Audits of antibiotic prescribing

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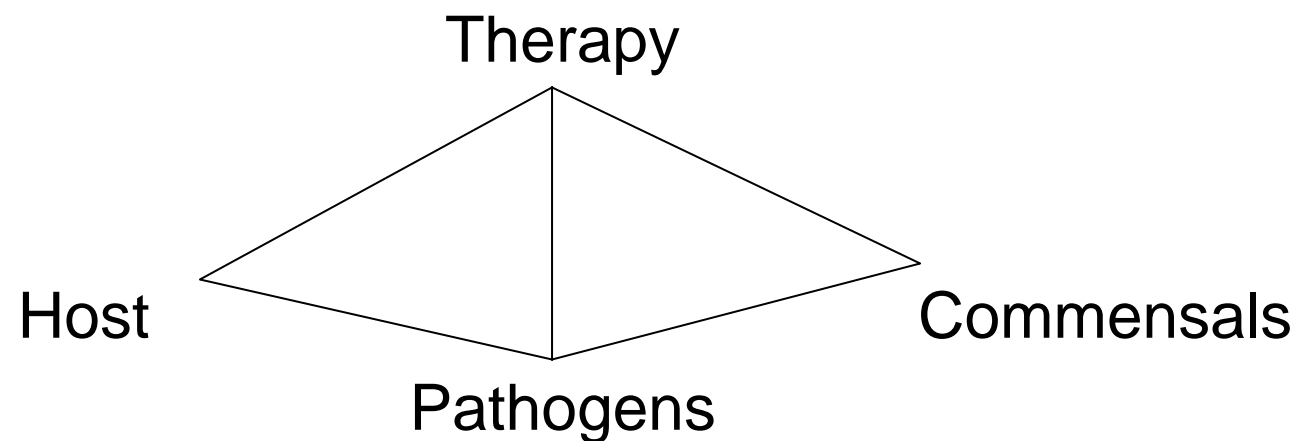Nijmegen, The Netherlands

Audits of medication use

Aim:

- Evaluation and improvement of correct use of drugs

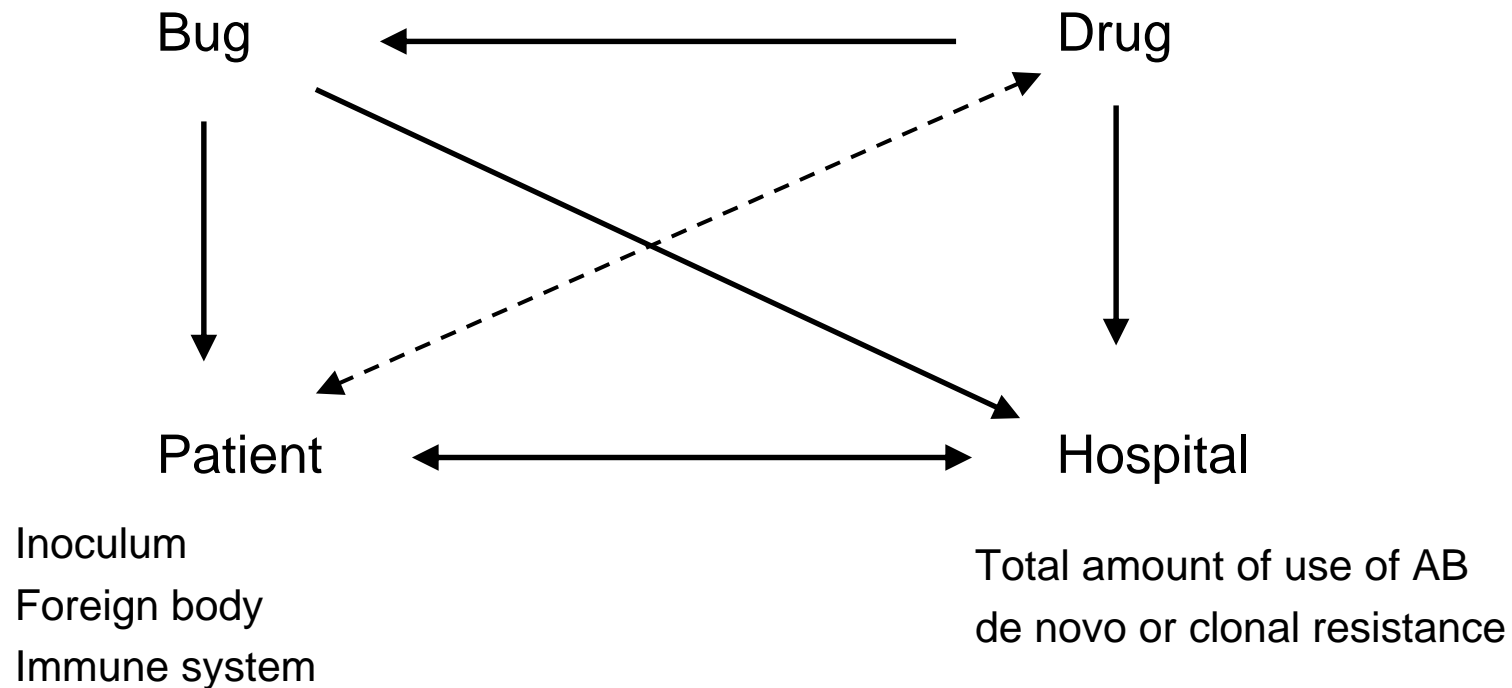- Focus on quality of use at a patient level

Antimicrobial drugs

- Use has not only impact on individual patient
- Adds to the problem of resistance

