WHO-ESGAP workshop

“What influences antibiotic prescribing?”

09.00-09.15

Jeroen Schouten

Date: January 26th 2017

Skopje, Macedonia

There is NO magic bullet

NO MAGIC BULLETS: A SYSTEMATIC REVIEW OF 102 TRIALS OF INTERVENTIONS TO IMPROVE PROFESSIONAL PRACTICE

Andrew D. Oxman, MD, MSc; Mary Ann Thomson, BHSc(PT);
David A. Davis, MD; R. Brian Haynes, MD, PhD

Abstract • Résumé

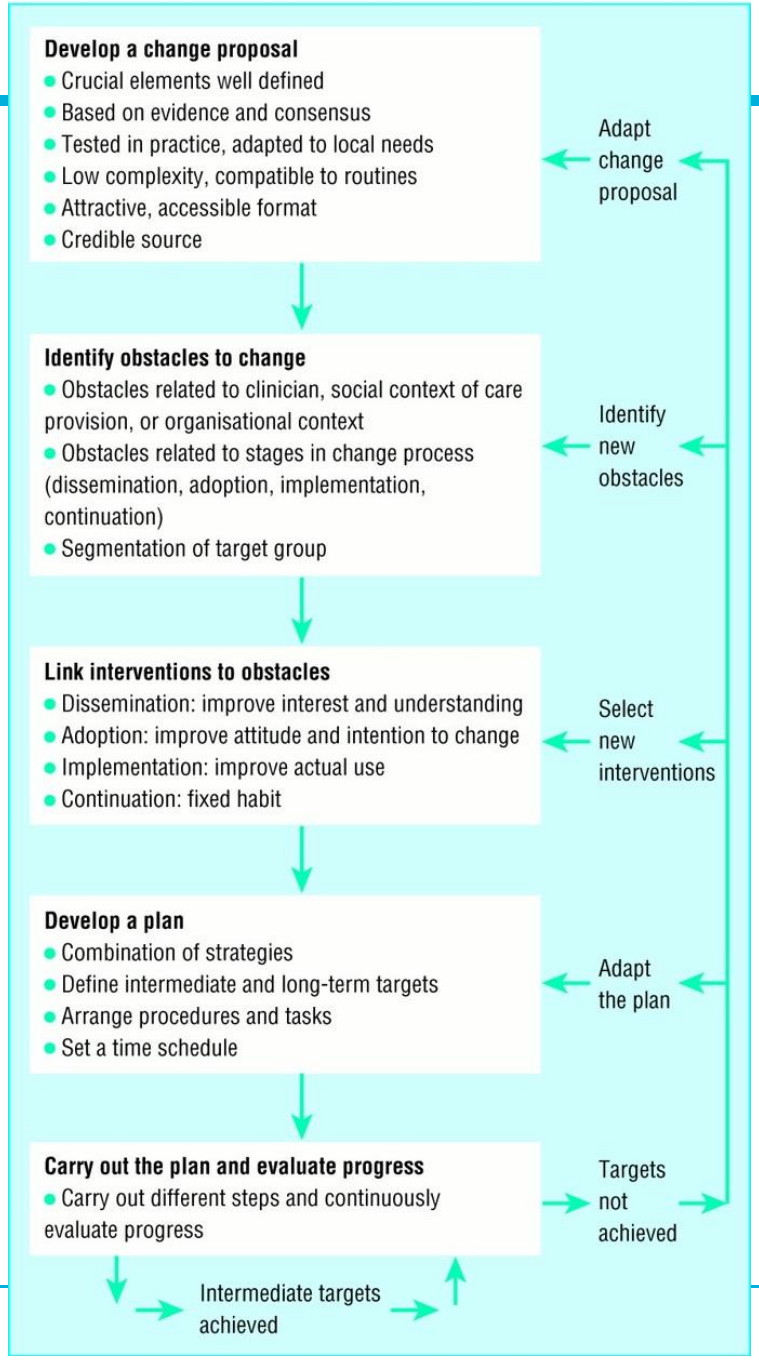
Objective: To determine the effectiveness of different types of interventions in improving health professional performance and health outcomes.

Data sources: MEDLINE, SCISEARCH, CINAHL and the Research and Development Resource Base in CME were searched for trials of educational interventions in the health care professions published between 1970 and 1993 inclusive.

Conclusion: There are no "magic bullets" for improving the quality of health care, but there are a wide range of interventions available that, if used appropriately, could lead to important improvements in professional practice and patient outcomes.

HOW TO SELECT AN IMPROVEMENT STRATEGY THAT RESULTS IN DESIRED CHANGE IN YOUR HOSPITAL/STUDY?

Model for planning change



Grol.
BMJ 1997

Tabak et al.
Am J Prev Med
2012

What influences appropriate prescribing?

