How to audit the quality of antimicrobial prescriptions in the hospital?

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Audit

An analysis of appropriateness of individual prescriptions

Audit and feedback

A summary of health workers' performance over a specified period of time, given to them in a written, electronic or verbal format. The summary may include recommendations for clinical actions

EPOC taxonomy 2015; Gould JAC 1994

Quality indicators

- **Measurable elements** of practice performance for which there is evidence or consensus that they can be used to assess the quality, and hence change in the quality, of care provided

- Can refer to recommended structures, processes or outcomes of care

Quality Indicators to Measure Appropriate Antibiotic Use in Hospitalized Adults

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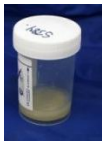
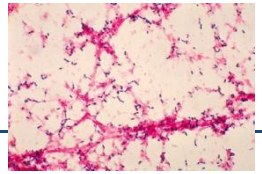
Van den Bosch CM Clin Infect Dis 2015

Stewardship objectives, process QI

CURB-65

STOP





compliance

Model for planning change

Define appropriate care **and measure** current performance

↓

Analyze determinants of appropriate care (or not)

↓

Develop an improvement strategy based on this diagnosis

↓

Develop plan, execute, evaluate this improvement strategy

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Grol R BMJ 1997

Activity - documentation - reporting

		A	B	C	D	E
Blood cultures	Activity					
Restricted	Activity					
agents						
IV-oral switch	Activity					
TDM	Activity					
SAB bedside	Activity					
consultation						

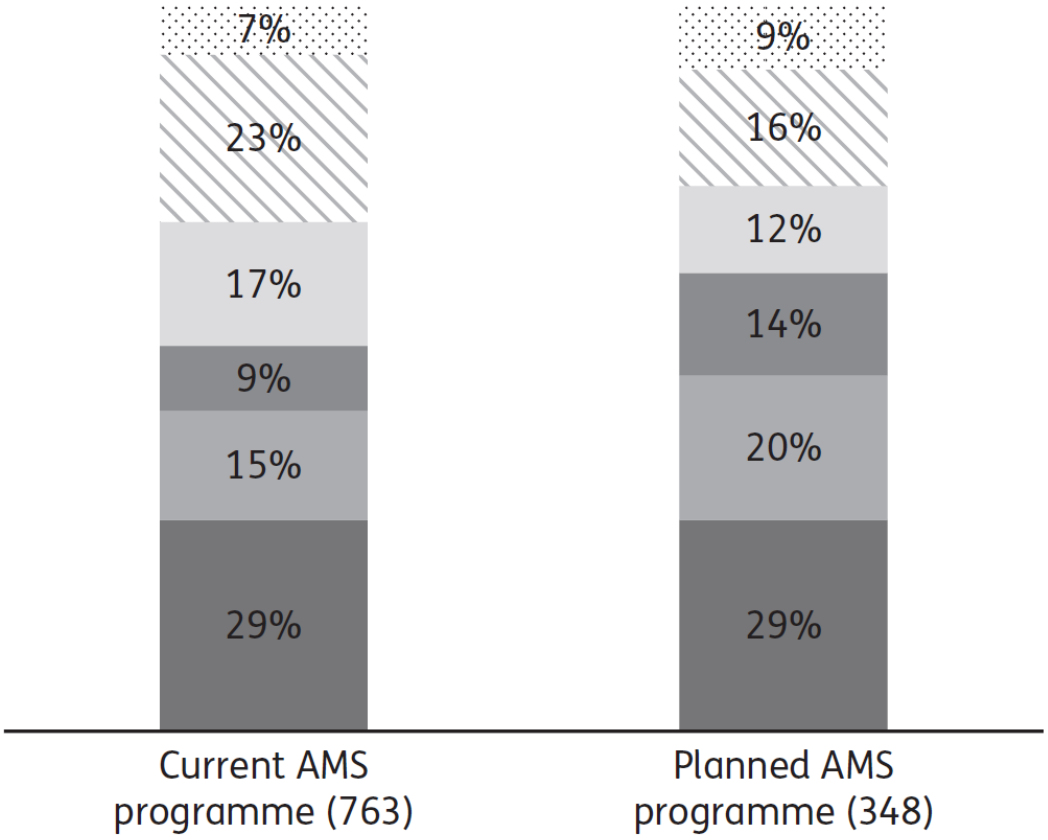
Activity - documentation - reporting

		A	B	C	D	E
Blood cultures	Activity					
	Documentation					
Restricted	Activity					
agents	Documentation					
IV-oral switch	Activity					
	Documentation					
TDM	Activity					
	Documentation					
SAB bedside	Activity					
consultation	Documentation					