Therapy

Host

Commensals

Pathogens

Dynamics of resistance

Mechanism of resistance

Reversion of resistance on AB withdrawal

Dosing regimen, combinations, rotation (cycling), length of treatment

Bug → Drug

Patient ↔ Hospital

Inoculum
Foreign body
Immune system

Total amount of use of AB
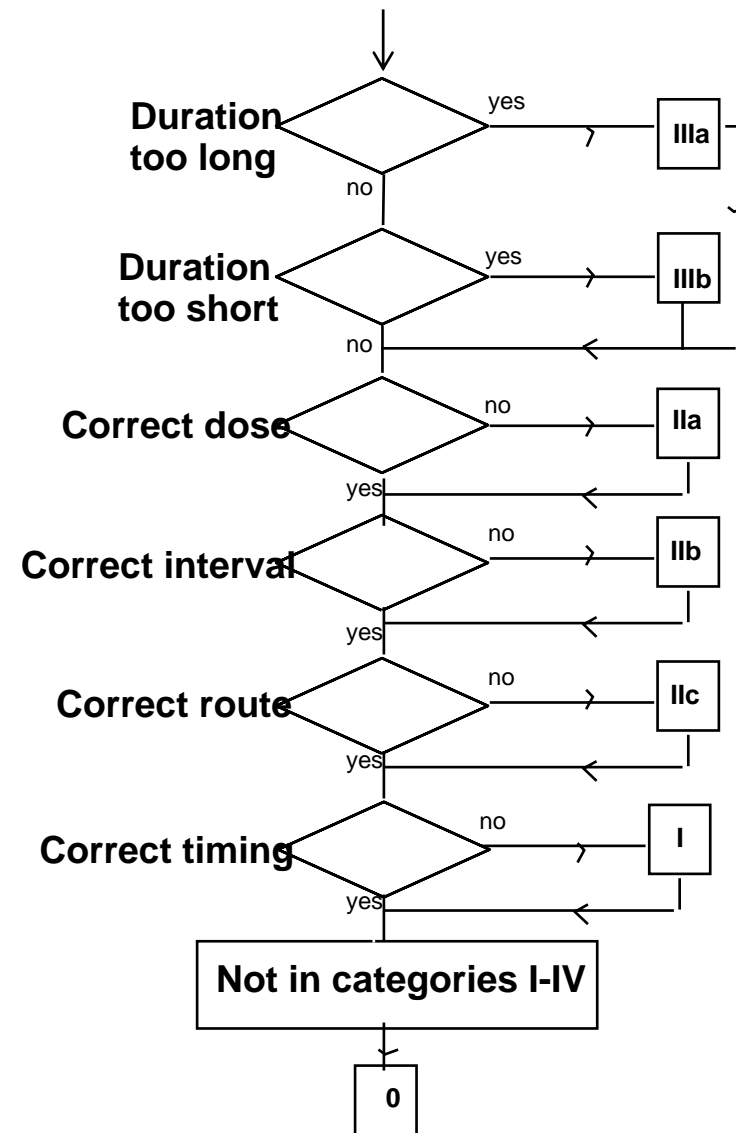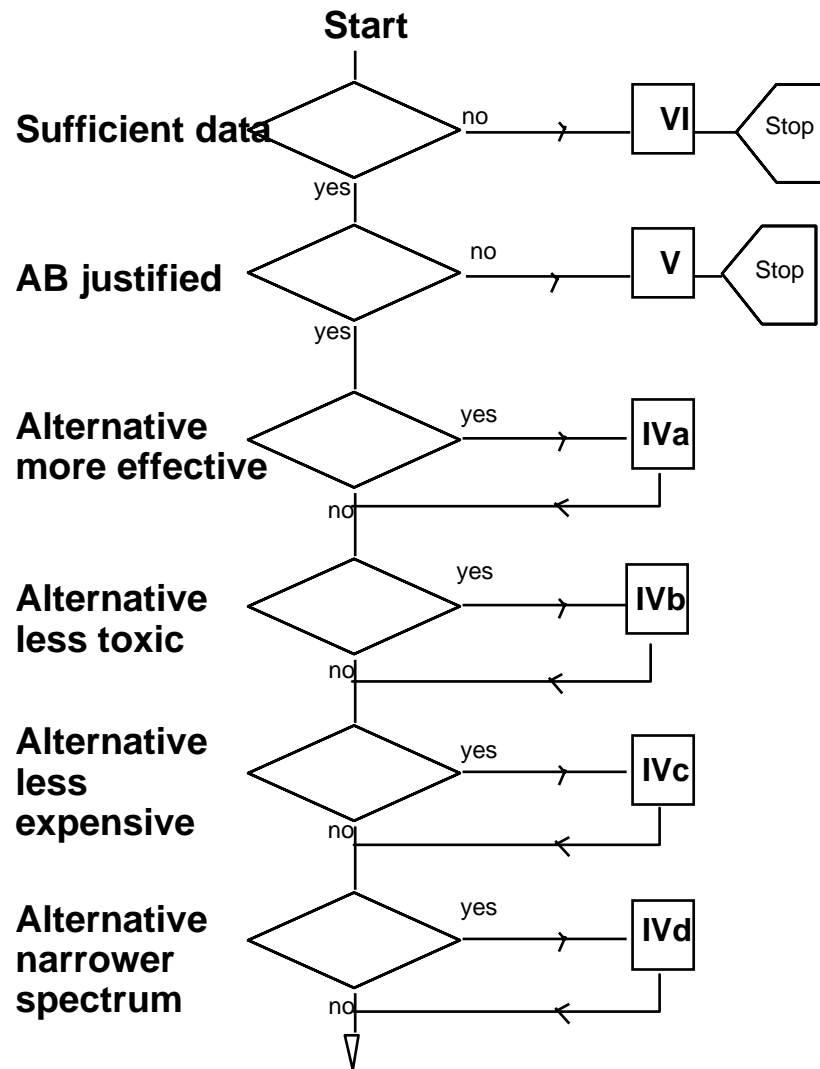de novo or clonal resistance

Performance of an audit

- Measuring the quality of prescibing of antimicrobials
- Results serve as basis for development of guidelines
- Measurement of adherence to guideline after implementation
- Benchmarking: comparison of different departments or hospitals
- Early-warning system indicating changes in patterns of drug use