- *to be able to design successful interventions one needs:*

  1. *insight in current antibiotic prescribing*
  2. *insight in factors that determine prescribing behaviour*

- *insight can be obtained through*

  1. *qualitative analysis (barrier analysis)*
  2. *quantitative analysis of the variation in prescribing*

Grol & Grimshaw, *Lancet,* 2001

Qualitative analysis

- *interviews and focus groups with healthcare professionals*
- *evaluation of barriers that influence prescribing*

    1. *internal (healthcare professional)*

    2. *external (patient, colleagues, organisation, guideline,…)*

- *each guideline recommendation may have it's own pattern!*

Recommendation	Internal barriers Knowledge	Internal barriers Attitude	External barriers
Prescribing an empirical antibiotic regimen adherent to the guidelines	Lack of familiarity (R/S) "I do not know what the exact content of the guideline is." Lack of insight in one's own behaviour (R/S) "I realize now that I actually never follow our hospital guideline recommendations."	Lack of outcome expectancy (R/M) "I think we are afraid of missing things, afraid to take risks with our own patients by prescribing narrow-spectrum therapy even when the guidelines recommend it." Lack of agreement with the guideline -*Interpretation of evidence* (R/S) "…recent studies show that enterobacteriaceae should be covered by aspiration pneumonia… so penicillin is just not enough…" -*Applicability to patient* (R/S) "I will deliberately deviate from this guideline for a patient with co-morbidities or one who is severely ill on admission." -*Lack of confidence in guideline developer* (S) "Microbiologists (who drew up the antibiotic guidelines) have a fundamentally different view than clinicians…" Inertia of current practice, lack of motivation (S) "I have been treating patients with this non-guideline-adherent antibiotic since medical school and it is always successful…"	Guideline factors (R/S) "The antibiotic booklet is unclear, confusing, poorly presented." Social context -*Social pressure* (R/S) "Everyone feels safe with cefuroxime (broad-spectrum betalactam antibiotic)…colleagues will not quickly criticize you for this choice." "Internists and pulmonologists make different antibiotic choices." Organizational context (S) "You know, you don't see the patient yourself at night; it is often difficult to assess from your bed whether a patient needs broad-spectrum antibiotic therapy…"
Timely initiation of antibiotic therapy	Lack of awareness or insight (S/M) "I assume that antibiotics are always administered immediately, but I am not sure." "Doctors and nurses do not realize how important timely administration of antibiotics is for outcome."	Lack of agreement with guideline -*Applicability to patient* (R/S) "This rule only applies to a patient with CAP who is severely ill." Lack of control of circumstances (R) "Once a patient is admitted to the ward, I am afraid I cannot control the schedule, I cannot guarantee timely administration."	Guideline factors -*Presence of conflicting guidelines* (M/S/N) "Nurses take recommendations of getting blood and sputum cultures *before* first administration of antibiotics very literally, which may cause several hours of delay." -*Guideline characteristics* (R/S/M/N) "There is no clear recommendation on this subject in our guideline."

Quantitative analysis

- *large variation in guideline adherence observed*
- *determinants of variation found at different levels*
    1. *patient (age, co morbidities, …)*
    2. *health professional (specialty, age, …)*
    3. *hospital (teaching, services,…)*
- *multilevel logistic regression analysis*

Community acquired pneumonia

Hospitals	n = 8	n = 59[a]	P	Professionals	n = 68	SD
Mean number of beds, n (SD)	524 (169)	491(286)	0.74[b]	Mean age, years	48	8
Teaching hospital, n (%)	4 (50)	27 (46)	0.82[c]	Gender, % male	84	
Antibiotic committee, n (%)	4 (50)	43 (73)	0.18[c]	Mean years in practice	21	9
Local antibiotic guidelines, n (%)	8 (100)	56 (95)	0.51[c]	Specialty professional, % respiratory care physician	53	
Use of national guidelines in composition process of local policies, n (%)	2 (25)	9 (15)	0.52[c]	Clinical experience, % > 25 CAP patients / year	78	
Routine feedback on pathogen-directed therapy, n (%)	3 (38)	31 (53)	0.43[c]	Member of local antibiotic committee, %	7	
Quality improvement project in past 5 years, n (%)	6 (75)	29 (49)	0.17[c]	Special task in quality improvement projects, %	70	
Pharmacist present at ward rounds discussing antibiotic prescription, n (%)	3 (38)	23 (39)	0.92[c]	Special task in guideline composition, %	32	
Patients	**n = 498**		**SD**	**Patients**	**n = 498**	**SD**
Evaluable patients, n (%)	432 (87)			Sodium mean (mmol/l)	137	4
Excluded patients, n (%)	66 (13)			pH, median	7.44	0.6
Male sex, n (%)	251 (58)			Antibiotic therapy within 30 days, n (%)	139 (32)	
Age, median in years	74		15	Admitted at night or weekend, n (%)	210 (49)	
PSI score > 3 (%)	47			Admission to respiratory unit, n (%)	332 (77)	
Co-morbidity score[d] ≥1 (%)	62			Resident involved in the admission procedure, n (%)	230 (53)	
COPD, n (%)	194 (45)					
Chronic Heart failure, n (%)	154 (35)					
Diabetes Mellitus, n (%)	65 (15)					
Oxygen saturation, % mean	92.3		5			
Temperature, °C mean	38.1		1.1			
Pulse (beats per minute), mean	97		21			