Activity - documentation - reporting

		A	B	C	D	E
Blood cultures	Activity					
	Reporting					
Restricted	Activity					
agents	Reporting					
IV-oral switch	Activity					
	Reporting					
TDM	Activity					
	Reporting					
SAB bedside	Activity					
consultation	Reporting					

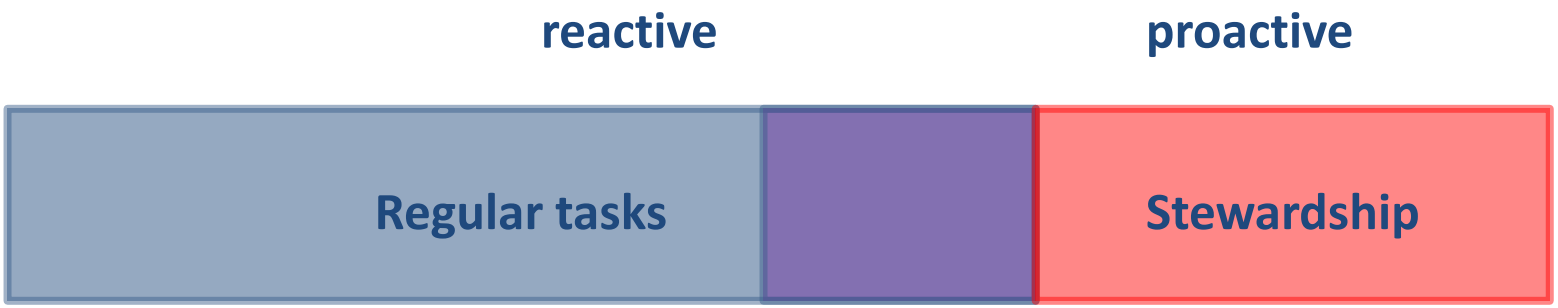
Barriers for implementation



Howard P J Antimicrob Chemother 2015

Stewardship

- Structural program
- Quality cycle
- Measuring - documentation - reporting



International Journal for Quality in Health Care 2004; **Volume 16, Number 5**: pp. 367–373 10.1093/intqhc/m

Practice variation in perioperative antibiotic use in Japan

MIHO SEKIMOTO, YUICHI IMANAKA, EDWARD EVANS, TATSURO ISHIZAKI, MASAHIRO HIROSE, KENSHI HAYASHIDA AND TSUGUYA FUKUI[1]

Our study has several limitations that must be acknowledged. Firstly, our study measured physicians' attitudes toward antimicrobial prophylaxis rather than their behaviors. A social desirability bias may have induced the physicians to report the practices they think they should perform rather than those they actually do. However, even if such a bias existed,

Audit – guidelines?

- German- Austrian:

Point prevalence surveys should be conducted for systematic quantitative and qualitative assessment of antiinfective use, and, if required should be reevaluated short-term (**A**). Antiinfective use data are collected at the patient level which allows to assess prescribing quality based on indication and type of infection, and to recognise the need for targeted ABS strategies. Access to patient-level data ought to be guaranteed.

Audit – guidelines?

- UK:

Consider including the following in an antimicrobial stewardship programme:

- monitoring and evaluating antimicrobial prescribing and how this relates to local resistance patterns
- integrating audit into existing quality improvement programmes.

- Dutch:
  About focus, not about measuring per se

NICE 2016; SWAB 2017

XXII. What Measures Best Reflect the Impact of Interventions to Improve Antibiotic Use and Clinical Outcomes in Patients With Specific Infectious Diseases Syndromes?

Recommendation

23. Measures that consider the goals and size of the syndrome-specific intervention should be used *(good practice recommendation)*.

Table 3. Possible Metrics for Evaluation of Interventions to Improve Antibiotic Use and Clinical Outcomes in Patients With Specific Infectious Diseases Syndromes

Process Measures	Outcome Measures
Excess days of therapy (ie, unnecessary days of therapy avoided based on accepted targets and benchmarks)[a]	Hospital length of stay
Duration of therapy	30-day mortality
Proportion of patients compliant with facility-based guideline or treatment algorithm[a]	Unplanned hospital readmission within 30 d
Proportion of patients with revision of antibiotics based on microbiology data	Proportion of patients diagnosed with hospital-acquired *Clostridium difficile* infection or other adverse event(s) related to antibiotic treatment[a]
Proportion of patients converted to oral therapy	Proportion of patients with clinical failure (eg, need to broaden therapy, recurrence of infection)