Target of an audit

To be determined in an early stage:
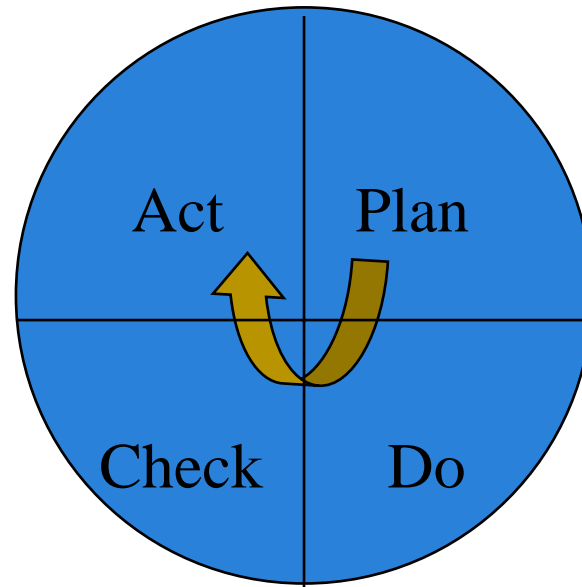
- Focus on a specific antibiotic or group of antimicrobials
  - Aminoglycosides, cephalosporins
- Focus on infections with selected microorganisms
  - Fungi, Pseudomonas
- Focus on microorganisms with particular resistance pattern
  - ESBL-producing gramnegative rods
- Focus on specific diseases
  - Pneumonia, bloodstream infections
- Focus on selected population
  - Elderly, children

Quality assessment

Start

Sufficient data — no → VI → Stop

yes

AB justified — no → V → Stop

yes

Alternative more effective — yes → IVa

no

Alternative less toxic — yes → IVb

no

