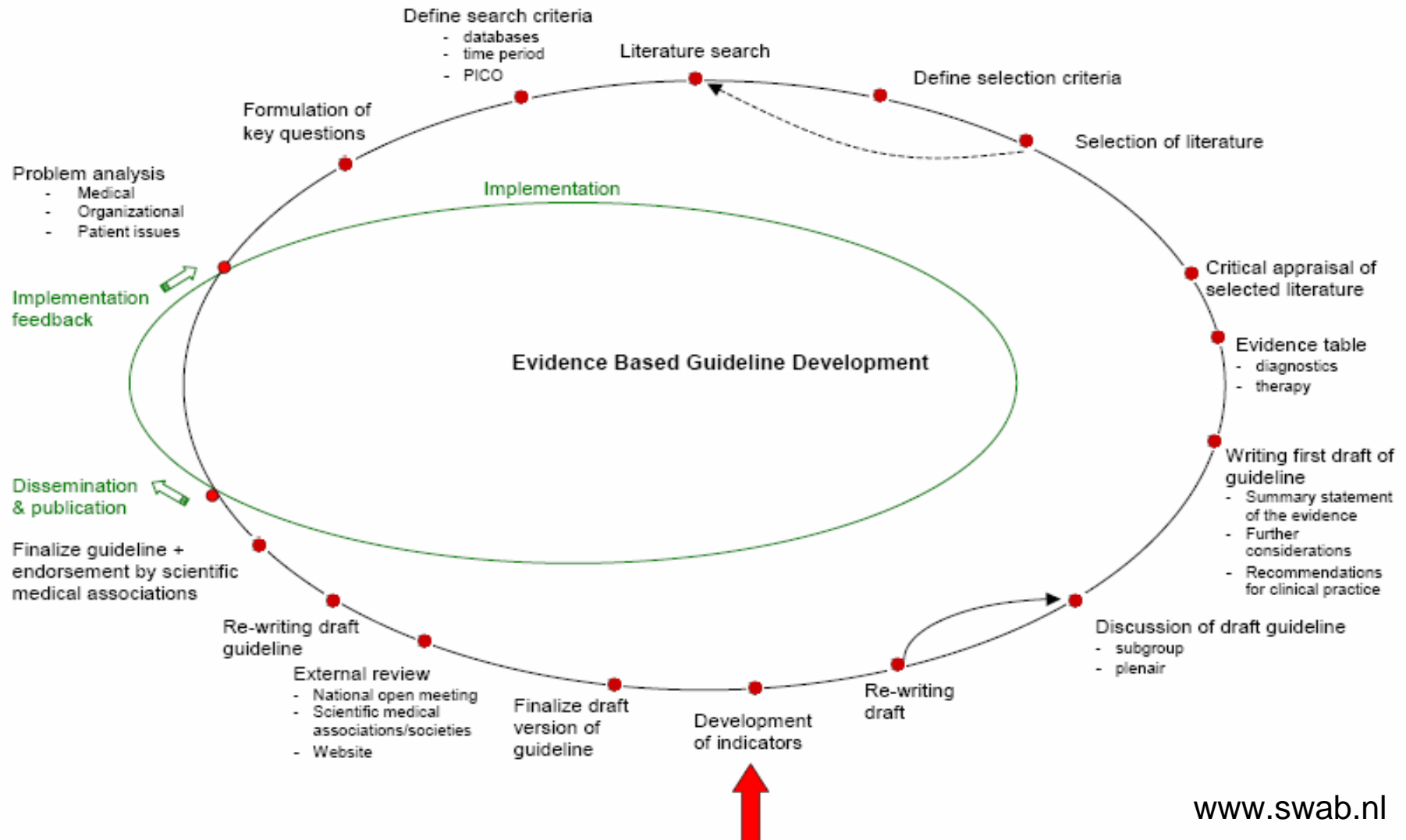
## Example: SWAB guideline CA-Pneumonia



# Development of Quality Indicators as a part from the



# guideline development process





# Quality improvement strategies in the Netherlands

- SWAB guideline programme:
  - ex. guidelines CAP, Urinary tract infections, Sepsis...include recommendations with quality indicators
- No national system of quality surveillance yet
- Government-funded research programs to research groups develop methodology (ZonMw) ex. van Kasteren, Schouten, Willemsen..
- Institute of Quality of Health Improvement (CBO) has projects « Doorbraakprojecten » measuring outcome indicators ex. SSI