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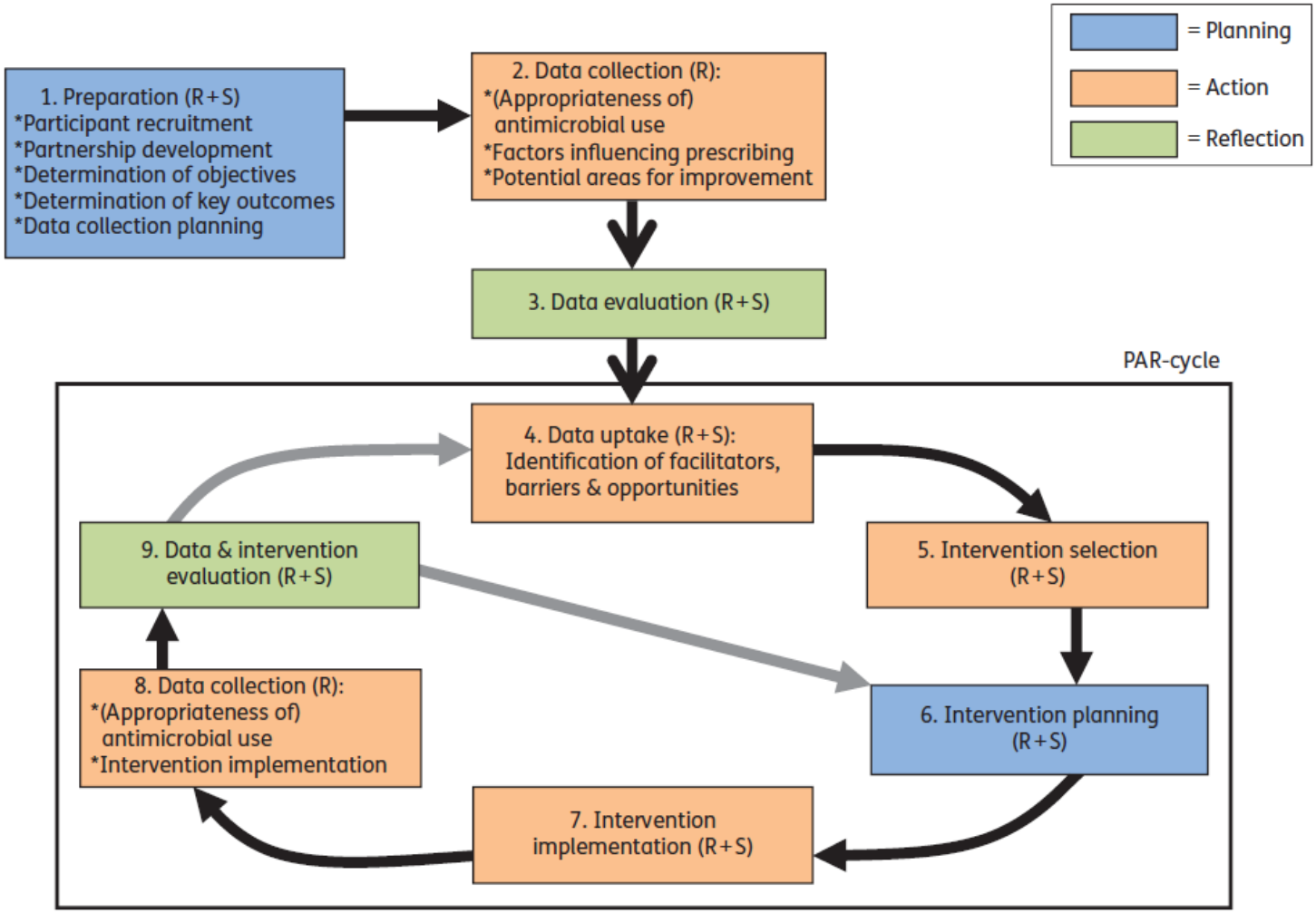
Barlam TF Clin Infect Dis 2016