Alternative less expensive — yes → IVc

no

Alternative narrower spectrum — yes → IVd

no

Duration too long — yes → IIIa

no

Duration too short — yes → IIIb

no

Correct dose — no → IIa

yes

Correct interval — no → IIb

yes

Correct route — no → IIc

yes

Correct timing — no → I

yes

Not in categories I-IV

0

Van der Meer and Gyssens, CMI 2001;7 (Suppl 6):12-15

Quality circle:

Deming cyclus

The surveillance cycle and beyond:

Data collection → Program planning

Data Analysis → Program Implementation

Data Interpretation → Program Evaluation

Information dissemination
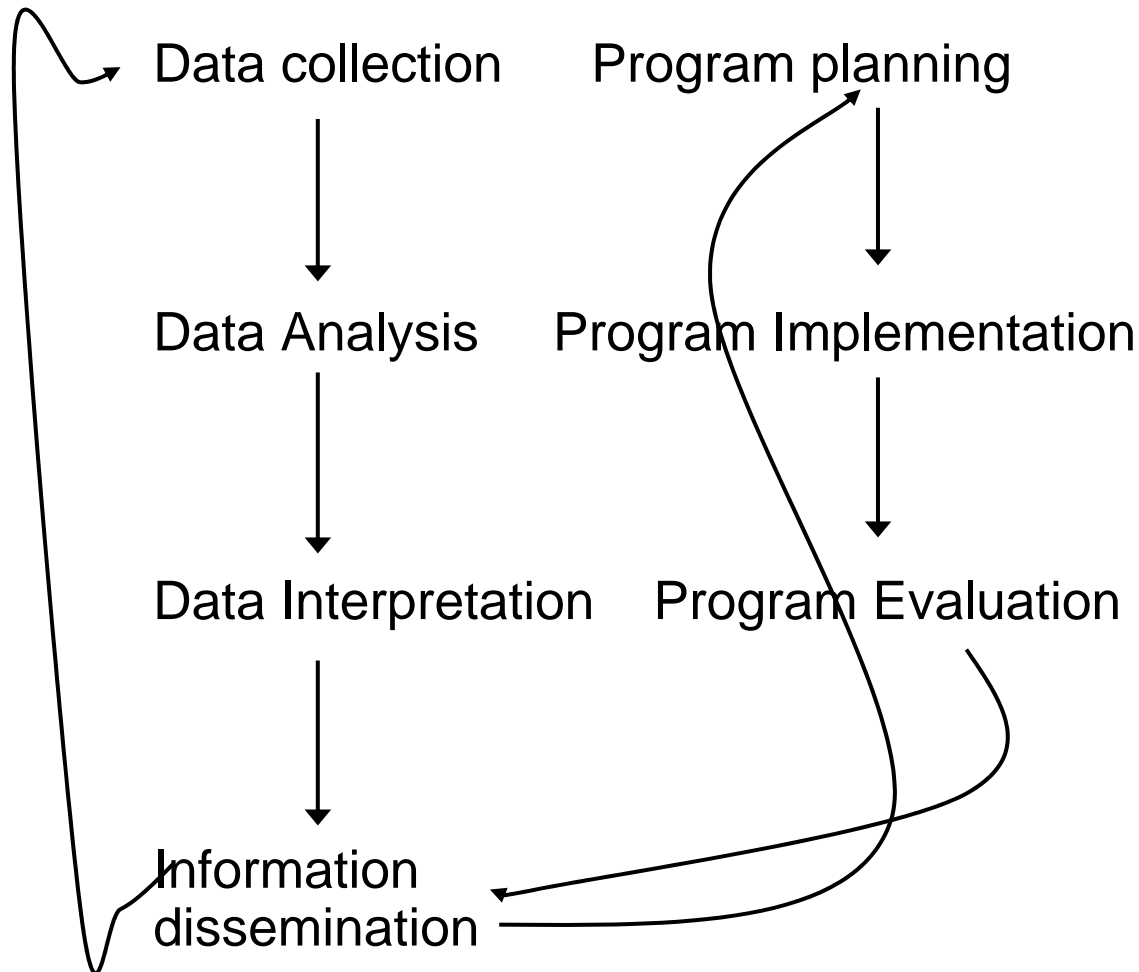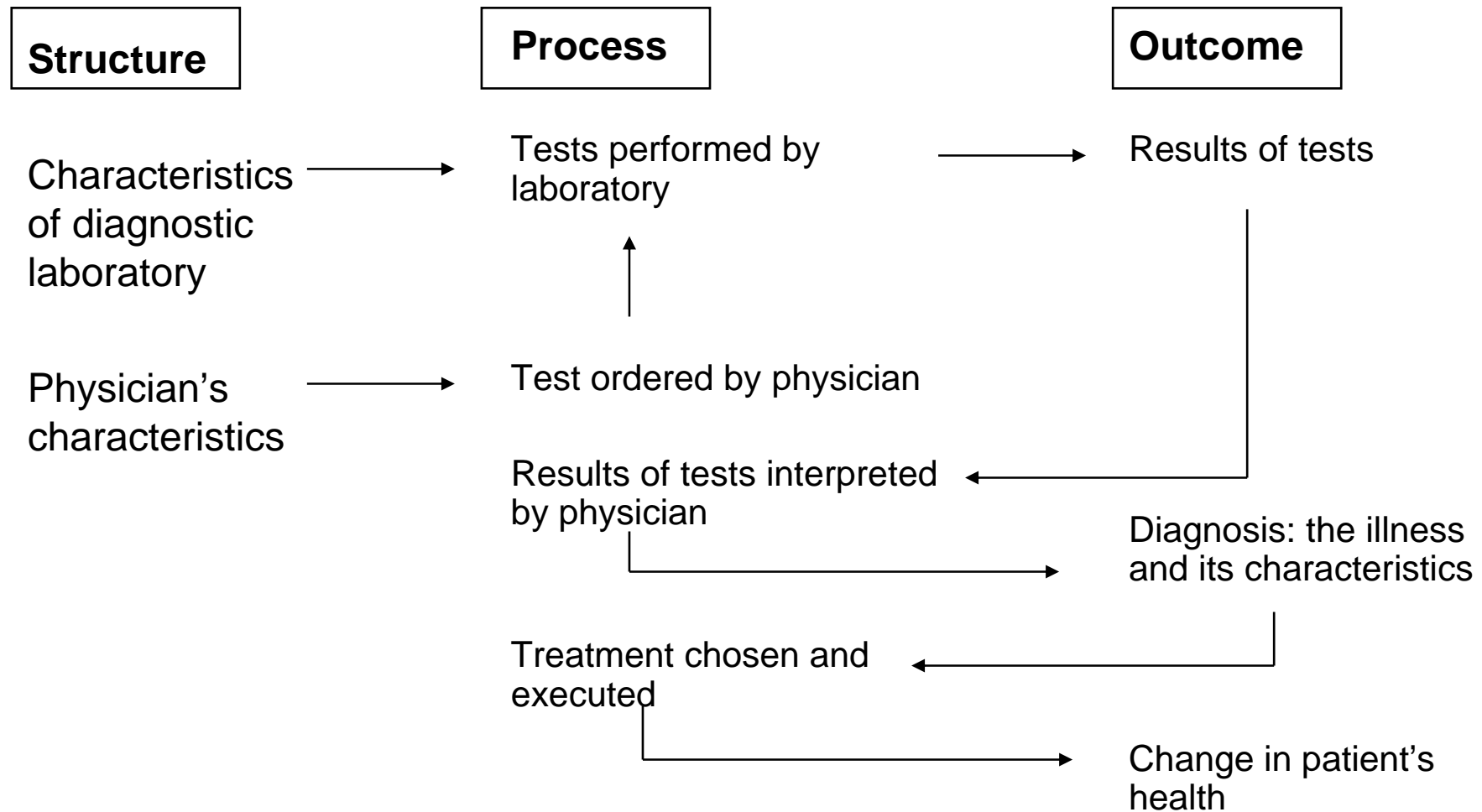
Outcome parameters

