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Improving the quality of antibiotic use for respiratory tract infections at hospitals

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Respiratory Tract infections at the hospital

- Community-acquired lower respiratory tract infections
  - Pneumonia (CAP)
  - Acute exacerbation of chronic bronchitis (AECB)

- Antibiotic treatment is ***always*** indicated for CAP, for AECB it is ***sometimes*** indicated

Optimal use of antibiotics

Impacts on:

- Clinical outcome
- Microbial resistance to antimicrobial drugs
- Costs

Study goal

To develop and test a strategy to improve the quality of antibiotic use within hospital departments of internal and respiratory medicine

Proposed model to improve antibiotic use

1. Develop targets for improvement
2. Analyse performance, target group and setting
3. Develop/select a set of strategies for improvement
4. Develop, test and execute implementation plan containing activities, tasks and time schedule
5. Evaluate and, if necessary, revise the plan

Improving patient care: the implementation of change in clinical practice. Grol R, Wensing M, Eccles M (ed). Oxford, Elsevier, 2005

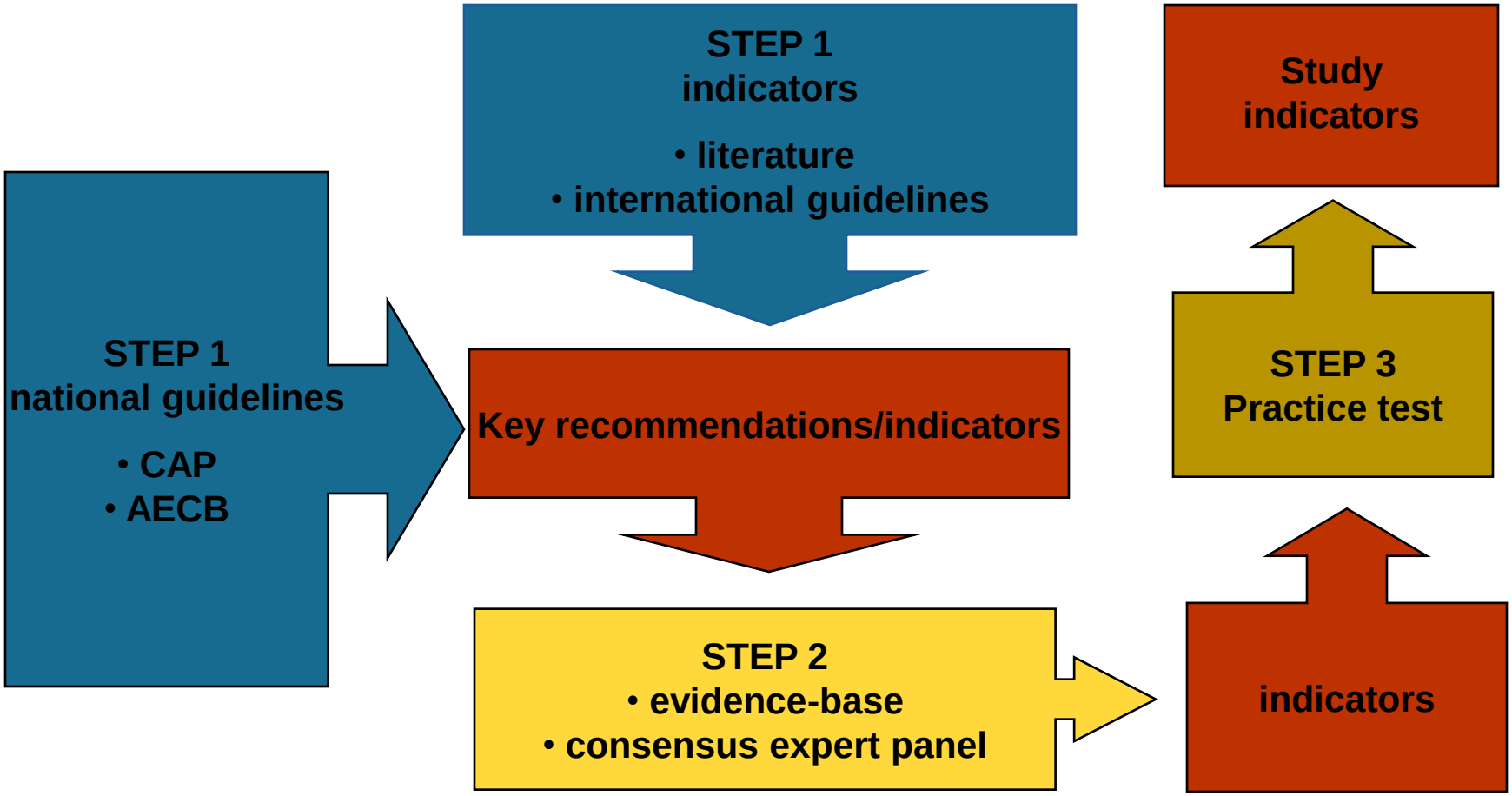
1. Develop targets for improvement

Development of ***indicators***:

A measurable element of practice performance for which there is evidence or consensus that it can be used to assess the quality, and hence change the quality of care provided …