Prioritize; involvement of prescribers

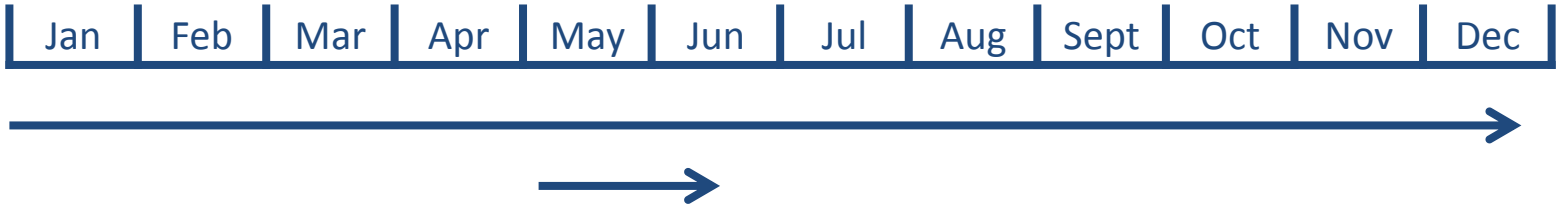


Van Buul LW J Antimicrob Chemother 2014

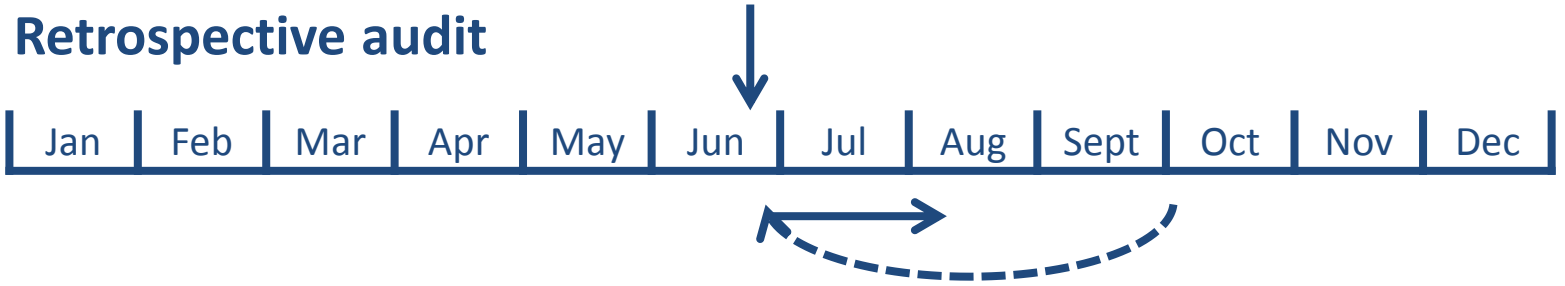
Audit

Cross sectional = point prevalence survey

Continuous = prospective audit



Retrospective audit



Point prevalence survey (PPS)

Table 2. *Univariable and multivariable analysis predicting non-compliance to guidelines*

	Univariable analysis				Multivariable analysis		
	OR	95% CI	P-value		OR	95% CI	P-value
Use of co-amoxiclav	4.47	1.81-11.03	0.001	Use of co-amoxiclav	4.08	1.57-10.56	0.004
Use of meropenem	1.04	0.20-5.29	0.96	Use of meropenem	-	-	-
Use of ciprofloxacin	1.77	0.67-4.68	0.25	Use of ciprofloxacin	-	-	-
Use of piperacillin-tazobactam	3.46	1.23-9.96	0.018	Use of piperacillin- tazobactam	-	-	-
Site of infection (yes vs. no)				Site of infection (yes vs. no)			
SSTBJ	0.92	0.35-2.43	0.87	SSTBJ	-	-	-
RTI	6.56	2.77-15.54	<0.001	RTI	6.17	2.55-14.94	<0.001
CNS	0.61	0.13-2.86	0.53	CNS	-	-	-
UTI	0.81	0.26-2.56	0.73	UTI	-	-	-
IA	1.17	0.30-4.59	0.82	IA	-	-	-

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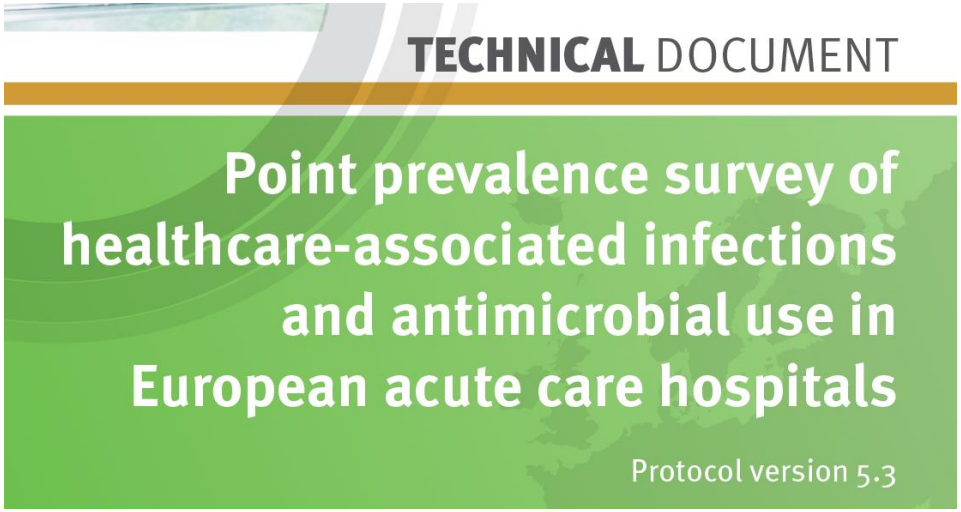
Van Spreuwel PC Neth J Med 2015