- Clinical parameters
  - Morbidity, mortality, clinical and microbiological cure
- Surrogate parameters
  - Biochemical, functional, anatomical changes
- Process outcome measures
  - Reduction in use, reduction in costs, changes in resistance
  - Timing, dosing, route of administration

Structure　　　　　　**Process**　　　　　　**Outcome**

Characteristics of diagnostic laboratory　→　Tests performed by laboratory　→　Results of tests

Physician's characteristics　→　Test ordered by physician

Results of tests interpreted by physician

Diagnosis: the illness and its characteristics

Treatment chosen and executed

Change in patient's health

Donabedian, QRB 1992;Nov:356-60.

Example 1

**Earlier initiation of antibiotic treatment in the emergency department**

- Time from presentation to the emergency room until administration of antibiotics.
- Time of taking cultures for microbiological analysis
- Number of cultures taken
- Body temperature, leucocyte count and ESR at admission

Natsch et al, Arch Intern Med 2000;160:1317-20.

Results:

- Median AB time was 5 hours,
  range 0.5 to 13.3 h
- Significant difference between admission during
  working hours and admission at night.
- No difference neither on the presenting syndrome, the
  body temperature or the laboratory values at
  presentation nor the number of cultures taken.
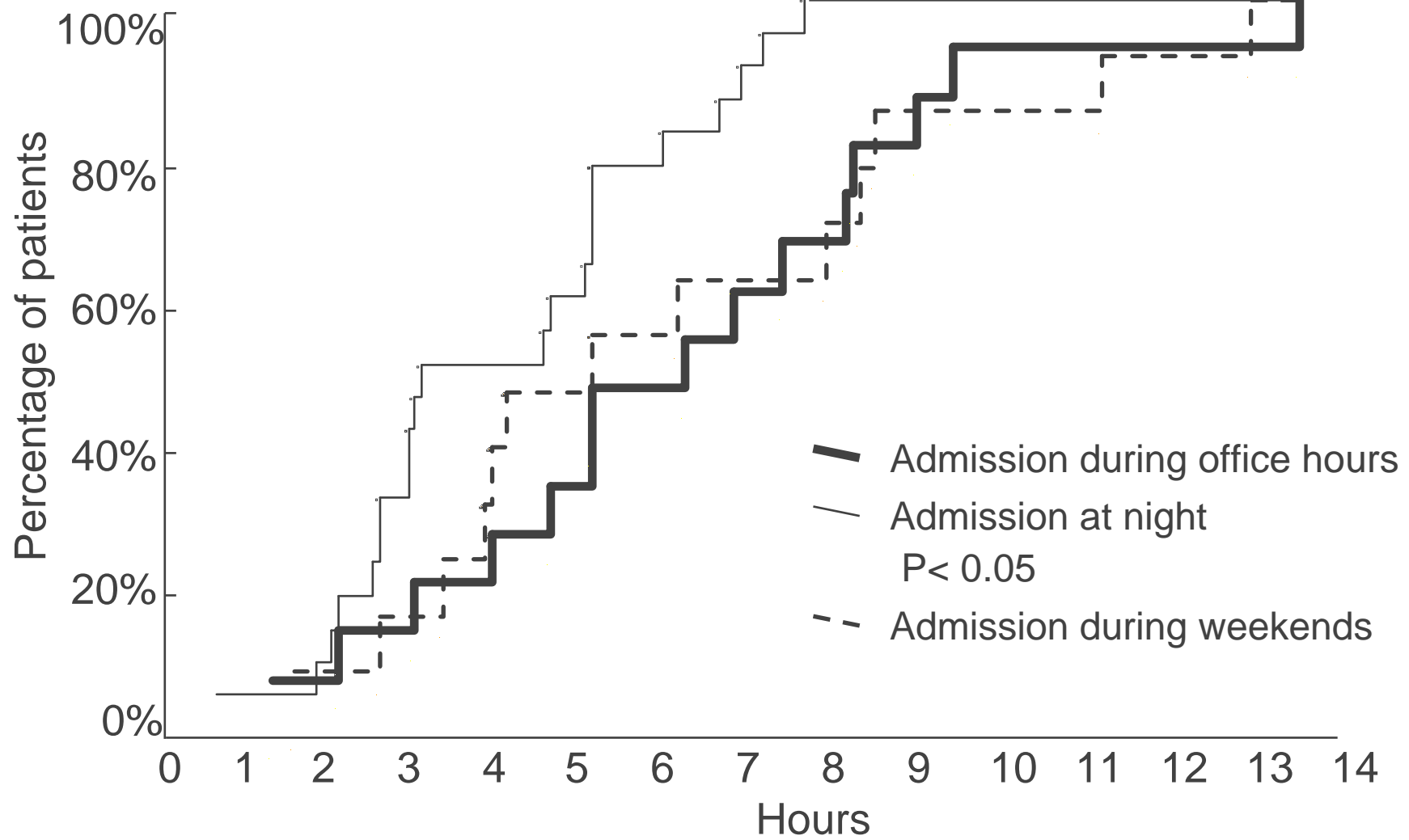
Interventions

- Newsletter to the medical staff
- Guidelines on ordering immediate treatment
- Guidelines on obtaining cultures
- Lectures to the medical staff
- Lectures to the nursing staff
- Improvement of the availability of antibiotics
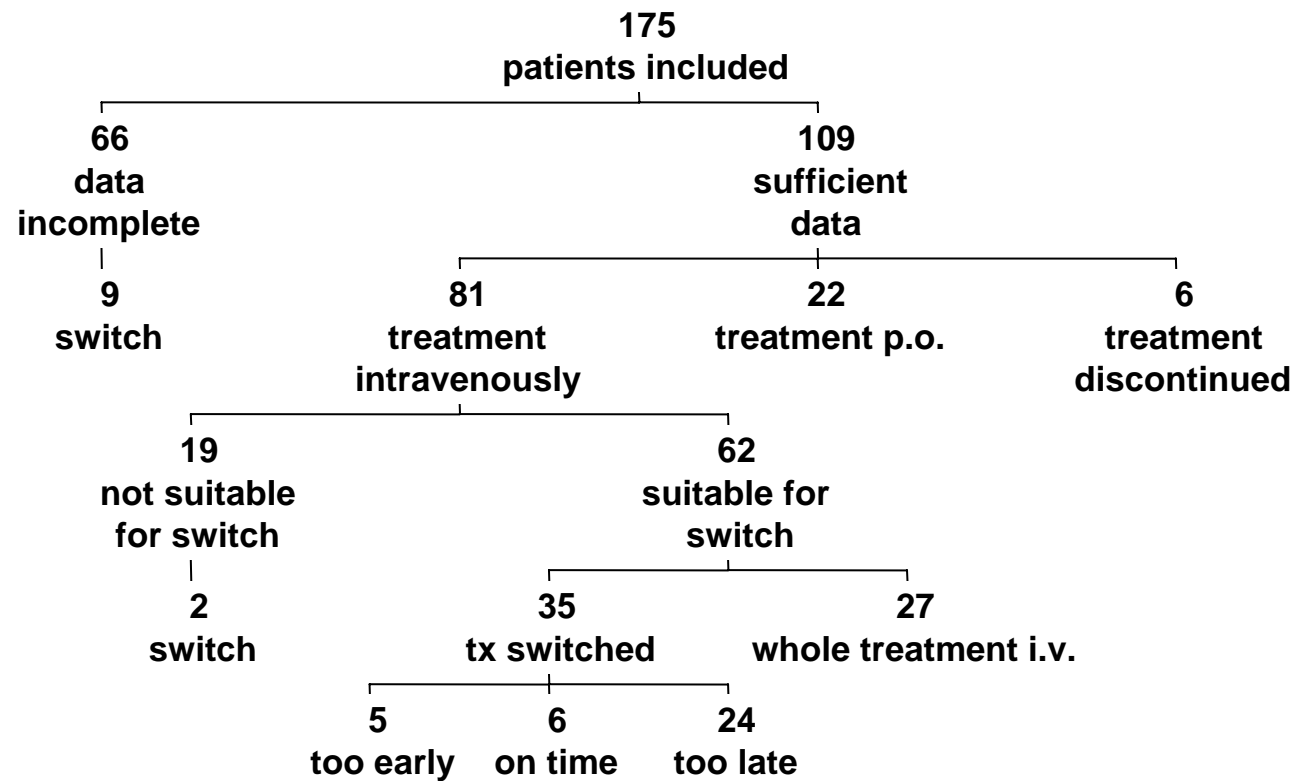- Removal of financial restraints

Results

	before	after	p
median delay (h):			
total	5.0 ± 2.9	3.2 ± 2.5	0.037
during office hours	6.1 ± 3.2 (n=15)	3.3 ± 2.8 (n=23)	0.064
at night	3.7 ± 1.9 (n=22)	2.8 ± 1.9 (n=17)	0.22
during weekends	5.0 ± 3.4 (n=13)	4.5 ± 2.3 (n=10)	0.49
Antibiotics administered at routine drug rounds	54%	32%	0.03

Example 2

Evaluation of patients for intravenous-to-oral switch therapy:

175
patients included

66
data
incomplete

109
sufficient
data

9
switch

81
treatment
intravenously

22
treatment p.o.