Lawrence M, Olesen F. Eur J Gen Pract 1997; 3: 103-108

1. Develop targets for improvement



1. Develop targets for improvement

5 indicators for both CAP and AECB:

- Prescribe empirical antibiotic regimen at correct indication and according to guidelines
- Adapt dose and dose interval of antibiotics to renal function
- Switch from iv to oral therapy, according to existing criteria
- Change broad spectrum empirical into pathogen-directed therapy (streamline)
- Obtain sputum samples for Gram stain and culture

4 additional CAP indicators:

- Timely initiate antibiotic therapy (within 4 hrs after presentation)
- Stop antibiotic therapy after three consecutive days of defervescence
- Take two sets of blood samples for culture
- Perform Urine antigen test against Legionella spp upon clinical suspicion

2 additional AECB indicators:

- Macrolide therapy is not first choice treatment
- Optimal duration of antibiotic therapy is between 5 and 7 days

Schouten JA, Hulscher MEJL et al. Clin Infect Dis 2005; 41: 450-460

2a. Analyse performance of professionals

Performance as described with the indicators varied between indicators and between hospitals, e.g.

- Prescribe empirical antibiotic regimen at correct indication and according to guidelines : 52% (46-58)
- Change broad spectrum empirical into pathogen-directed therapy (streamline): 69% (63-96)
- Switch from iv to oral therapy, according to existing criteria: 62% (22-94)
- Obtain sputum samples for Gram stain and culture: 53% (47-66)

Schouten JA, Hulscher ME, et al. J Antimicrobial Chemotherapy 2005; 56: 575-582

2b. Analyse target group & setting: barriers to optimal antibiotic use

- Data obtained with qualitative techniques using a clinical case, asking about each indicator separately

  18 in-depth semistructured interviews and 2 small group sessions with professionals from various professional backgrounds

- Framework regarding the whole spectrum of barriers that impede optimal antibiotic use
  - *Internal barriers (individual related)*
  - *External barriers (patient, environment, guideline related)*

Schouten JA, Hulscher MEJL et al. Quality and Safety in Health Care 2007: 16: 143-149

2b. Analyse barriers to optimal antibiotic use

Participants mentioned barriers, covering the whole range of barriers (guideline, individual, patient and setting related)

However,

Each indicator elicited its own pattern of barriers that should be overcome, e.g.

2b. Analyse barriers to optimal antibiotic use

For example:

‘Timely initiate antibiotic therapy (within 4 hrs after presentation)’:

“Some antibi… are not present on the ward”

“Once a patient is ad… is no easy way to check whether antibiotics are administered”

“Nursing protocols do not necessarily put a… inistration ahead of less urgent aspects of care”

Barriers in the organization of care

2b. Analyse barriers to optimal antibiotic use

For example:

'Prescribe empirical antibiotic regimen at correct indication and according to guidelines'

"Everyone feels safe with a broad spectrum antibiotic, colleagues will not criticize yo choice at end-of-shift meetings"

Physician their own performance

Physicians worried when prescribing narrow-spectrum antibiotic therapy

"There is no evidence justifying the

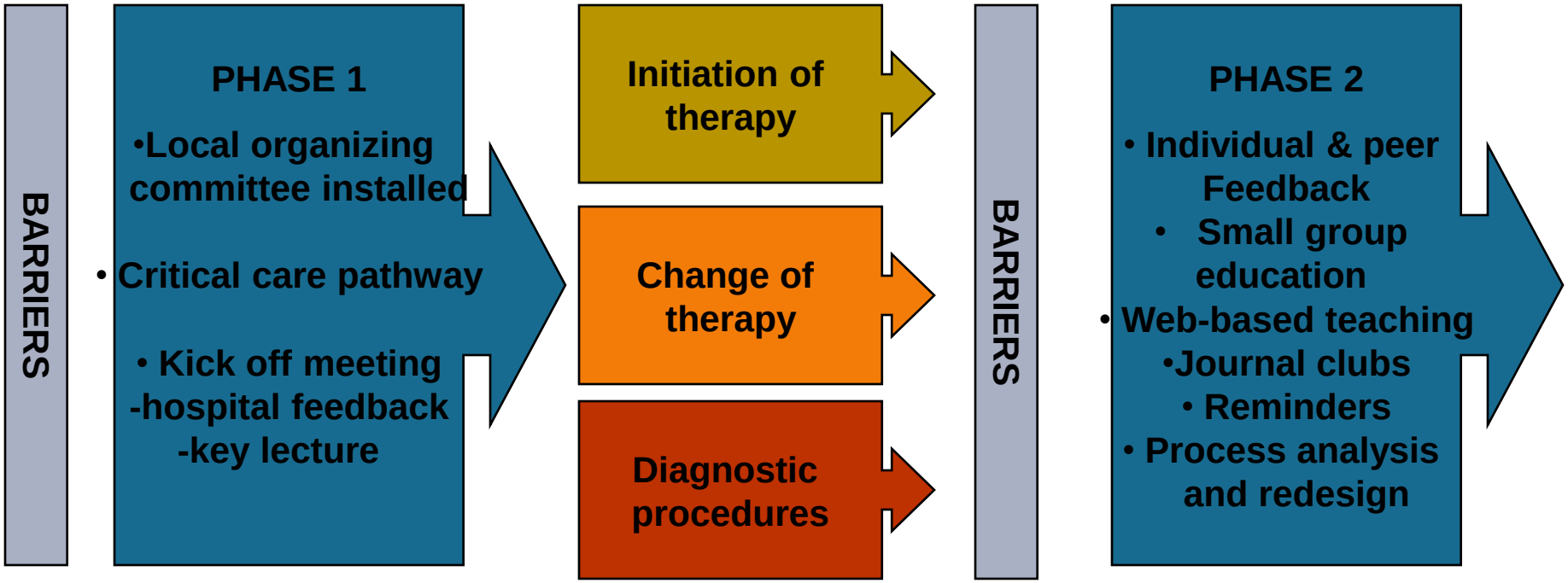
"I don't have confidence in the guideline develo