Point prevalence survey

- National initiatives
- ECDC: technical document on PPS
  https://ecdc.europa.eu/en/healthcare-associated-infections-acute-care-hospitals



- Global PPS
  www.global-pps.com

Repeated PPS – prophylaxis outside OR

Table 1 Antimicrobial prescriptions per point prevalence survey

	Total number of prescriptions	Prophylactic prescriptions (%)	Medical prophylaxis (%)	Medical intervention prophylaxis (%)	Surgical prophylaxis[a] (%)	Antibiotic prescriptions	Antiviral prescriptions	Antifungal prescriptions
PPS1	229	60 (26.2%)	40 (17.5%)	5 (2.2%)	15 (6.8%)	188	21	20
PPS2	261	80 (30.7%)	67 (25.7%)	4 (1.5%)	9 (3.4%)	204	33	24
PPS3	259	81 (31.3%)	62 (23.9%)	5 (1.9%)	14 (5.4%)	210	22	27
PPS4	271	96 (35.4%)	68 (25.1%)	8 (3.0%)	20 (7.4%)	225	20	26
Total	1020	317 (31.1%)	237 (23.2%)	22 (2.2%)	58 (5.7%)	827	96	97

Divided in antibiotic, antiviral and antifungal prescriptions *PPS* point prevalence survey. [a] surgical prophylaxis given on a ward

Table 2 Prophylactic antibiotic prescriptions

	Prescriptions (n)	Presence of protocol (%)	According to protocol (%)	Motivation of non-adherence (%)
Medical prophylaxis (%)	141	125 (88.7%)	118 (94.4%)	1/7 (14.3%)
Medical intervention prophylaxis	22	13 (59.1%)	12 (92.3%)	0/1
Surgical prophylaxis[a]	57	42 (73.7%)	41 (97.6%)	0/1
Total	220	180 (81.8%)	171 (95.0%)	1/9 (11.1%)