6
treatment
discontinued

19
not suitable
for switch

62
suitable for
switch

2
switch

35
tx switched

27
whole treatment i.v.

5
too early

6
on time

24
too late

Improving the process of antibiotic therapy. Vogtländer et al,
Arch Intern Med 2004;164:1206-12

Renal function:

175
patients included

23
data
incomplete

152
sufficient
data

50
clearance < 50ml/min

102
clearance >50ml/min

119
prescriptions

24
no dose adjustment necessary
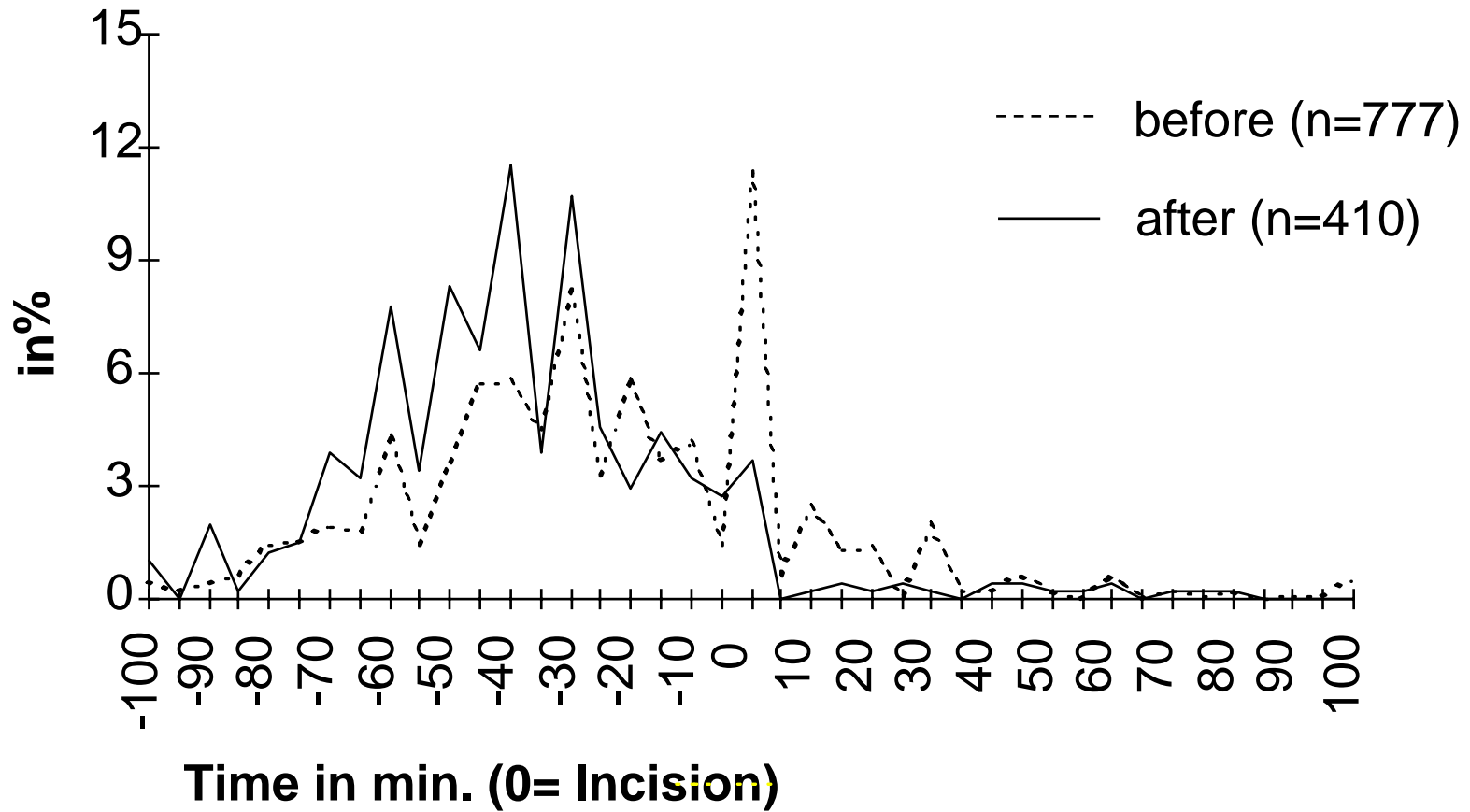
95
dose adjustment necessary