"I have been treating patients with this non-guideline-adherent antibiotic since medical school and it is always successful"

Individual barriers and barriers in social context

3. Develop a set of strategies for improvement
4. Develop, test & execute implementation plan

Based on the assessment of barriers, “targeted” implementation activities were combined into a multifaceted implementation strategy



5. Evaluate and, if necessary, revise the plan

Multicentred, cluster-randomized trial to assess the effectiveness of this multifaceted improvement strategy to improve the quality of antibiotic use for LRTI

6 medium-large hospitals in the southeast of the Netherlands (pair matched)

Prospectively enrolled patients, data collected by chart review

Quality Indicators LRTI	Intervention group			Control group				
	Pre	Post	% change	Pre	Post	% change	Odds ratio (95% CI)	P
	421	508		359	363			
1. Prescribe empirical antibiotic regimen at correct indication and according to guidelines	187/372 (50.3)	296/460 (64.3)	+14	175/326 (53.7)	154/338 (45.6)	-8.1	2.34 (1.43-3.83)	0.0008
2. Adapt dose and dose interval of antibiotics to renal function	201/253 (79.5)	310/326 (95.1)	+15.6	273/285 (95.8)	231/250 (92.4)	-3.4	7.32 (2.09-25.7)	0.0019
3. Switch from iv to oral therapy, according to existing criteria	142/192 (74)	199/238 (83.6)	+9.6	120/225 (53.3)	138/192 (71.9)	+18.6	1.75 (0.10-30.21)	0.4864
4. Change broad spectrum empirical into pathogen-directed therapy (streamline)	80/111 (72.1)	77/99 (77.8)	+5.7	47/71 (66.2)	28/49 (57.1)	-9.1	1.88 (0.32-11.03)	0.4551
5. Obtain sputum samples for Gram stain and culture	235/421 (55.8)	270/508 (53.2)	-2.6	178/359 (49.6)	155/363 (42.7)	-6.9	1.03 (0.59-1.83)	0.9077
6. Sumscore: all 5 key indicators for LRTI performed	22.1	29.1	+7	18.7	15.7	-3	1.77 (0.94-3.34)	0.079

Quality Indicators CAP	Intervention group			Control group				
	Pre	Post	% change	Pre	Post	% change	Odds ratio[1] (95% CI)	P
	212	276		166	173			
1. Timely initiate antibiotic therapy (within 4 hrs after presentation)	80 /145 (55.2)	105/167 (62.9)	+7.7	66/97 (68)	33/64 (51.6)	-16.4	2.49 (1.11-5.57)	0.0269
2. Stop antibiotic therapy after three consecutive days of defervescence	5/147 (3.4)	33/193 (17.1)	+13.7	19/ 125 (15.2)	9/120 (7.5)	-7.7	13.86 (3.9-49.4)	0.001
3. Take two sets of blood samples for culture	112/212 (52.8)	167/276 (60.5)	+7.7	97/166 (58.4)	94/173 (54.3)	-4.1	1.60 (0.83-3.07)	0.1545
4. Perform Urine antigen test against Legionella spp upon clinical suspicion	11/14 (78.6)	20/24 (83.3)	+4.7	12/16 (75.0)	12/13 (92.3)	+17.3	0.34 (0.02-6.56)	0.4823

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Quality Indicators AECB	Intervention group			Control group				
	Pre	Post	% change	Pre	Post	% change	Odds ratio (95% CI)	P
	209	193		232	191			
1. Macrolide therapy not first choice treatment for AECB	104 /105 (99)	135/141 (95.7)	-3.3	139/148 (93.9)	115/129 (89.1)	-4.8	0.53 (0.06-5.10)	0.589
2. Optimal duration of antibiotic therapy between 5 and 7 days	24/93 (25.8)	47/127 (37.0)	+11.2	73/141 (51.8)	51/119 (42.9)	-8.9	2.22 (0.96-5.12	0.062

Schouten JA, Hulscher MEJL et al. Clin Infect Dis 2007; 44: 931-941

In summary

We developed indicators using a carefully planned procedure that combined evidence and expert opinion

We developed a multifaceted intervention that was based on the outcomes of an in-depth analysis of performance

This complex intervention was effective on several indicators