[a]Surgical prophylaxis given on a ward

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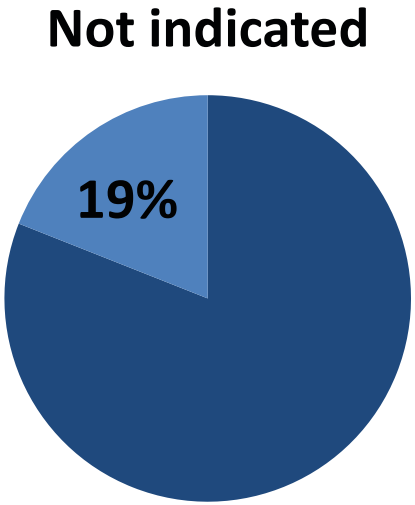
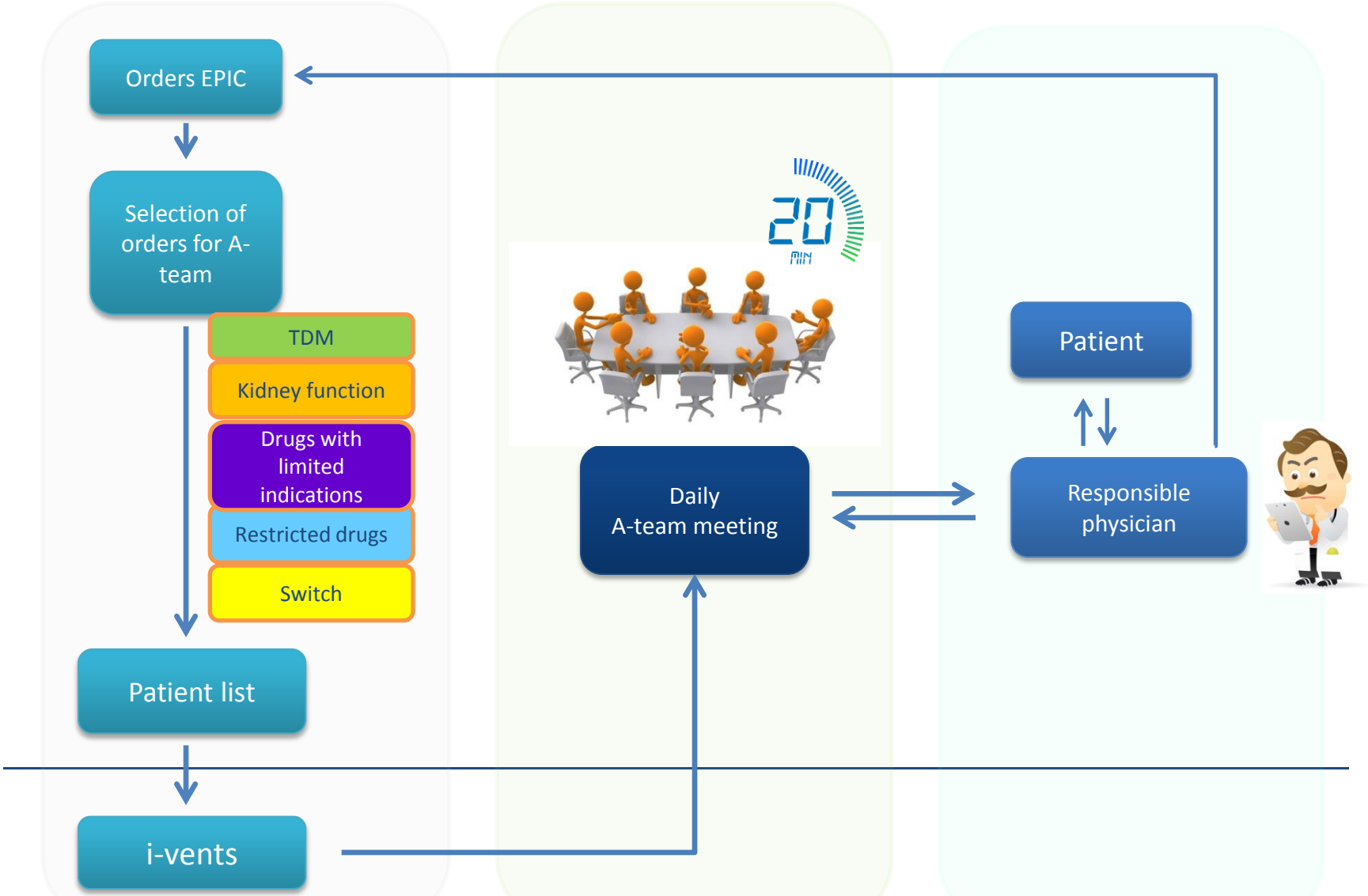
Deelen JWT BMC Infect Dis 2017

Combination with outcomes

- Retrospective selection of patients who received >24 hrs of antibiotics
- Observed for 30 days (ADE) and 90 days (CDI, MDRO)
- 1488 patients included



- 20% of ADEs were attributable to antibiotics prescribed for conditions for which antibiotics were not indicated


Orders EPIC
Selection of orders for A-team
TDM
Kidney function
Drugs with limited indications
Restricted drugs
Switch
Patient list
i-vents
20 MIN
Daily A-team meeting
Patient
Responsible physician