38
correctly adjusted

57
not adjusted
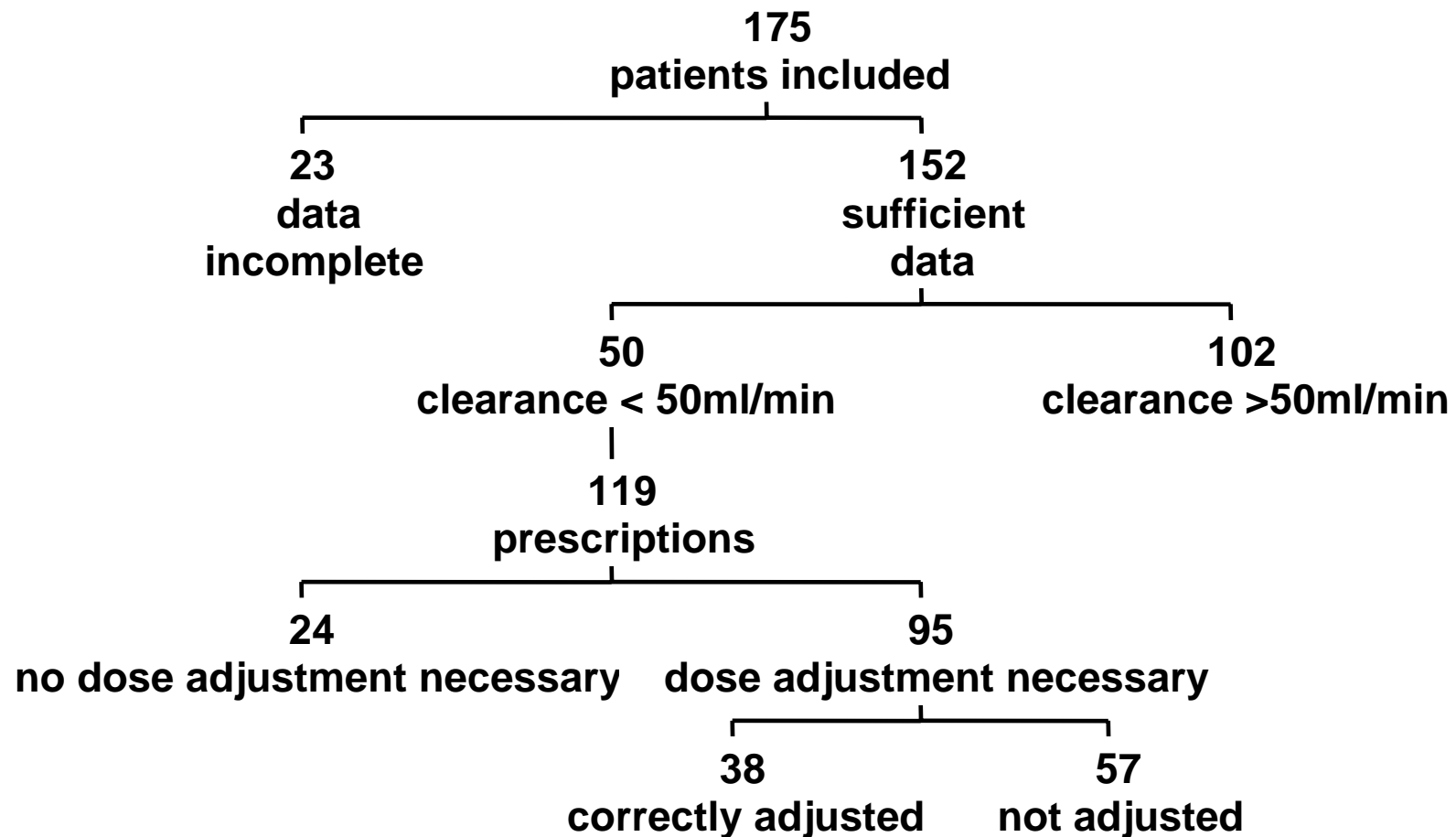
Example 3

Antibiotic prophylaxis in surgery

Example 4

Use of fluconazole in daily practice: still room for improvement

Target drug programme

- Fluconazole is one of the most active and best tolerated antifungal drugs available
- Retain its good activity against fungi
- Prevent development of resistance
- Prevent shift to non-albicans species

J Antimicrob Chemother. 2001;48:303-10.

Data collection

- Prospective identification of patients receiving fluconazole
- Assess indication/reason for prescription
- Collection of laboratory results (microbiology, haematology, chemistry)
- Document complete medication history

Data from patient file:

- actual medical problems
- underlying disease, co-morbidity
- clinical signs (body temperature, blood pressure)
- course of the treatment
- outcome (cured, died, switched to other antifungal treatment, no fungal infection diagnosed)