Schouten, *JAC*, 2005

Timely initiation of antibiotic therapy (within 4 hours)	**Odds Ratio (95% CI)**	**P**
Low oxygen saturation on admission	1.11 (1.04-1.19)[b]	0.004
Chronic Obstructive Pulmonary Disease (COPD)	0.51 (0.27-0.96)	0.026
Initiation of antibiotic therapy at the Emergency Department	3.9 (1.96-8.73)	0.001
Explained variance (%)	**31.3**	
Empirical antibiotics according to national guidelines	**Odds Ratio (95% CI)**	**P**
Pleural effusion present on admission	0.27 (0.12-0.65)	0.004
Chronic Obstructive Pulmonary Disease (COPD)	2.40 (1.40-4.08)	0.002
Recent antibiotic therapy in outpatient setting (< 30 days)	0.46 (0.26-0.80)	0.007
Presence of an antibiotic committee	0.27 (0.08-0.90)	0.034
Explained variance (%)	**14.4**	
Adapting dose of antibiotic to renal function	**Odds Ratio (95% CI)**	**P**
Age (patient)	0.55 (0.39-0.68)[c]	<0.0001
Heart failure	0.52 (0.28-0.96)	0.038
Admission to a respiratory care ward	5.13 (2.56-10.23)	<0.0001
Presence of an antibiotic committee	8.82 (1.03-75.88)	0.048
Explained variance (%)	**37.4**	
Switching from iv to oral therapy	**Odds Ratio (95% CI)**	**P**
Clinical experience of treating physician (no. of years)	0.95 (0.92-0.99)	0.042
Explained variance (%)	**34.1**	
Streamlining therapy	**Odds Ratio (95% CI)**	**P**
Presence of a clinical pharmacist at ward meetings	0.24 (0.08-0.72)	0.012
Teaching Hospital	4.14 (1.44–11.96)	0.010
Explained variance (%)	**27.9**	
Taking 2 blood samples for culture	**Odds Ratio (95% CI)**	**P**
Temperature on admission (> 37.5°C or < 36.0°C)	7.75 (4.53-13.23)	<0.0001
Low sodium concentration on admission	1.10 (1.03-1.16)[d]	0.003
Treating physician other than pulmonologist	2.82 (1.30-6.13)	0.009
Explained variance (%)	**27.6**	
Obtaining sputum samples for Gram stain & culture	**Odds Ratio (95% CI)**	**P**
Male sex (patient)	2.15 (1.29-3.56)	.003
Chronic Obstructive Pulmonary Disease (COPD)	1.95 (1.16-3.26)	.012
Recent antibiotic therapy in outpatient setting (< 30 days)	2.16 (1.28-3.64)	.004
Admission to a respiratory care ward	2.35 (1.18-4.59)	.017
Explained variance (%)	**13.9**	

Schouten, *JAC*, 2005

Quantitative analysis

- *can guide choice of an effective intervention strategy*
    - *guideline adherence best in sicker patients*
    - *antibiotic choice strongly determined by recent (<30 days) antibiotic use*
    - *respiratory physicians poor in ordering blood cultures*
- *multifaceted, targeted intervention strategy*

The HOW?

in antibiotic stewardship

- *linking barriers/determinants to effective interventions*
  - *intervention mapping*
  - *based on literature for change theories (EPOC)*
- *multifaceted, specific intervention strategy*

Bartolomew, Health Education Behaviour 1998, http:// EPOC.cochrane.org

The HOW?

in antibiotic stewardship

Link a barrier to an effective intervention

- *lack of knowledge ———> education*
- *routine behaviour ———> reminders*
- *lack of awareness ——-—> feedback*

Bartolomew, Health Education Behaviour 1998,
Ivers, Cochrane Database Syst Rev, 2012

The HOW?

in antibiotic stewardship

Tailor the intervention using behavioural change theories

lack of awareness -> (audit and) feedback

Feedback should be

- *delivered in written and verbal form*
- *by a colleague or supervisor*
- *including explicit targets and an action plan*

Ivers, Cochrane Database Syst Rev, 2012

Discussion

дискусија