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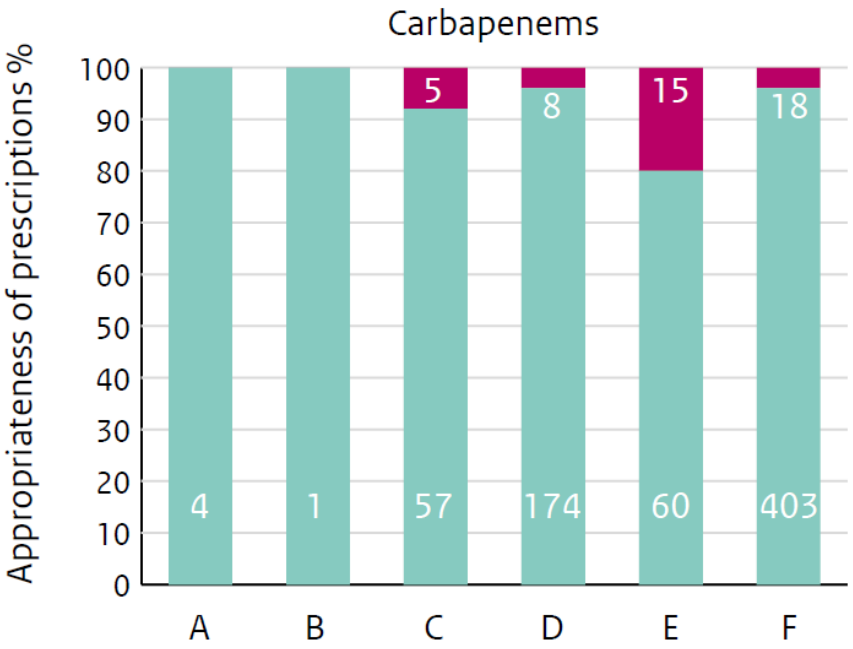
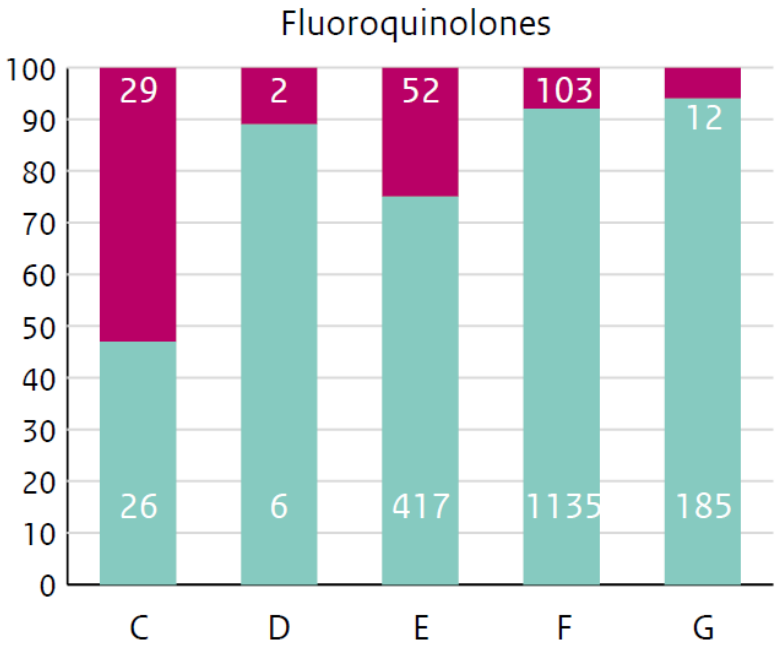
ICT

National pilot: automatic data-extraction + feedback
First results Jan 2018

Data


Carbapenems
Appropriateness of prescriptions %
100
90
80
70
60
50
40
30
20
10
0
4
1
57
5
174
8
60
15
403
18
A
B
C
D
E
F


Fluoroquinolones
100
90
80
70
60
50
40
30
20
10
0
26
29
6
2
417
52
1135
103
185
12
C
D
E
F
G

Interventions

- Preauthorization

versus

- Audit and feedback

Preauthorization	Prospective Audit and Feedback
Advantages	
• Reduces initiation of unnecessary/ inappropriate antibiotics • Optimizes empiric choices and influences downstream use • Prompts review of clinical data/ prior cultures at the time of initiation of therapy • Decreases antibiotic costs, including those due to high-cost agents • Provides mechanism for rapid response to antibiotic shortages • Direct control over antibiotic use	• Can increase visibility of antimicrobial stewardship program and build collegial relationships • More clinical data available for recommendations, enhancing uptake by prescribers • Greater flexibility in timing of recommendations • Can be done on less than daily basis if resources are limited • Provides educational benefit to clinicians • Prescriber autonomy maintained • Can address de-escalation of antibiotics and duration of therapy
Disadvantages	
• Impacts use of restricted agents only • Addresses empiric use to a much greater degree than downstream use • Loss of prescriber autonomy • May delay therapy • Effectiveness depends on skill of approver • Real-time resource intensive • Potential for manipulation of system (eg, presenting request in a biased manner to gain approval) • May simply shift to other antibiotic agents and select for different antibiotic-resistance patterns	• Compliance voluntary • Typically labor-intensive • Success depends on delivery method of feedback to prescribers • Prescribers may be reluctant to change therapy if patient is doing well • Identification of interventions may require information technology support and/or purchase of computerized surveillance systems • May take longer to achieve reductions in targeted antibiotic use