Disseminated candidiasis

Results

Actual vs. recommended duration of treatment
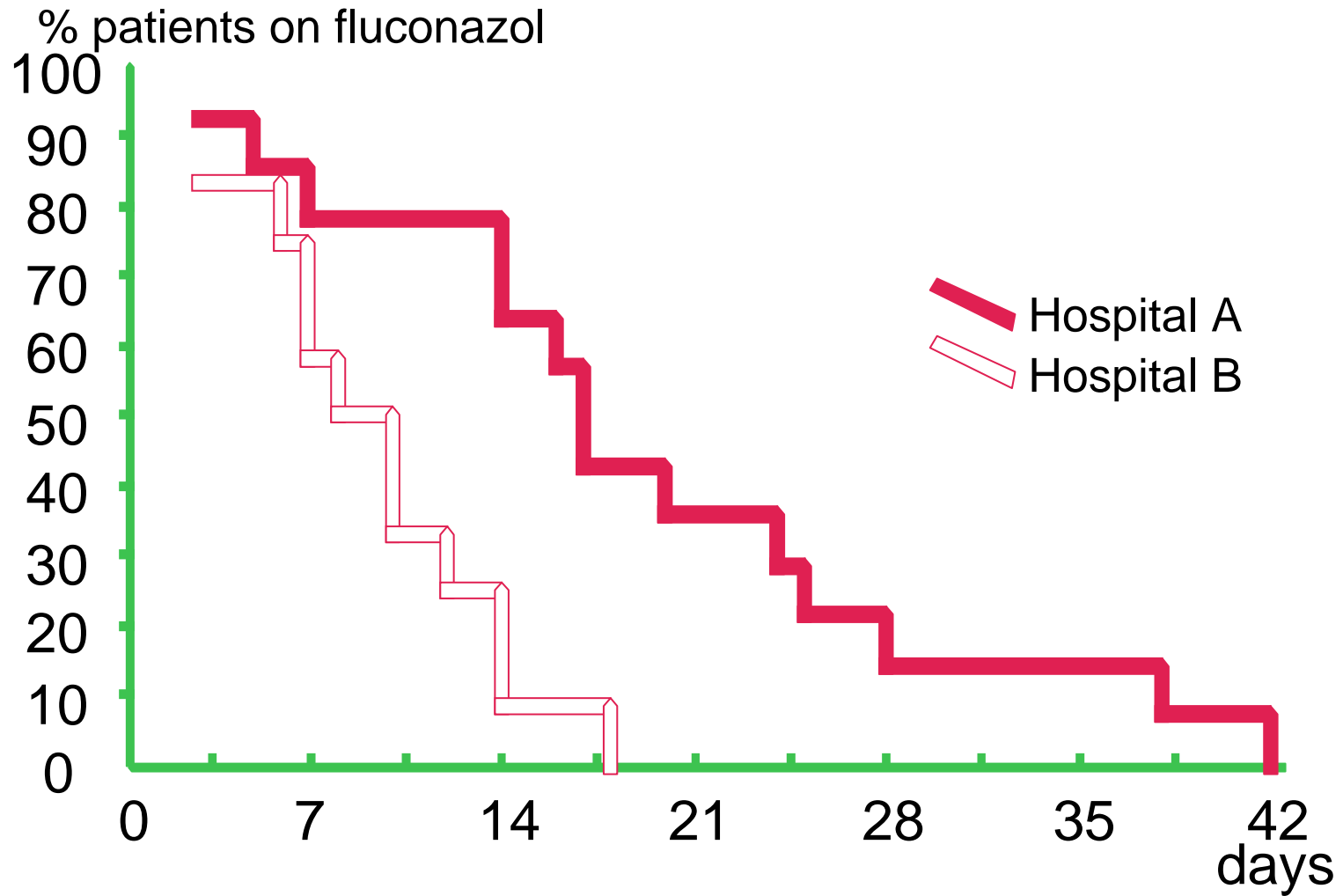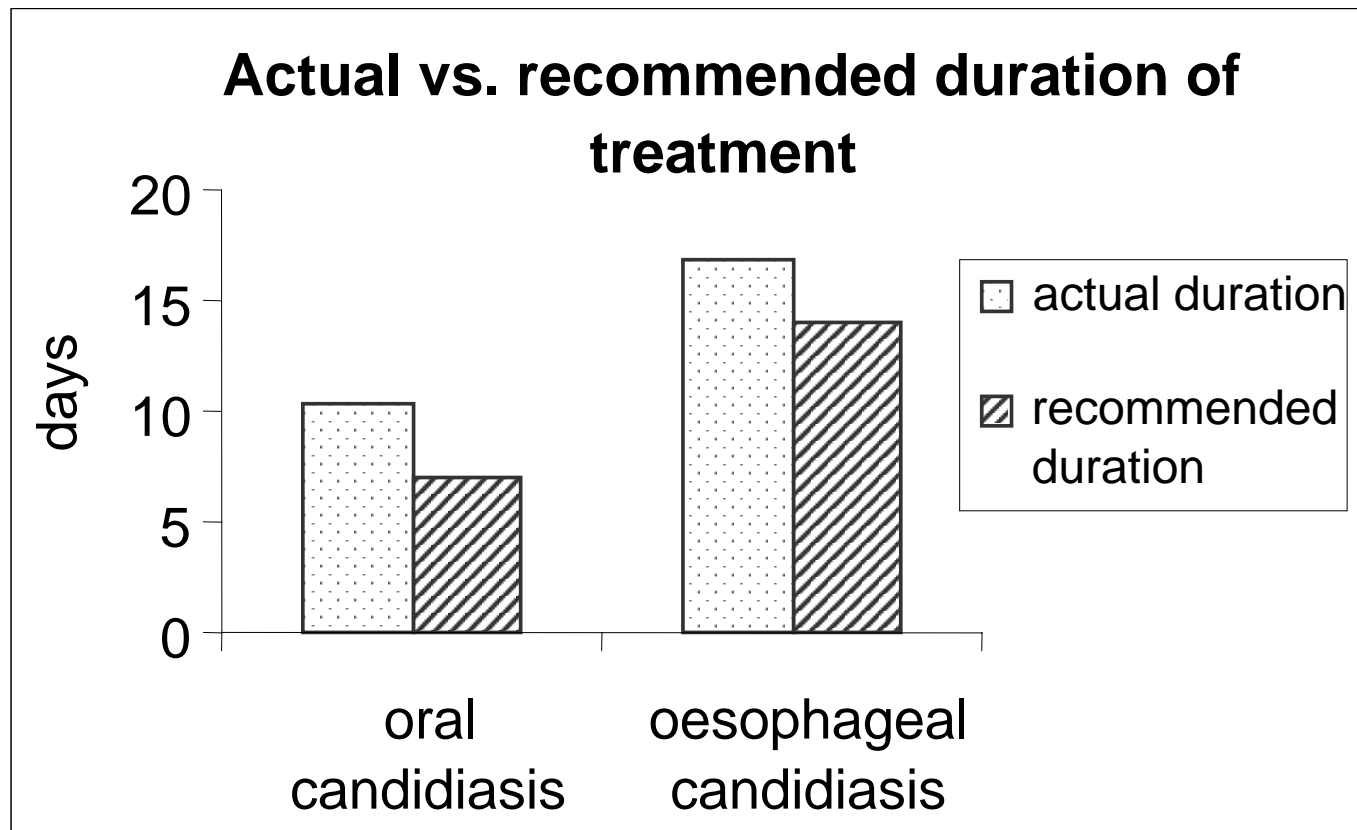
Data collection

- Trained data collectors, research nurses, pharmacy technicians, infection control practitioners
- Use of specific antibiotic order forms
- Retrospectively or prospectively

Quality evaluation

- Independent experts and comparison of agreement
- Panel discussion until agreement

Implementation of an audit

- Careful selection of target
- Careful selection of outcome measure
- Communication about audit:
    - Involvement of pharmacy and therapeutics committee
    - Involvement of antibiotic committee
- Be aware of extra administrative work for physicians
- Realistic timeframe
- Clear follow-up of audit

Dos and Don'ts for Implementing a Target Drug Program

Dos

Choose the right drugs (consider volume, risks, costs and problems encountered)

Identify the problems (baseline included)

Specify the criteria

Benchmark

Summarize the project for AB committee

Estimate outcomes

Create incentives

Communicate about the project

Simplify the project

Provide for exceptions (inclusion, exclusion)

Reevaluate and update early in the program

Be prepared (proactive)

Be action oriented

Don'ts

Overload physicians with paperwork

Fail to see the feasibility for all disciplines

Make decisions in isolation

Try too much or too fast

Forget to follow-up

Focus on costs only

Forget to get baseline information

Neglect the impact

Get pressured

Underestimate the workload