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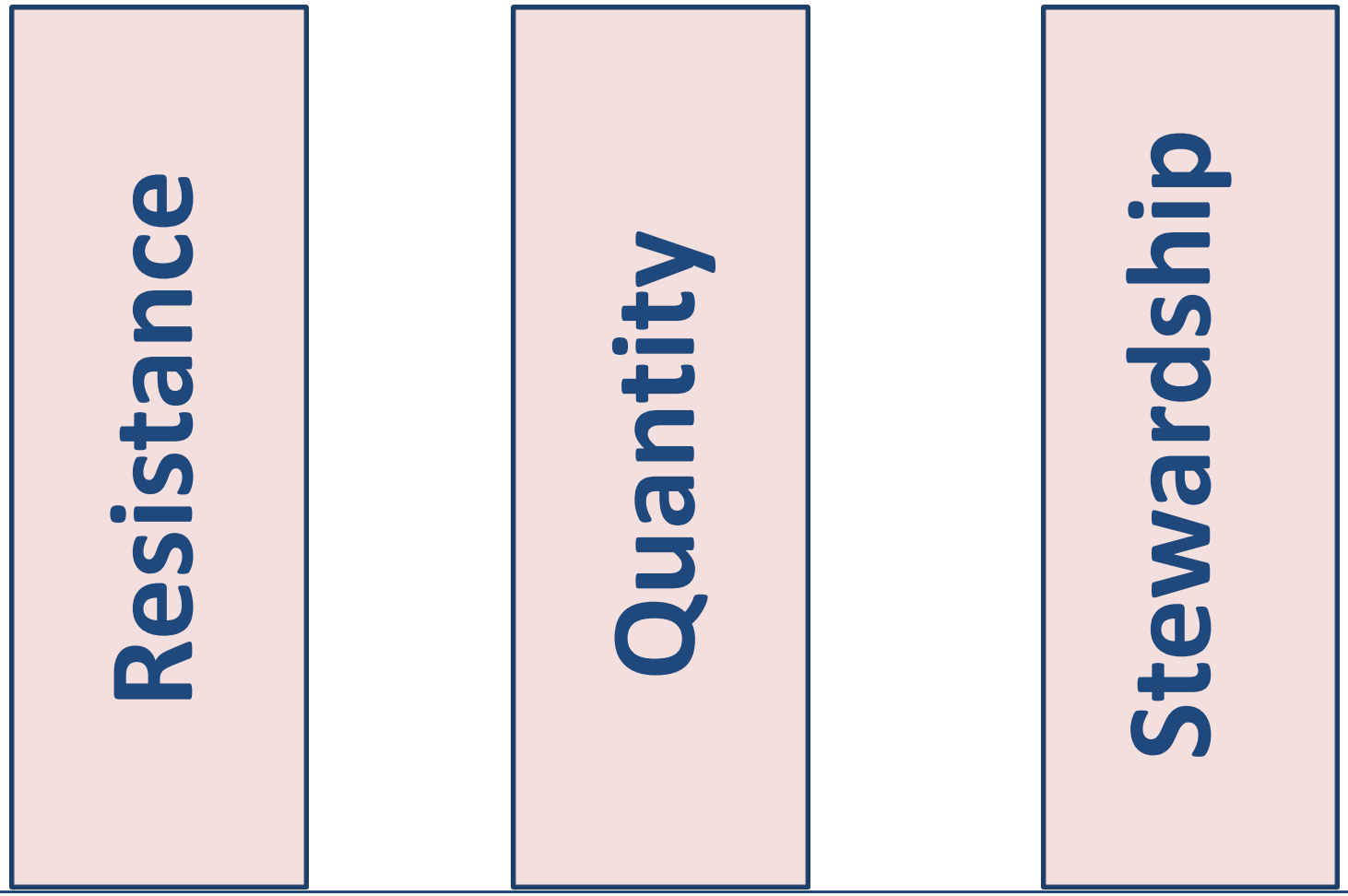
Barlam TF Clin Infect Dis 2016

Summary of audit types

	PPS		Continuous	
	Prospective	Retrospective	Prospective	Retrospective
Evaluation QI	Limited	Limited	Limited-thorough	Limited-thorough
Scale	(small-)large	(small-)large	Small-large	Small-large
Workload	Short, intensive	Less intensive	Large	Large
Feedback	Possible, usually not	impossible	Usually included	Impossible
Availability of data	Available	Depends on documentation	Available	Depends on documentation

NethMap



Conclusion

- Audit is a core element of ASP
- Time consuming
- Prioritize
- Involve all stakeholders
- Involve ICT
- Choose method based on objective: PPS or continuous
- Standardisation

Acknowledgements

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